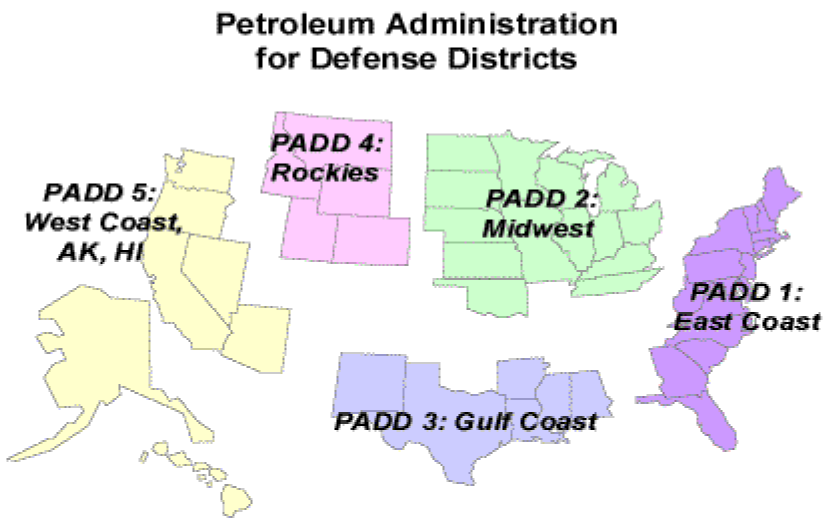
Petroleum Product Prices Module
Short-Term Energy Outlook

Table of Contents

1. Overview

The petroleum products price module of the *Short-Term Energy Outlook* (*STEO*) model is designed to provide U.S. average wholesale and retail price forecasts for motor gasoline, diesel fuel, heating oil, and jet fuel. Motor gasoline regular-grade retail price forecasts are also provided for the 5 Petroleum for Administration Defense Districts (PADDs): East Coast, Midwest, Gulf Coast, Rockies, and West Coast (Figure 1). Motor gasoline consumption shares for each PADD are used to calculate an average U.S. regular gasoline retail price. The price equations use PADD-level inventory forecasts for total motor gasoline and total U.S. inventories for distillate fuel oil and jet fuel.

Figure 1. Petroleum for Administration Defense Districts (PADDs)



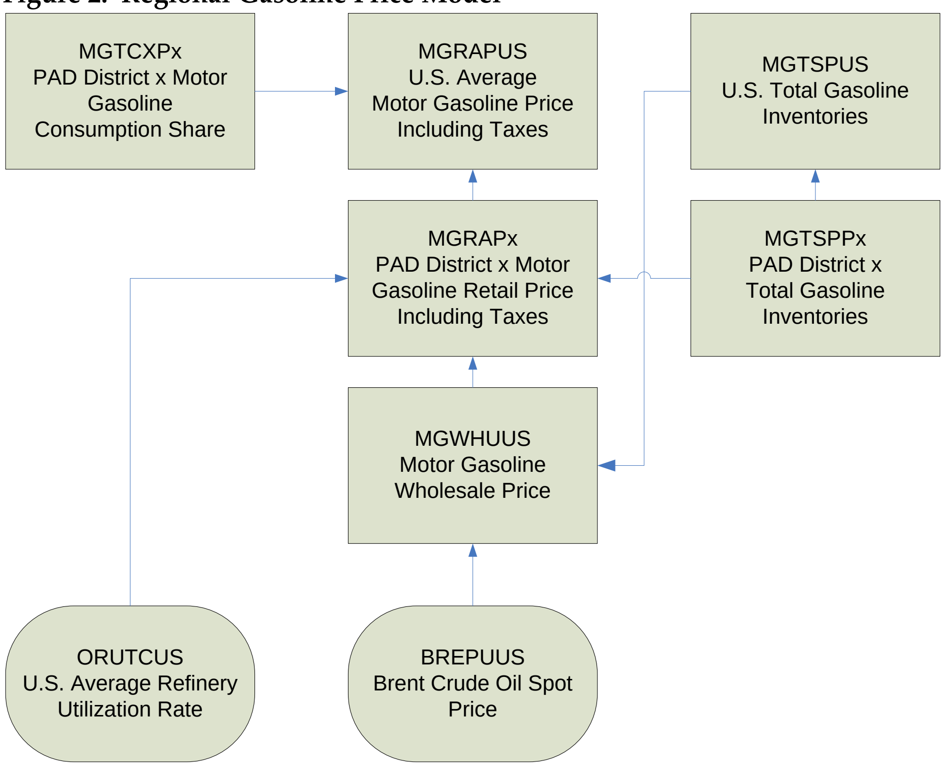
The frequency of the *STEO* model is monthly and the model equations are used to produce monthly forecasts over a 13-to-24 month horizon (every January the *STEO* forecast is extended through December of the following year).

The *STEO* model contains over 2,000 equations, of which about 450 are estimated regression equations. The regression equations are estimated and the forecast models are solved using the IHS EViews Econometric Software. The petroleum product prices module contains 45 equations, of which 29 are estimated regression equations. Some input variables to the *STEO* model are exogenous, coming from other modules in the *STEO* model or forecasts produced by other organizations (e.g., weather forecasts from the National Oceanic and Atmospheric Administration).

Gasoline is sold in different formulations: conventional, reformulated, and different blends with ethanol. There are also several grades of gasoline based on octane content: regular, mid-grade and premium. Retail prices of regular grade gasoline, all formulations, which covers over 80 percent of all motor gasoline sold in the United States, are estimated for the 5 PADDs and the national average. A national average retail price for all types of motor gasoline is also estimated.

Regional motor gasoline retail prices are estimated as a function of the average U.S. motor gasoline wholesale price and regional inventories (Figure 2). Regional motor gasoline prices are aggregated to the U.S. level by weighting regional prices by estimated regional consumption shares. The average U.S. gasoline wholesale price is estimated as a function of the Brent crude oil spot price and total U.S. finished gasoline and gasoline blend component inventories.

Figure 2. Regional Gasoline Price Model



Generalized representations of the gasoline price equations are provided in the following equations. Equation (1) is an identity and equations (2) through (5) are estimated regression equations.

$$P_t^r = \sum_{i=1}^{5} C_{i,t}\, P_{i,t}^r \Big/ \sum_{i=1}^{5} C_{i,t} \ , \qquad (1)$$

$$C_{i,t}^r = f\left(C_{i,\,t-1}^r\right), \qquad i = 1, 2, 3, 4, 5 \qquad (2)$$

$$N_{i,t} - N_{i,\,t-1} = f(N^*_{i,t-1}) \qquad i = 1, 2, 3, 4, 5 \qquad (3)$$

$$P_t^w - P_t^{oil} = f\left(N_{t-1}^*,\ (P_t^{oil} - P_{t-1}^{oil}),\ (P_{t-1}^w - P_{t-1}^{oil})\right) \qquad (4)$$

$$\left(P_{i,t}^r - P_t^w\right) = f\left(U_{i,t},\ \left(P_t^w - P_{t-1}^w\right), \left(P_{i,t-1}^r - P_{t-1}^w\right)\right), \qquad i = 1, 2, 3, 4, 5 \qquad (5)$$

where,

f(.) = general linear function

$C_{i,t}$ = gasoline consumption in PADD *i* during month *t* as a share of total U.S. consumption

$N^*_{i,t}$ = total gasoline inventory in Petroleum Administration for Defense District (PADD) *i* at end-of-month *t*, deviation from previous 3- or 4-year average

N^*_t = total U.S. gasoline inventory at end-of-month *t*, deviation from previous 4-year average

P_t^r = average U.S. gasoline retail price during month *t*

$P_{i,t}^r$ = average gasoline retail price in PADD *i* during month *t*

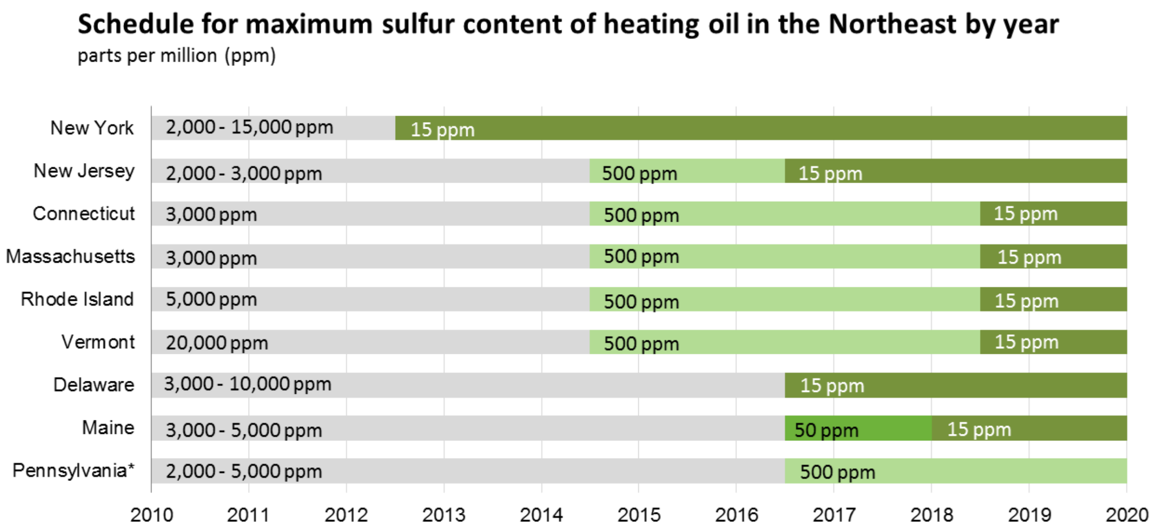
P_t^w = average U.S. gasoline wholesale price during month *t*

P_t^{oil} = average Brent crude oil spot price during month *t*

U_t = average U.S. refinery utilization rate

Distillate fuel includes diesel fuels and fuel oils. Products known as No. 1, No. 2, and No. 4 diesel fuel are used in on-highway diesel engines, such as those in trucks and automobiles, as well as off-highway engines, such as those in railroad locomotives and agricultural machinery. Products known as No. 1, No. 2, and No. 4 fuel oils are used primarily for space heating and electric power generation. Distillate fuel is also distinguished by sulfur levels. Diesel fuel is primarily sold as ultra-low sulfur diesel (ULSD), which contains a maximum 15 parts per million (ppm) sulfur. ULSD accounted for about 92% of U.S. total distillate consumption in 2013. Fuel oil, commonly referred to as heating oil, has different sulfur specifications depending on the State in which the fuel is sold (Figure 3).

Figure 3. Heating oil sulfur specifications in Northeast States.



Note: Specifications change on July 1 of the years shown, with the exception of Maine's 15 ppm requirement, which changes on January 1, 2018.

* Philadelphia, Pennsylvania changes from 2,000 ppm to 15 ppm on July 1, 2015.

The petroleum product prices module includes average U.S. diesel fuel and heating oil wholesale prices (refiner prices for resale) and average U.S. diesel fuel and heating oil retail prices.

Jet fuel is a refined petroleum product used in jet aircraft engines. There are two general types of jet fuel: naphtha-type jet fuel and kerosene-type jet fuel. The use of naphtha-type jet fuel, which has a distillation range similar to that of motor gasoline, was phased out in the early 1990s. The petroleum product prices module includes only a jet fuel price charged by refiners to end users.

2. Data sources

The monthly price and volume data used in the petroleum product prices module, with the exception of the heating oil retail price, appear in three EIA publications: the *Petroleum Supply Monthly* (*PSM*), *Petroleum Marketing Monthly* (*PMM*), and *Weekly Petroleum Status Report* (*WPSR).*

The *PSM* includes monthly volume data from surveys of primary suppliers such as refineries, pipelines, and bulk terminals. Regional monthly gasoline consumption and end-of-month inventories are reported in the *PSM*. Weekly regional inventories reported in the *WPSR* are used for the two most recent months where monthly data are not yet available.

The *PMM* reports monthly average U.S. wholesale prices (refiner price for resale) motor gasoline, number 2 diesel fuel, and number 2 fuel oil, and the refiner price to end users for kerosene-type jet fuel.

The *WPSR* reports PADD-level gasoline and diesel fuel retail prices (including taxes) and daily Brent crude oil spot prices. Monthly average gasoline and diesel retail prices are calculated as simple averages of the weekly prices

The national average heating oil retail price is obtained from the Bureau of Labor Statistic's monthly consumer price survey.

3. Variable naming convention

Over 2000 variables are used in the *STEO* model for estimation, simulation and report writing. Most of these variables follow a similar naming convention. The following table shows an example of this convention using PADD 1 regular gasoline retail price:

Characters	MG	RA	R	P1
Positions	1 and 2	3 and 4	5	6 and 7
Identity	Type of energy	Energy activity or consumption end-use sector	Type of data	Geographic area or special equation factor

In this example, MGRARP1 is the identifying code for motor gasoline (MG) regular grade (RA) in retail pricing units (R) in PADD1 (P1).

Some examples of the identifiers used in this naming convention are:

Type of energy categories:

D2 = heating oil
DF = distillate fuel
DS = diesel fuel
JF = jet fuel
MB = motor gasoline blending components
MG = finished motor gasoline
MT = total motor gasoline

Energy activity or consumption end-use sectors:

PS = petroleum stocks
RA = retail sales
TC = total consumption
WH = wholesale sales

Type of data:

P = data in physical units
R = retail price (including taxes) per physical unit
X = share or ratio expressed as a fraction
U = price per physical unit

The physical units for petroleum data series represented by a "P" in the fifth character are in million barrels (stocks) or million barrels per day (flows). The pricing units for petroleum data are dollars per barrel for crude oil and cents per gallon for petroleum products.

Geographic identification or special equation factor:

US = United States
P1 = Petroleum Administration for Defense District 1 (East Coast)
P2 = Petroleum Administration for Defense District 2 (Midwest)
P3 = Petroleum Administration for Defense District 3 (Gulf Coast)
P4 = Petroleum Administration for Defense District 4 (Mountain)
P5 = Petroleum Administration for Defense District 5 (Pacific)

Most regression equations include monthly dummy variables to capture the normal seasonality in the data series. For example, JAN equals 1 for every January in the time series and is equal to 0 in every other month.

Dummy variables for specific months may also be included in regression equations because the observed data may be outliers because of infrequent and unpredictable events such as hurricanes, survey error, or other factors. Generally, dummy variables are introduced when the absolute value of the estimated regression error is more than 2 times the standard error of the regression (the standard error of the regression is a summary measure based on the estimated variance of the residuals). No attempt was made to identify the market or survey factors that may have contributed to the identified outliers.

Dummy variables for specific months are generally designated Dyymm, where yy = the last two digits of the year and mm = the number of the month (from "01" for January to "12" for December). Thus, a monthly dummy variable for March 2002 would be D0203 (i.e., D0203 = 1 if March 2002, = 0 otherwise).

Dummy variables for specific years are designated Dyy, where yy = the last two digits of the year. Thus, a dummy variable for all months of 2002 would be D02 (i.e., D02= 1 if January through December 2002, 0 otherwise). A dummy variable might also be included in an equation to show a structural shift in the relationship between two time periods. Generally, these type of shifts are modeled using dummy variables designated DxxON, where xx = the last two digits of the years at the beginning of the latter shift period. For example, D03ON = 1 for January 2003 and all months after that date, = 0 for all months prior to 2003.

4. Motor gasoline prices

The motor gasoline price model begins with an estimate of the U.S. average motor gasoline wholesale price. This U.S. average wholesale price is used as a proxy for the motor gasoline spot price to each region. Retail motor gasoline prices including taxes are modeled as a function of the wholesale price and regional inventories.

Unit roots were found in every price time series. The price series were transformed to stationary series by calculating price spreads. The left-hand side (dependent) variable in the motor gasoline wholesale price equation is the difference between the average U.S. motor gasoline wholesale price and the Brent crude oil spot price (in cents per gallon). For regional retail prices the dependent variable is the difference between the PADD regular gasoline retail price and the U.S. average motor gasoline wholesale price.

A. Motor gasoline wholesale price

Since motor gasoline is a product of crude oil refining, we assume the wholesale price is directly related to the marginal cost of crude oil. There are many measures of crude oil prices because of the many different grades of crude oil. The Brent crude oil spot price was selected as the crude oil price that is most strongly related to motor gasoline wholesale prices (see EIA, What Drives U.S. Gasoline Prices?, October 30, 2014).

The price difference between the average U.S. motor gasoline wholesale price and the average cost of crude oil (converted from dollars per barrel to cents per gallon) is estimated as a function of the change in the cost of crude oil, inventory deviation from the previous 4-year average, a trend variable, and a lagged dependent variable (equation 6).

$$\begin{aligned}(\text{MGWHUUS} - 100 * \text{BREPUUS} / 42) = {} & a_0 + a_1 (\text{BREPUUS} - \text{BREPUUS(-1)} \\ & + a_2 * [\text{MGTSPUS(-1)} - \text{MGTSPUS*}] \\ & + a_3 * \text{@TREND(2003:12)} \\ & + a_4 * (\text{MGWHUUS(-1)} - 100 * \text{BREPUUS(-1)}/42)\end{aligned} \quad (6)$$

where,

MGWHUUS = average U.S. motor gasoline wholesale price, cents per gallon
BREPUUS = Brent crude oil spot price average, dollars per barrel

MGTSPUS = U.S. total gasoline end-of-month inventory, million barrels
MGTSPUS* = prior 4-year average, [MGTSPUS(-13) + MGTSPUS(-25)+ MGTSPUS(-37)+MGTSPUS(-49)]/4, million barrels
TREND(2003:12) = trend variable that starts at 1 in January 2004 and increases by 1 each month

The change in the Brent crude oil spot price average from the previous month is expected to feed forward to motor gasoline wholesale prices, possibly with a short lag. The estimated coefficient was negative and statistically significant, which implies that there is a short delay in the full pass through of changes in the crude oil price to the wholesale gasoline price. As the crude oil price increases, the spread between the wholesale gasoline and crude oil price gets smaller.

Higher-than-historical U.S. gasoline inventory levels are expected to lower the gasoline wholesale price relative to the cost of crude oil. The estimated coefficient for the beginning of month (end of prior month) total U.S. motor gasoline inventory as a deviation from the prior 4-year average for that month was negative and statistically significant.

A trend variable is included to capture a gradual weakening in the gasoline wholesale - Brent crude oil price spread. The estimated coefficient indicates the price spread declines by about 0.6 cents per gallon per year.

B. Motor gasoline retail prices including taxes

The model includes regular-grade gasoline retail prices for the five PADDs. The retail margin, the difference between the PADD motor gasoline retail price and the gasoline wholesale price is estimated as a function of the change in the gasoline wholesale price from the prior month, the deviation in regional inventories from their prior 4-year averages, a trend, and a lagged dependent variable (equation 7).

$$\begin{aligned} MGRARP\mathit{x} - MGWHUUS = {} & a_0 + a_1 * (MGWHUUS - MGWHUUS(-1)) \\ & + a_2 * [MGTSPP\mathit{x}(-1) - MGTSPP\mathit{x}^*] \\ & + a_3 * @TREND(2002:12) \\ & + a_4 * (MGRARP\mathit{x}(-1) - MGWHUUS(-1)) \end{aligned} \qquad (7)$$

where,

MGRARPx = motor gasoline retail price including taxes in region x, cents per gallon

MGWHUUS = motor gasoline wholesale price, cents per gallon
MGTSPPx = total motor gasoline end-of-month inventory in PADD x, million barrels
MGTSPPx* = prior 4-year average, [MGPSPPx(-1) + MGPSPPx(-13) + MGPSPPx(-25) + MGPSPPx(-37)]/4, million barrels
TREND(2002:12) = trend variable that starts at 1 in January 2003 and increases by 1 each month

A change in the motor gasoline wholesale price is expected to feed forward to retail prices, possibly with a short lag. The estimated coefficients on the wholesale gasoline price change variable were negative and statistically significant in all PADD equations.

PADD-level total gasoline inventories are included in the regular gasoline retail price equations. Inventories are entered as the difference in beginning-of-month stocks from the prior four-year average. The estimated coefficients on inventories are negative as expected in all PADDs, and were statistically significant in all regions except the Gulf Coast (PADD3). The estimated coefficient on the stock deviation from average was largest on the West Coast (PADD 5), which is dominated by the California market. California has motor gasoline product quality requirements to reduce emissions that are stricter than the Federal regulations as well as somewhat more costly to produce. These requirements, while improving air quality, create a tight supply situation that is vulnerable to price volatility if a refinery or pipeline has unscheduled disruptions. The result is often a more expensive gasoline.

A trend variable is included to capture trends in the gasoline wholesale-retail price spreads, such as from increases in local and State taxes. The trend variables were positive as expected in all PADDs, and statistically significant in all regions except the Gulf Coast (PADD3).

C. Retail motor gasoline retail price, all types

The regional motor gasoline retail prices are for regular-grade gasoline only, which makes up about 80 percent of the total motor gasoline market. Premium and mid-grade gasoline make up the remainder. The difference between the average price for all types of gasoline and regular-grade gasoline has been fairly consistent, although growing slightly, over the last several years. The difference between the U.S. average price for all types of gasoline and regular-grade gasoline is estimated as a function of the gasoline price level, a trend variable, and a lagged dependent variable (equation 8):

$$MGEIAUS - MGRARUS = a_0 + a_1 * MGRARUS + a_1 * @TREND(2008:12) + a_2 * (MGEIAUS(-1) - MGRARUS(-1)) \quad (8)$$

where,

MGEIAUS = motor gasoline retail price, average all types, for the U.S., cents per gallon

MGRARUS = motor gasoline regular grade retail price including taxes, U.S. average, cents per gallon

TREND(2008:12) = trend variable that starts at 1 in January 2009 and increases by 1 each month

The regular gasoline price level is included to capture a possible relationship between the price level and the price spread. The estimated coefficient was negative but not statistically significant. The estimated coefficient on the trend variable suggests the price spread has been increasing by about 0.14 cents/gallon per year.

D. Motor gasoline consumption shares

Regional consumption volumes are needed to weight regional regular gasoline retail prices in the calculation of quarterly and annual averages and a U.S. average price. The regional consumption share is calculated as total regional consumption divided by total U.S. consumption.

The PADD-level motor gasoline consumption share equations are estimated as linear functions of monthly dummy variables (equation 9). Additional dummy variables may be included in individual equations to control for observed outliers in the data series.

$$MGTCXP\mathit{x} = a_0 + \text{monthly dummy variables} \quad (9)$$

where,

MGTCXP*x* = monthly consumption in PADD*x* as a share of total U.S. consumption,

The error in the calculated average prices is expected to be much smaller than the error in the estimated consumption shares. For example, consider two regions, one with a price of $3.50 and the other with a price of $3.00. Assume actual consumption in the two regions are identical but are each measured with 20 percent error in opposite directions: region A's measured consumption share is 0.6 and region B's is 0.4, rather than 0.5 each. While the errors in the consumption shares are large, the error in the volume-weighted average price is much smaller: $3.30 when consumption is measured with error and $3.25 when consumption shares are correct (a 1.5 percent error).

5. Distillate fuel prices

A. Diesel fuel oil wholesale price

Like motor gasoline, since distillate fuel is a product of crude oil refining we assume the wholesale price is directly related to the marginal cost of crude oil. The Brent crude oil spot price was selected as the crude oil price that is most strongly related to distillate fuel wholesale prices.

The price difference between the average U.S. diesel fuel wholesale price and the crude oil price (converted from dollars per barrel to cents per gallon) is estimated as a function of the change in the cost of crude oil, the difference between current-month consumption and the prior 2-year average for that month, and the difference between beginning-of-month inventories and the prior 4-year average (equation 10).

$$
\begin{aligned}
(DSWHUUS - 100 * BREPUUS / 42) = {} & a_0 + a_1 (BREPUUS - BREPUUS(-1)) \\
& + a_2 * (DFTCPUS - DFTCPUS^*) \\
& + a_3 * (DFPSPUS(-1) - DFPSPUS^*) \\
& + a_4 * (DSWHUUS(-1) - 100 * BREPUUS(-1)/42)
\end{aligned} \qquad (10)
$$

where,

DSWHUUS = average U.S. diesel fuel wholesale price, cents per gallon
BREPUUS = Brent crude oil spot price average, dollars per barrel
DFTCPUS = U.S. Distillate fuel oil product supplied, million barrels per day
DFTCPUS* = prior 2-year average, [DFTSPUS(-12) + DFTSPUS(-24)]/2, million barrels
DFPSPUS = U.S. total distillate fuel end-of-month inventory, million barrels
DFPSPUS* = prior 4-year average, [DFTSPUS(-13) + DFTSPUS(-25)+ DFTSPUS(-37)+DFTSPUS(-49)]/4, million barrels

A change in the crude oil price from the prior month is expected to feed forward to diesel fuel wholesale prices, possibly with a short lag. Including the difference in the change in the crude oil price as an explanatory variable allows for some delay in the price pass through. The estimated coefficient was negative but not statistically significant.

Consumption relative to the previous two years is intended to capture demand shocks that drive up the wholesale price of diesel relative to crude oil. The coefficient was positive, as expected, and statistically significant.

Higher-than-historical beginning-of-month U.S. inventory levels are expected to lower the diesel wholesale price relative to crude oil. The estimated coefficient was negative and statistically significant.

B. Diesel fuel retail price including taxes

The retail margin, the difference between the U.S. average diesel fuel retail price and the diesel fuel wholesale price, is estimated as a function of the diesel fuel wholesale price change and a time trend. The estimating equation for the retail diesel fuel prices is shown in equation (equation 11), which is estimated using ordinary least squares:

$$\begin{aligned} DSRTUUS - DSWHUUS = {} & a_0 + a_1 * (DSWHUUS - DSWHUUS(-1)) \\ & + a_2 * @TREND(2005{:}12) \\ & + a_3 * (DSRTUUS(-1) - DSWHUUS(-1)) \end{aligned} \qquad (11)$$

where,

DSRTUUS = average U.S. diesel fuel retail price including taxes, cents per gallon
DSWHUUS = average U.S. diesel fuel wholesale price, cents per gallon
TREND(2005:12) = trend variable that starts at 1 in January 2006 and increases by 1 each month

A change in the diesel fuel wholesale price is expected to feed forward to retail prices, possibly with a short lag. The estimated coefficient indicates a $0.10 per gallon wholesale price results in a $0.065 increase in the retail price in that month and a smaller increase in the following month(s).

The estimated coefficient on the time trend variable indicates that the retail - wholesale price spread has increased by an average of 2.6 cents per gallon per year.

C. Heating oil wholesale price

The U.S. average heating oil wholesale price is modeled as a function of the average U.S. diesel fuel wholesale price. In general, we expect the heating oil wholesale price to be lower than the diesel wholesale price because of the more relaxed heating oil product specifications, such as sulfur level. However, heating oil wholesale prices can rise above diesel fuel wholesale prices during very cold winter months.

The price difference between the average U.S. heating oil wholesale price and the diesel fuel wholesale price is estimated as a function of the change in the diesel fuel wholesale price, the difference between beginning-of-month inventories and the prior 4-year average, and heating degree day deviations from normal in the Northeast census region (New England and Middle Atlantic census divisions) weighted by the number of households in each division that use heating oil as their primary space heating fuel (equation 12). Over 80% of the households that use heating oil as their primary space heating fuel are located in the Northeast.

$$(D2WHUUS - DSWHUUS) = a_0 + a_1 (DSWHUUS - DSWHUUS(-1)) + a_2 * (DFPSPUS(-1) - DFPSPUS^*) + a_3 * (ZWHD(wtd) - ZWHN(wtd)) / ZSAJQUS \quad (12)$$

where,

D2WHUUS = heating oil wholesale price, cents per gallon
DSWHUUS = diesel fuel wholesale price, cents per gallon
DFPSPUS = heating oil end-of-month total U.S. inventory, million barrels
DFPSPUS* = prior 4-year inventory average, [DFTSPP1(-13) + DFTSPP1(-25) +DFTSPP1(-37)+DFTSPP1(-49)]/4, million barrels
ZWHD(wtd) - ZWHN(wtd) = Heating degree day deviations from normal in the Northeast, heating degree days
ZSAJQUS = number of days in the month

D. Heating oil retail price

The heating oil retail price is estimated as a markup over the heating oil wholesale price. The heating oil retail - wholesale price difference is estimated as a function of the change in the heating oil wholesale price, the difference between beginning-of-month inventories and the prior 4-year average, and Northeast heating degree day deviations from normal (equation 13).

$$(D2RCAUS - D2WHUUS) = a_0 + a_1 * (D2WHUUS - D2WHUUS(-1)) \quad (13)$$

$+ a_2 * (DFPSPUS(-1) – DFPSPUS^*)$
$+ a_2 * (ZWHD(wtd) - ZWHN(wtd)) / ZSAJQUS$

where,

D2RCAUS = heating oil retail price, cents per gallon
D2WHUUS = heating oil wholesale price, cents per gallon
DFPSPP1 = heating oil end-of-month stocks in PADD 1 (East Coast), million barrels
DFPSPP1* = prior 4-year average, [DFTSPP1(-13) + DFTSPP1(-25) +DFTSPP1(-37)+DFTSPP1(-49)]/4, million barrels
ZWHD(wtd) - ZWHN(wtd) = Heating degree day deviations from normal in the Northeast, heating degree days
ZSAJQUS = number of days in the month

6. Jet fuel price

A. Jet fuel refiner price to end users

Jet fuel and diesel fuel are produced at similar distillation ranges within a refinery and jet fuel prices are historically tied to distillate prices. The difference between the average U.S. jet fuel refiner to end user price and the diesel fuel wholesale price is estimated as a function of the change in the diesel fuel wholesale price from the previous month, world real gross domestic product, and a lagged dependent variable (equation 14).

$$\begin{aligned} JKTCUUS - DSWHUUS = {} & a_0 + a_1 * (DSWHUUS - DSWHUUS(-1)) \\ & + a_2 * RGDPQ\_WORLD \\ & + a_3 * JKTCUUS(-1) - DSWHUUS(-1) \end{aligned} \tag{14}$$

where,

JKTCUUS = average U.S. jet fuel refiner to end user price, cents per gallon
DSWHUUS = average U.S. diesel fuel wholesale price, cents per gallon
RGDPQ_WORLD = World real gross domestic product

A change in the diesel fuel wholesale price is expected to feed forward to jet fuel end user prices, possibly with a short lag. Including the difference in the current and prior-month diesel fuel wholesale price as an explanatory variable allows for some delay in the price pass through. The estimated coefficient is negative and statistically significant but is substantively small with about 95% of a change in the diesel fuel wholesale price showing up as a change in the jet fuel wholesale price.

The world real gross domestic product is included as an explanatory variable to capture world economic growth as a proxy for global air travel and jet fuel demand. The estimated coefficient is negative, contrary to expectations, but not statistically significant.

7. Inventories

Inventories are modeled as first difference stock changes rather than as stock levels to make the series stationary. Moreover, stock changes rather than stock levels reflect the balance between supply and demand. Inventory survey data are available only at the primary storage level (refineries, pipelines, and bulk terminals).

A. Gasoline

U.S. total gasoline inventories are typically built up during the winter months, peaking at the end of January or February and reaching their lowest point in August or September when the driving season ends.

Total gasoline inventories include both finished gasoline inventories and gasoline blending component inventories. Total gasoline inventory change by PADD is estimated as a function of the current inventory deviation from the prior 4-year average (equation 15).

$$MGTSPxBLD = a_0 + a_1 * (MGTSPPx(-1) - MGTSPPx^*) \quad (15)$$

where,

MGTSPx_BLD = Total gasoline inventory change (end of current month – end of previous month) in PADD x, million barrels

MGTSPPx = total gasoline end-of-month inventory in PADD x, million barrels

MGTSPPx* = prior 4-year average, [MGTSPPx(-13) + MGTSPPx(-25)+ MGTSPPx(-37)+MGTSPPx(-49)]/4, million barrels

The beginning-of-month (end of prior month) PADD inventory as a deviation from the prior four-year average for that month is included as a right-hand-side variable. Higher-than-historical average beginning inventory levels are expected to be correlated with smaller stock builds or larger stock draws. The four-year average, which is a proxy for the desired level of inventory, generally provided the best model fit compared with shorter and longer averages. The estimated coefficients for all PADDs were negative as expected and statistically significant. For each 1 million barrels the prior end-of-month inventory is above previous 4-year average, the forecast stock change ranges from -0.27 to -0.48 million barrels lower (i.e., smaller stock builds or larger stock draws) for PADDs 5 and 3, respectively

Total gasoline end-of-month inventory in each region is equal the prior month ending inventory plus that month’s stock change (equation 16).

$$MGTSPPx = MGTSPPx(-1) + MGTSPxBLD \quad (16)$$

U.S. total gasoline end-of-month stocks is equal to the sum of the regional stock levels (equation 17).

$$MGTSPUS = MGTSPP1 + MGTSPP2 + MGTSPP3 + MGTSPP4 + MGTSPP5 \quad (17)$$

where,

MGTSPUS = U.S. total gasoline end-of-month inventory, million barrels

Total gasoline U.S. stocks are disaggregated into finished gasoline and gasoline blending components stocks by estimating the blending components' share of total gasoline stocks (equation 18). The blending component share is a positive function of the share of ethanol in finished motor gasoline consumption and trend variables.

$$\begin{aligned} MBPSPUS\_SHR = {} & a_0 + a_1 * EOTCPUS / MGTCPUSX \\ & + a_2 * d08on*@TREND(2007:12) \\ & + a_3 * d11on*@TREND(2010:12) \end{aligned} \quad (18)$$

where,

MBPSPUS_SHR = motor gasoline blending components U.S. end-of-month inventory as share of total gasoline inventory
EOTCPUS = ethanol blended into motor gasoline, million barrels per day
MGTCPUSX = finished motor gasoline consumption, million barrels per day
D08ON*@trend(2007:12) = trend series; 0 before Jan 2008, increasing by 1 each month afterwards
D11ON*@trend(2010:12) = trend series; 0 before Jan 2011, increasing by 1 each month afterwards

Motor gasoline blending component end-of-month U.S. inventory is equal to the blending components' share of total gasoline inventory times the total gasoline end-of-month inventory (equation 19).

$$MBPSPUS = MBPSPUS\_SHR * MGTSPUS \quad (19)$$

where,

MBPSPUS = motor gasoline blending components U.S. end-of-month inventory, million barrels

Finished motor gasoline stocks equal total gasoline inventory less gasoline blending components inventory (equation 20)

$$MGPSPUS = MGTSPUS - MBPSPUS \quad (20)$$

where,

MGPSPUS = finished motor gasoline U.S. end-of-month inventory, million barrels

B. Distillate fuel

U.S. distillate stocks traditionally built during the summer months and were drawn down during the winter months because of the seasonality in heating oil demand. However, in recent years the pattern of distillate stocks has changed as distillate exports have grown and the number of homes using heating oil for space heating have declined. Distillate exports increased from an average of 110,000 barrels per day in 2004 to 1,134,000 barrels per day in 2013 while total U.S. consumption has fallen from 4,058 million barrels per day to 3,827,000 million barrels over day over the same period. The number of households that use heating oil as their primary space heating fuel fell from 9.2 million in 2004 to 6.4 million in 2013. Consequently, it has been difficult to reliably forecast distillate stocks in recent years, particularly in PADDs 1 and 3.

Total distillate inventory change by PADD is estimated as a function of weather deviations from normal and the current inventory deviation from the prior 4-year average (equation 21). Heating degree day (HDD) deviations from normal are at the census division level and PADD-level HDD deviations from normal are estimated by weighting census division HDD by the number of households that use heating oil as their primary space heating fuel in each census division.

$$DFPSPxBLD = a_0 + a_1 * QHFO\_Px * (ZWHD\_Px - ZWHN\_Px) + a_2 * (DFPSPPx(-1) - DFPSPPx^*) \quad (21)$$

where,

DFPSPxBLD = total distillate stock change in PADD x, million barrels

QHFO_Px * (ZWHD_Px - ZWHN_Px) = heating degree day deviations from normal weighted by the number of households that use heating oil as their primary space heating fuel

QHFO_P1 * (ZWHD_P1 - ZWHN_P1) = (qhfo_nec*(zwhd_nec-zwhn_nec) + qhfo_mac*(zwhd_mac-zwhn_mac) + qhfo_sac*(zwhd_sac-zwhn_sac))/(qhfo_nec+qhfo_mac+qhfo_sac)

QHFO_P2 * (ZWHD_P2 - ZWHN_P2) = (qhfo_enc*(zwhd_enc-zwhn_enc) + qhfo_wnc*(zwhd_wnc-zwhn_wnc)) /(qhfo_enc+qhfo_wnc)

QHFO_P3 * (ZWHD_P3 - ZWHN_P3) = (qhfo_esc*(zwhd_esc-zwhn_esc) + qhfo_wsc*(zwhd_wsc-zwhn_wsc)) /(qhfo_esc+qhfo_wsc)

QHFO_P4 * (ZWHD_P4 - ZWHN_P4) = zwhd_mtn - zwhn_mtn

QHFO_P5 * (ZWHD_P5 - ZWHN_P5) = zwhd_pac - zwhn_pac

QHFO_xxx = number of households that use heating oil as their primary space heating fuel in census division xxx.

ZWHD_xxx - ZWHNxxx = total heating degree day deviations from normal in census division xxx.

DFPSPPx* = (dfpsppx(-13)+dfpsppx(-25)+dfpsppx(-37)+dfpsppx(-49))/4

Distillate stocks in PADD 1 (East Coast), which has over 90% of all U.S. households that use heating oil as their primary space heating fuel, typically build in the summer months and are drawn down in the winter months, although the peak inventory over the last 15 years (2000-14) was reached anywhere from August through January. PADD1 also has the largest seasonal swings in inventory with stock builds over the last 15 years ranging from 11.5 million barrels (2011) to 32.5 million barrels (2003). However, the seasonal swings (peak-to-trough) in PADD 1 stocks have gotten somewhat smaller as the number of homes that use heating oil for space heating declined by about 30% between 2002 and 2013. PADD 2 stocks typically fall during the year and reach a low point in October or November with seasonal stock changes averaging about 6 million barrels. The PADD 3 stock pattern has appeared to change over the last 15 years. Seasonal stock highs, which used to occur in late summer, have more recently appeared in January with total seasonal stock changes averaging about 7 million barrels. Distillate stocks in PADDs 4 and 5 are much smaller than those in the other regions with seasonal stock changes average 0.9 million barrels and 2.7 million barrels, respectively.

C. Jet fuel

Jet fuel stocks are only modeled at the national level. Jet fuel stocks typically vary from a low near 38 million barrels to a high of 44 million barrels. However, the peaks and troughs of the inventory cycle do not following a regular seasonal pattern

$$JFPSBLD = a_0 + a_1 * (ZWHDPUS - ZWHNPUS) + a_2 * (JFPSPUS(-1) – JFPSPUS^*) \quad (22)$$

Where,

JFPSBLD = Total jet fuel inventory change (end of current month – end of previous month), million barrels

ZWHDPUS = U.S. population-weighted heating degree days

ZWHNPUS = U.S. population-weighted heating degree days normal

JFPSPUS = jet fuel end-of-month inventory in PADD x, million barrels

JFPSPUS * = prior 4-year average, [JFPSPUS (-13) + JFPSPUS (-25)+ JFPSPUS (-37)+ JFPSPUS (-49)]/4, million barrels

8. Forecast evaluations

In order to evaluate the reliability of the forecasts, we generated out-of-sample forecasts and calculated forecast errors. Each price and inventory equation was estimated over the period January 2001 through June 2012. Dynamic forecasts were then generated for the period July 2012 through June 2014 using each regression equation.

Dynamic forecasts of each equation are forecasts generated using the actual values of the right-hand side variables in the regression equations (e.g., crude oil prices and weather) but simulated values of the lagged dependent variable. Moreover, any dummy variables that capture outliers or shifts in the series during the forecast period are not included in the regression equations. Consequently, the calculated forecast error is not the same as a calculated regression error for an equation that includes all observations.

Summary forecast error statistics are reported for each regression equation. The *Root Mean Squared Error* and the *Mean Absolute Error* depend on the scale of the dependent variable. These are generally used as relative measures to compare forecasts for the same series using different models; the smaller the error, the better the forecasting ability of that model.

The *Mean Absolute Percentage Error* (MAPE) and the *Theil Inequality Coefficient* are invariant to scale. The smaller the values are, the better the model fit. The Theil inequality coefficient always lies between zero and one, where zero indicates a perfect fit. The Theil inequality coefficient is broken out into bias, variance, and covariance proportions, which sum to 1. The bias proportion indicates how far the mean of the forecast is from the mean of the actual series signaling systematic error. The variance proportion indicates how far the variation of the forecast is from the variation of the actual series. This will be high if the actual data fluctuates significantly but the forecast fails to track these variations from the mean. The covariance proportion measures the remaining unsystematic forecasting errors. For a "good" forecast the bias and variance proportions should be small with most of the forecast error concentrated in the covariance proportion.

It should be remembered that these models are not static. They are followed by analysts who can utilize add factors to follow changing trends that would likely be missed by a typical model relying on historical data.

A. Gasoline prices

Figure 4 shows the difference between forecast and actual motor gasoline price spreads for out-of-sample forecasts over the 24-month period, July 2012 through June 2014. The gasoline wholesale - Brent crude oil price actual price spreads realized much greater seasonality than were forecast. Forecast errors (forecast - actual) ranged from -20 cents per gallon (Sep. 2012) to +22 cents per gallon (Nov. 2013). However, over the 24 months the average error in the price spread was only 0.6 cents per gallon (0.2%) where the price spread forecast averaged 25.0 cents per gallon compared with an actual average price spread of 24.4 cents per gallon. These results are consistent with the forecast error statistics (Table 1) where Thiel bias proportion was very close to 0 while the mean absolute error was 11 cents per gallon and the Thiel variance proportion was 0.79. Seasonality in the gasoline - crude oil price spread has varied significantly with very high seasonality in 2006 and 2007 and relatively low seasonality from 2008 through 2011.

Gasoline retail-wholesale price spread forecast errors (Figure 4 and Table 2) are smaller than the wholesale price forecast error. The smallest forecast errors occurred in PADD 3 and the largest errors were observed in PADD 4. The largest bias in the price spread forecasts was in PADD 1 where the average price forecast error over the 24 month forecast period was 3.5 cents per gallon.

Figure 4. Gasoline price spread forecasts versus actual, July 2012 - June 2014.

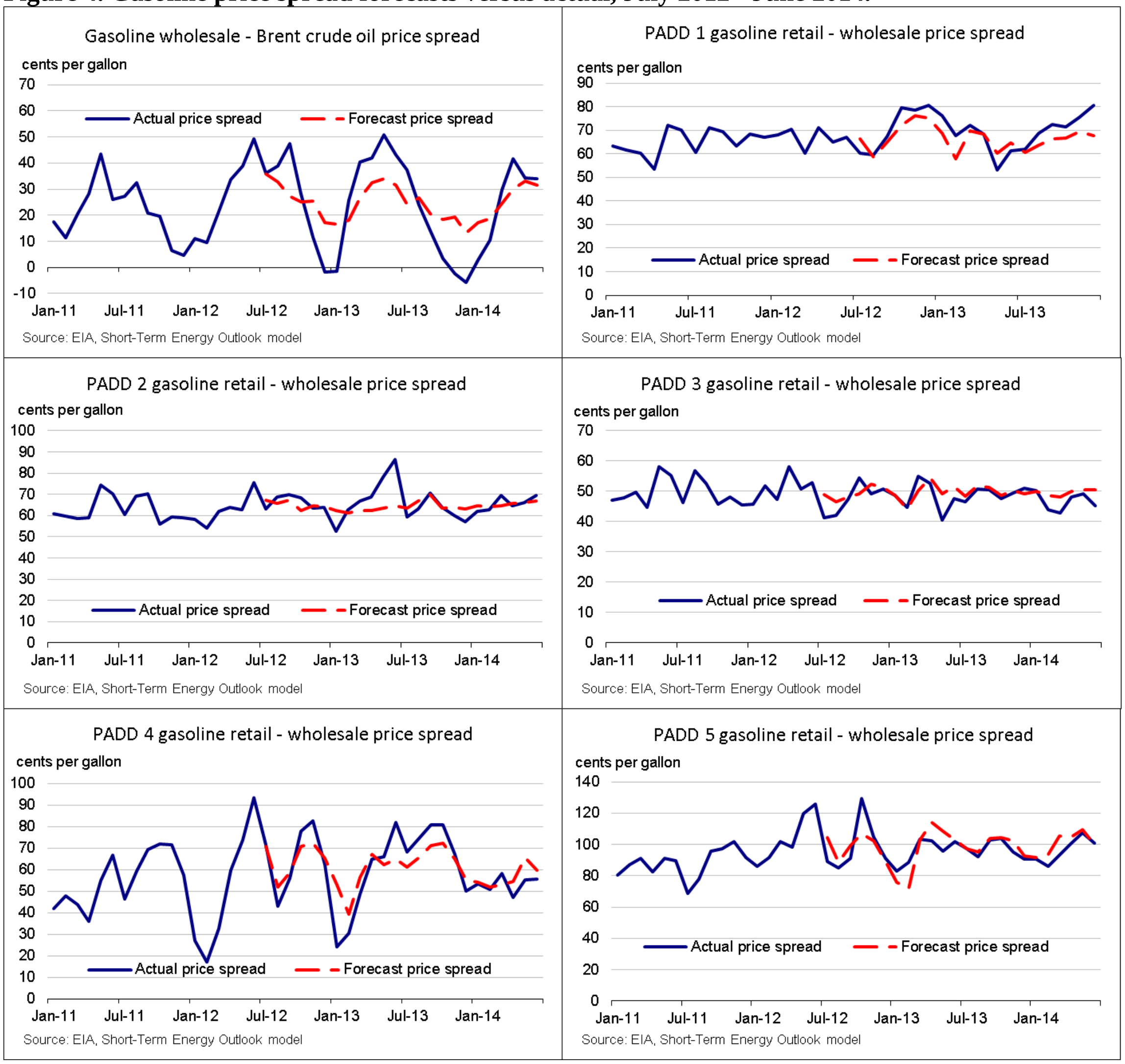


Table 1. Gasoline wholesale (MGWHUUS) price spread out-of-sample simulation error statistics.

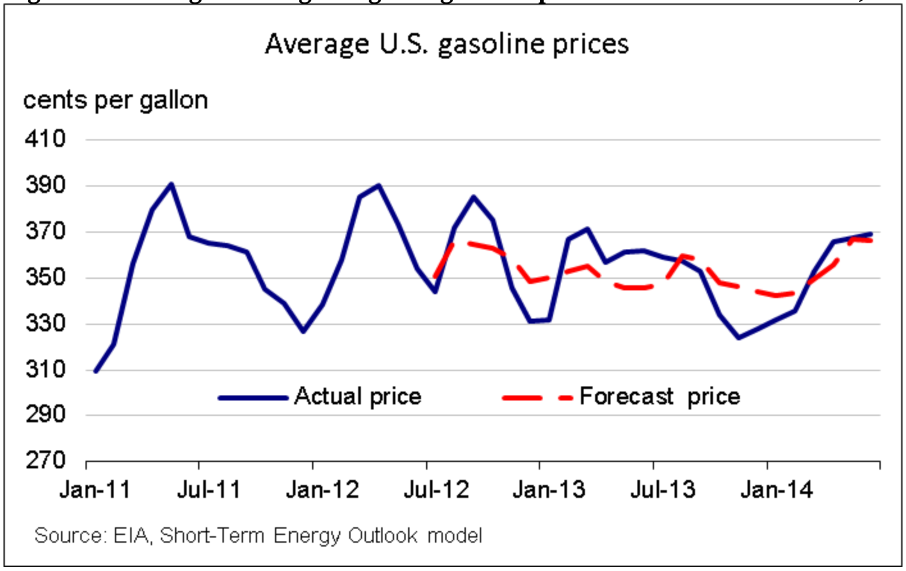
	Wholesale price – Brent crude oil price (refiner margin)
Root Mean Squared Error	12.6
Mean Absolute Error	10.8
Mean Absolute Percentage Error	217
Theil Inequality Coefficient	0.22
Bias Proportion	0.00
Variance Proportion	0.79
Covariance Proportion	0.20
Note: Forecast period = July 2012 – June 2014	

Table 2. Regional gasoline retail price spreads out-of-sample simulation error statistics.

	Gasoline retail price – wholesale price				
	PADD1	PADD2	PADD3	PADD4	PADD5
Root Mean Squared Error	6.05	6.57	3.68	9.35	8.55
Mean Absolute Error	4.92	4.49	2.82	7.21	6.06
Mean Absolute Percentage Error	6.94	6.57	6.17	15.2	6.27
Theil Inequality Coefficient	0.044	0.050	0.038	0.076	0.044
Bias Proportion	0.34	0.04	0.24	0.00	0.04
Variance Proportion	0.20	0.50	0.25	0.62	0.00
Covariance Proportion	0.47	0.46	0.51	0.38	0.96
Note: Forecast period = July 2012 – June 2014					

A forecast average U.S. regular gasoline price was calculated using the forecasted wholesale gasoline-crude oil and retail-wholesale gasoline price spreads and the actual crude oil price. The difference between the forecast and actual average U.S. price generally reflects the forecast error in the wholesale gasoline-crude oil price spread (Figure 5). The mean monthly absolute forecast error in the wholesale gasoline price forecast was 10.8 cents per gallon while the mean monthly absolute forecast error in the average U.S. gasoline price was 11.0 cents per gallon. For both forecasts, the mean error over the 24-month forecast were +0.6 and -0.2 cents per gallon for the wholesale and average U.S. gasoline prices, respectively.

Figure 5. Average U.S. regular-grade gasoline price forecasts versus actual, July 2012 - June 2014.



B. Distillate and jet fuel prices

Figure 6 shows the difference between actual and forecast diesel fuel and heating oil wholesale and retail price spreads. The diesel fuel and heating oil wholesale and retail price spreads show very little bias in the forecasts with the Thiel bias proportion equal to 0.00 for both wholesale price spreads (Table 3) and 0.10 for both retail price spreads (Table 4). The average error (forecast-actual) over the 24-month forecast was +0.3 cents per gallon for both wholesale price spreads. The average error over 24 months was -0.7 cents per gallon for the diesel fuel retail-wholesale price spread and -2.0 cents per gallon for the heating oil retail - wholesale price spread.

The jet fuel retail - diesel fuel wholesale price spread showed more bias in the forecast with the Thiel bias proportion equal to 0.57 (Table 4) and an average forecast error over 24 months of +5.4 cents per gallon. The jet fuel - diesel price spread typically averages close to zero, but diesel fuel wholesale prices have been higher than jet fuel prices for most months since April 2013.

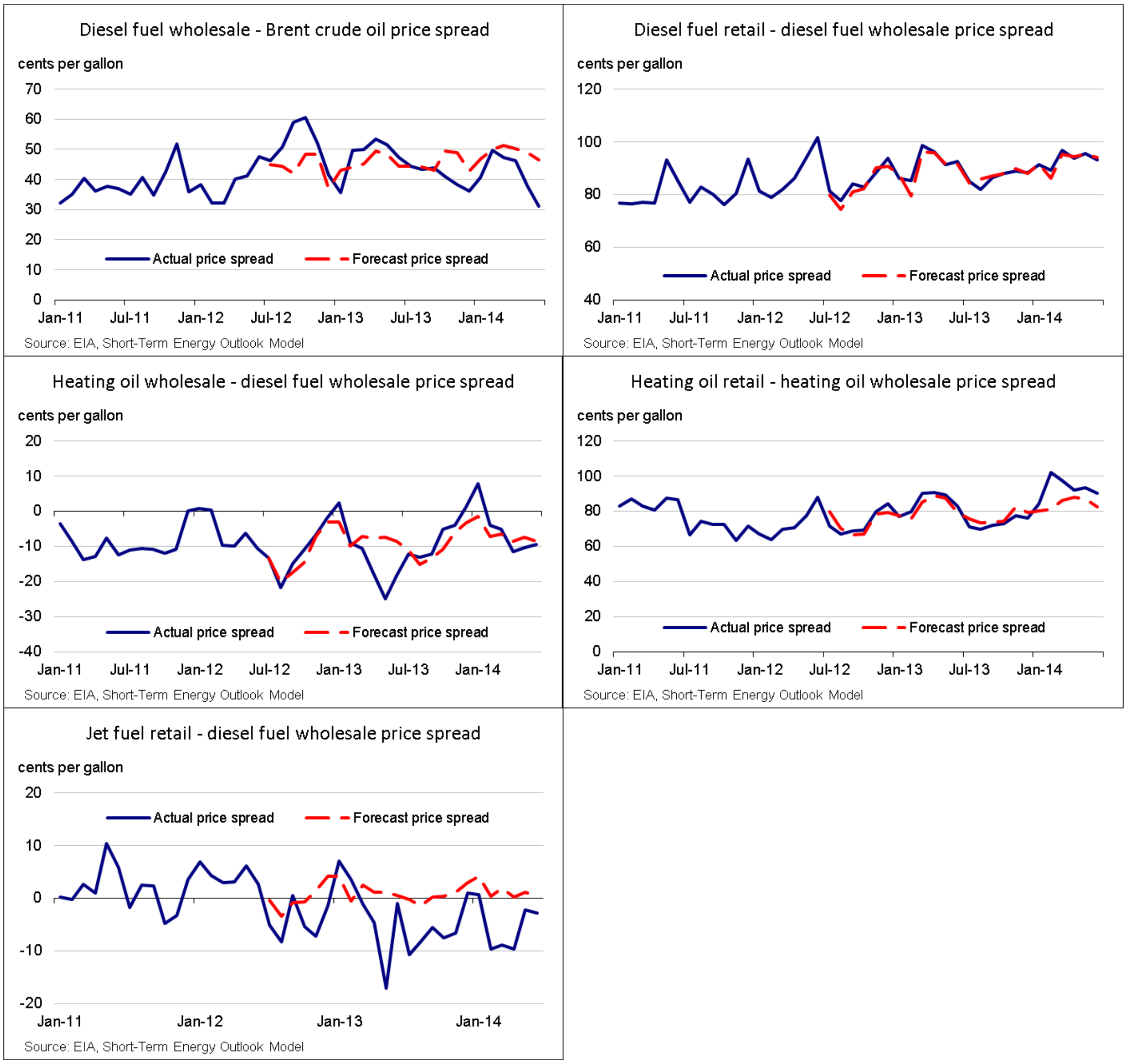
Table 3. Diesel fuel (DSWHUUS) and heating oil (D2WHUUS) wholesale price spreads out-of-sample simulation error statistics.

	Diesel wholesale price – Brent crude oil price spread	Heating oil wholesale - diesel fuel wholesale price spread
Root Mean Squared Error	7.39	5.59
Mean Absolute Error	5.88	3.89
Mean Absolute Percentage Error	13.6	58.9
Theil Inequality Coefficient	0.080	0.25
Bias Proportion	0.00	0.00
Variance Proportion	0.26	0.27
Covariance Proportion	0.73	0.73
Note: Forecast period = July 2012 – June 2014		

Table 4. Diesel fuel (DSRTUUS), heating oil (D2RCAUS), and jet fuel (JKTCUUS) retail price spreads out-of-sample simulation error statistics.

	Retail prices – wholesale price		
	Diesel Fuel	Heating Oil	Jet Fuel
Root Mean Squared Error	2.09	6.28	7.20
Mean Absolute Error	1.57	4.71	6.14
Mean Absolute Percentage Error	1.80	5.57	157
Theil Inequality Coefficient	0.012	0.039	0.81
Bias Proportion	0.10	0.10	0.57
Variance Proportion	0.04	0.34	0.22
Covariance Proportion	0.86	0.55	0.21
Note: Forecast period = July 2012 – June 2014			

Figure 6. Diesel fuel, jet fuel, and heating oil price spread forecasts versus actual, July 2012 - June 2014.



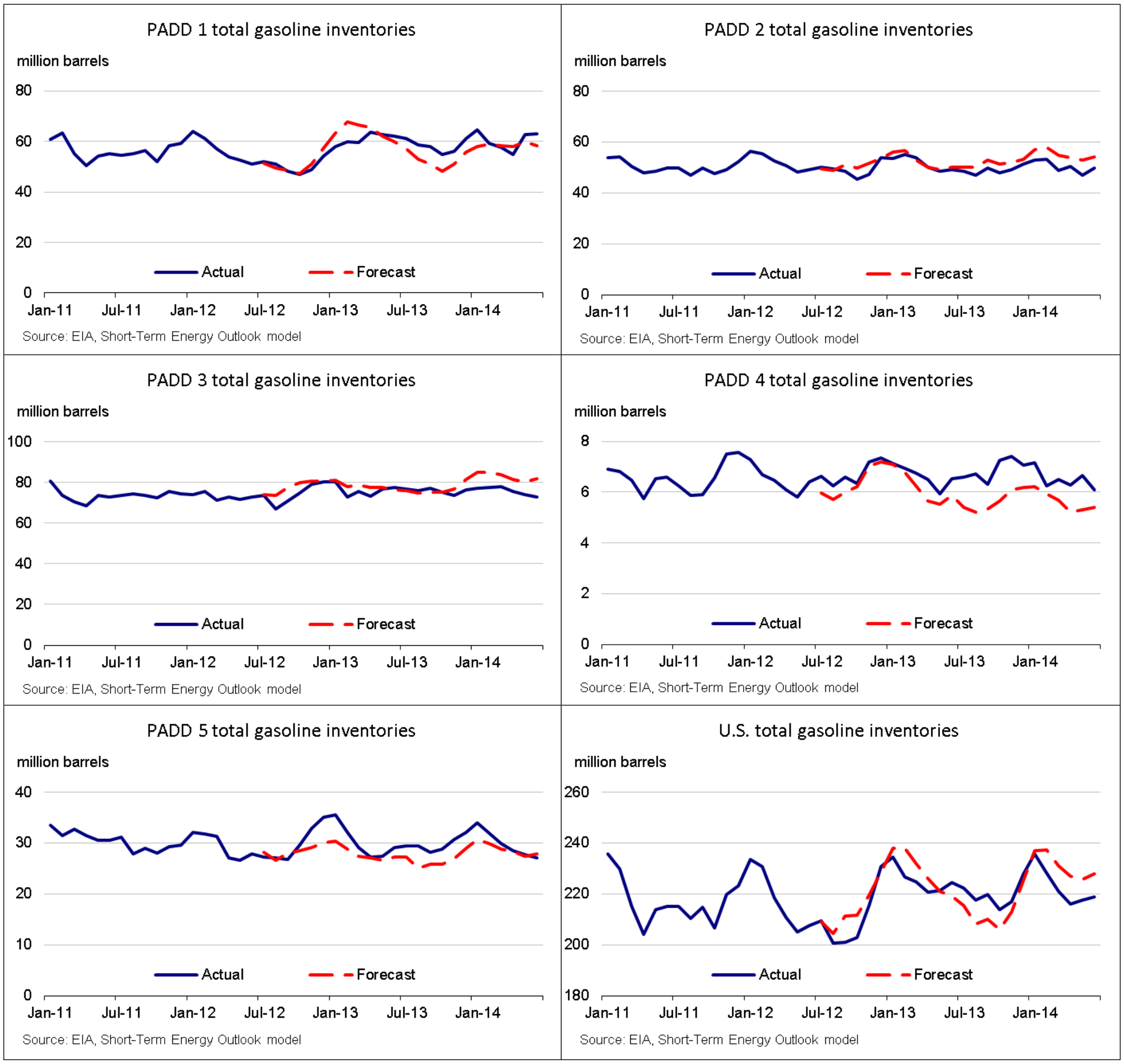
C. Inventories

Figure 7 shows the differences between the forecast and actual total motor gasoline inventories in each PADD and the United States. All inventory forecasts were generated by adding the forecast monthly stock change to the calculated prior month ending inventory.

The average difference between forecast and actual inventories over the 24-month simulation period ranged from -1.9 million barrels in PADD 5 to +3.3 million barrels in PADD 3. PADD 1, however, showed the greatest variation with the forecast ranging from 7.1 million barrels lower than actual in September

2013 to 8.0 million barrels above actual in February 2013. Consequently, the Thiel bias proportions were low in all PADDs while the variance proportion was highest in PADD 1 (Table 5). The U.S. total gasoline inventory forecast, which is the sum of the five regional inventories, averaged 2.3 million barrels above the actual level, ranging from 9.6 million barrels below to 11.1 million barrels above.

Figure 7. Total gasoline inventories out-of-sample forecasts compared with actual, July 2012 – June 2014.



Monthly inventory changes are difficult to forecast where they are affected by unexpected shocks to both supply and demand. Forecast percentage errors are particularly high because the deviations from forecast are compared with stock changes that average close to zero (Table 5).

Table 5. Total gasoline inventory change out-of-sample simulation error statistics.

	PADD1	PADD2	PADD3	PADD4	PADD5
Root Mean Squared Error	2.53	1.83	2.36	0.40	1.35
Mean Absolute Error	1.95	1.40	1.81	0.34	1.15
Mean Absolute Percentage Error	118	125	131	136	237
Theil Inequality Coefficient	0.41	0.46	0.49	0.51	0.48
Bias Proportion	0.01	0.01	0.03	0.01	0.00
Variance Proportion	0.00	0.11	0.21	0.05	0.23
Covariance Proportion	0.99	0.88	0.76	0.95	0.76
Notes: Forecast period = July 2012 – June 2013					

Figure 8 shows the differences between the forecast and actual total distillate inventories in each PADD and the United States. Total U.S. distillate inventories have been difficult to forecast over recent years as inventories levels have swung from a high of 173 million barrels at the end of September 2009 to a low of 113 million barrels at the end of February 2014. Distillate inventory swings in PADDs 1 and 3 are the primary contributors to the wide range in U.S. total inventories. The wide swings in inventory levels may bias the estimated coefficients on the deviation of current inventory levels from the previous four-year averages.

Figure 8. Distillate inventories out-of-sample forecasts compared with actual, July 2012 – June 2014.

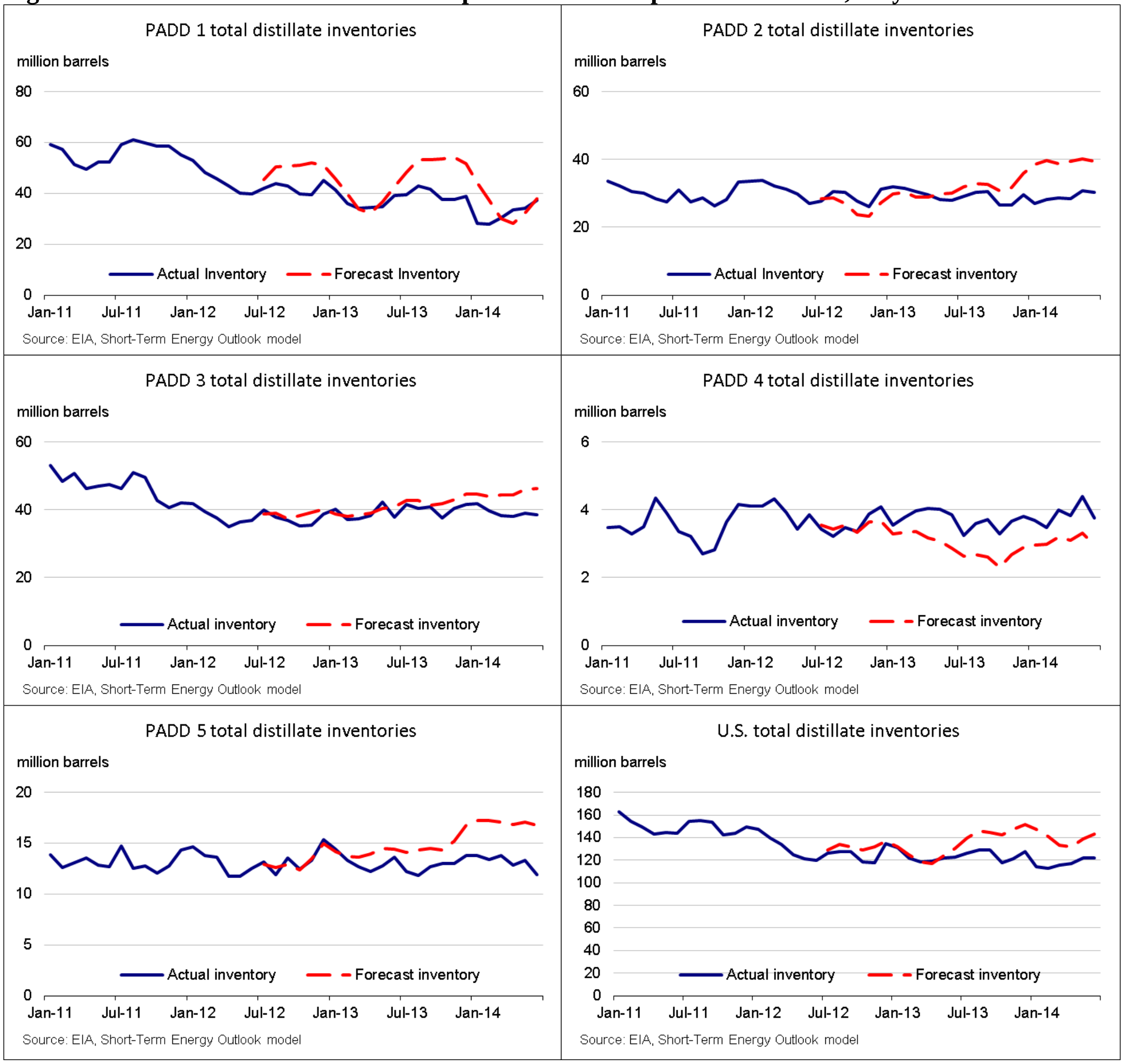


Table 6. Distillate inventory change out-of-sample simulation error statistics.

	PADD1	PADD2	PADD3	PADD4	PADD5
Root Mean Squared Error	3.48	1.37	2.02	0.18	0.78
Mean Absolute Error	2.87	1.14	1.66	0.14	0.67
Mean Absolute Percentage Error	359.64	378.21	166.10	94.91	959.46
Theil Inequality Coefficient	0.50	0.36	0.58	0.31	0.47
Bias Proportion	0.06	0.37	0.03	0.06	0.07
Variance Proportion	0.13	0.02	0.35	0.32	0.19
Covariance Proportion	0.80	0.61	0.62	0.63	0.74
Notes: Forecast period = January 2012 – December 2013					

The jet fuel inventory out-of-sample forecast rose above actual inventory levels in mid-2013 and ended the 24-month forecast period 8.3 million barrels above the actual level. Jet fuel inventories in the second half of 2013 and early 2014 were drawn down to unusually low levels. December 2013 jet fuel inventory was the lowest December level since 1986, while June 2014 was the lowest level for June since 1984 and almost 5 million barrels below the previous 10-year average.

Figure 9. Jet fuel inventories out-of-sample forecasts compared with actual, July 2012 – June 2014.

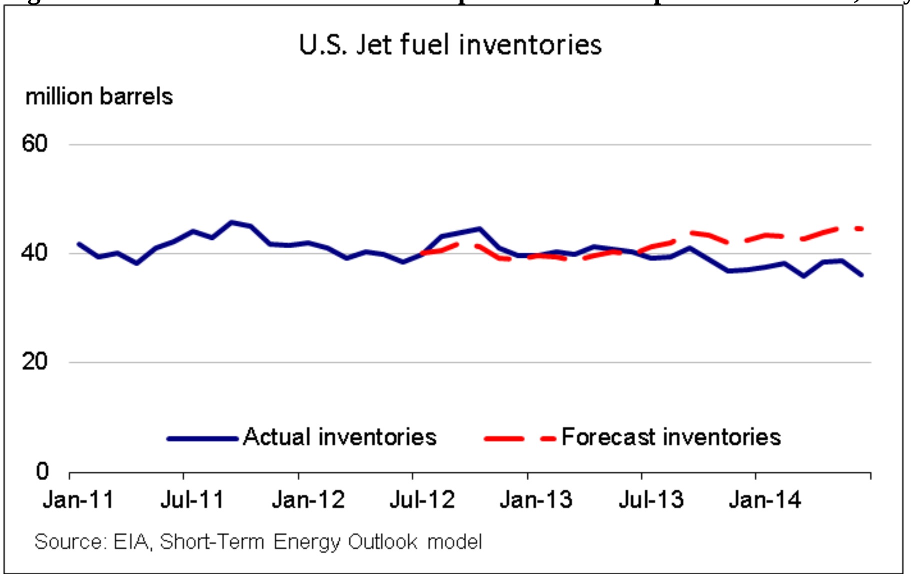


Table 7. Jet fuel inventory change out-of-sample simulation error statistics.

	Jet Fuel
Root Mean Squared Error	1.30
Mean Absolute Error	1.05
Mean Absolute Percentage Error	188.5
Theil Inequality Coefficient	0.49
Bias Proportion	0.07
Variance Proportion	0.24
Covariance Proportion	0.69
Notes: Forecast period = July 2012 – June 2014	

This report was prepared by the U.S. Energy Information Administration (EIA), the statistical and analytical agency within the U.S. Department of Energy. By law, EIA's data, analyses, and forecasts are independent of approval by any other officer or employee of the United States Government. The views in this report therefore should not be construed as representing those of the U.S. Department of Energy or other federal agencies.

Appendix A. Variable definitions, units, and sources

Table A1. Variable definitions, units, and sources

			Sources	
Variable Name	**Units**	**Definition**	**History**	**Forecast**
APR	Integer	= 1 if April, 0 otherwise	--	--
AUG	Integer	= 1 if August, 0 otherwise	--	--
BREPUUS	DBBL	Brent crude oil spot price average	WPSR	EXO
D2RCAUS	CPG	Heating oil retail price including taxes	BLS	STEO
D2WHUUS	CPG	Heating oil wholesale price	PMM	STEO
DFPSPP*x*	MMB	Distillate fuel end-of-month stocks, PADD *x*	PSM	STEO
DFPSPP*x*BLD	MMB	Distillate fuel stock change, PADD *x*	PSM	STEO
DSRTUUS	CPG	Diesel fuel retail price including taxes	WPSR	STEO
DSWHUUS	CPG	Diesel fuel wholesale price	PMM	STEO
Dyy	Integer	= 1 if year (yy), 0 otherwise	--	--
Dyymm	Integer	= 1 if month (mm) and year (yy), 0 otherwise	--	--
DyyON	Integer	= 1 if year (yy) or later, 0 otherwise	--	--
EOTCPUS	MMB/D	Ethanol blended into motor gasoline	PSM	STEO
FEB	Integer	= 1 if February, 0 otherwise	--	--
JAN	Integer	= 1 if January, 0 otherwise	--	--
JKTCUUS	CPG	Jet fuel wholesale price	PMM	STEO
JUL	Integer	= 1 if July, 0 otherwise	--	--
JUN	Integer	= 1 if June, 0 otherwise	--	--
MAR	Integer	= 1 if March, 0 otherwise	--	--
MAY	Integer	= 1 if May, 0 otherwise	--	--
MBPSPUS	MMB	Gasoline blending components end-of-month stocks, U.S.	PSM	STEO
MGEIAUS	CPG	Motor gasoline, all types, retail price including taxes	WPSR	STEO
MGPSPUS	MMB	Finished motor gasoline end-of-month stocks, U.S.	PSM	STEO
MGRARP*x*	CPG	Regular motor gasoline retail price including taxes, PADD *x*	WPSR	STEO
MGRARUS	CPG	Regular motor gasoline retail price including taxes, U.S.	WPSR	STEO
MGTCPUSX	MMB/D	Finished motor gasoline product supplied	PSM	STEO
MGTCXP*x*	Index	Motor gasoline demand share, PADD *x*	PSM	STEO
MGTCXUS	Index	Sum of motor gasoline demand shares, PADDs 1 -5	PSM	STEO
MGTSPP*x*	MMB	Total motor gasoline end-of-month stocks, PADD *x*	PSM	STEO
MGTSPP*x*BLD	MMB	Total motor gasoline stock change, PADD *x*	PSM	STEO
MGTSPUS	MMB	Total motor gasoline end-of-month stocks, U.S.	PSM	STEO
MGWHUUS	CPG	Motor gasoline wholesale price	PMM	STEO
NOV	Integer	= 1 if November, 0 otherwise	--	--
OCT	Integer	= 1 if October, 0 otherwise	--	--
QHFO_xxx	Millions	Number of households that use heating oil as their primary space heating fuel in census division xxx	Census	STEO
RGDPQ_WORLD	Index	World oil-consumption-weighted real GDP index	GI	STEO
ZSAJQUS	Integer	Number of days in the month	--	--
ZWHD_xxx	HDD	Heating degree days, total per month	NOAA	NOAA
ZWHN_xxx	HDD	Heating degree days, 30-year normal	NOAA	NOAA

Table A2. Units Key

CPG	Cents per gallon
DBBL	Dollars per barrel
DMMB	Dollars per million Btu
HDD	Heating degree days
MMB	Million barrels
MMB/D	Million barrels per day

Table A3. Sources Key

BLS	Bureau of Labor Statistics
Census	U.S. Census Bureau, American Community Survey
GI	IHS-Global Insight macroeconomic model
EXO	Exogenous
NOAA	National Oceanic and Atmospheric Administration
PMM	Petroleum Marketing Monthly
PSM	Petroleum Supply Monthly
STEO	Short-term Energy Outlook Model

Appendix B. EViews model program file

```
' -- Wholesale (refiner price for resale) motor gasoline price

:EQ_MGWHUUS

' -- Regular gasoline all grades retail price

:EQ_MGRARP1
:EQ_MGRARP2
:EQ_MGRARP3
:EQ_MGRARP4
:EQ_MGRARP5

' -- Regional consumption shares

:EQ_MGTCXP1
:EQ_MGTCXP2
:EQ_MGTCXP3
:EQ_MGTCXP4
:EQ_MGTCXP5

@IDENTITY MGTCXUS  = MGTCXP1  + MGTCXP2  + MGTCXP3  + MGTCXP4  + MGTCXP5

'--  Consumption share-weighted U.S. average regular gasoline retail price

@IDENTITY MGRARUS  = (MGTCXP1  * MGRARP1  + MGTCXP2  * MGRARP2  + MGTCXP3  * MGRARP3
+ MGTCXP4  * MGRARP4  + MGTCXP5  * MGRARP5)  / MGTCXUS

' –  Retail price all gasoline types

:EQ_MGEIAUS

' –  Gasoline Stocks ---------

:EQ_MGTSP1BLD
:EQ_MGTSP2BLD
:EQ_MGTSP3BLD
:EQ_MGTSP4BLD
:EQ_MGTSP5BLD

@IDENTITY MGTSPP1  = MGTSPP1(-1)  + MGTSP1BLD
@IDENTITY MGTSPP2  = MGTSPP2(-1)  + MGTSP2BLD
@IDENTITY MGTSPP3  = MGTSPP3(-1)  + MGTSP3BLD
@IDENTITY MGTSPP4  = MGTSPP4(-1)  + MGTSP4BLD
@IDENTITY MGTSPP5  = MGTSPP5(-1)  + MGTSP5BLD

@IDENTITY MGTSPUS  = MGTSPP1  + MGTSPP2  + MGTSPP3  + MGTSPP4  + MGTSPP5

:EQ_MBPSPUS
```

```
@IDENTITY MGPSPUS  = MGTSPUS  - MBPSPUS

' -- Wholesale (refiner price for resale) diesel fuel and heating oil prices

:EQ_DSWHUUS
:EQ_D2WHUUS

' -- Diesel fuel and heating oil retail prices

:EQ_DSRTUUS
:EQ_D2RCAUS

' –  Distillate fuel stocks

:EQ_DFPSP1BLD
:EQ_DFPSP2BLD
:EQ_DFPSP3BLD
:EQ_DFPSP4BLD
:EQ_DFPSP5BLD

@IDENTITY DFPSPP1  = DFPSPP1(-1)  + DFPSP1BLD
@IDENTITY DFPSPP2  = DFPSPP2(-1)  + DFPSP2BLD
@IDENTITY DFPSPP3  = DFPSPP3(-1)  + DFPSP3BLD
@IDENTITY DFPSPP4  = DFPSPP4(-1)  + DFPSP4BLD
@IDENTITY DFPSPP5  = DFPSPP5(-1)  + DFPSP5BLD

@IDENTITY DFPSPUS  = DFPSPP1  + DFPSPP2  + DFPSPP3  + DFPSPP4  + DFPSPP5

' -- Jet fuel refiner price for to end users

:EQ_JKTCUUS

' -- Jet fuel U.S. inventories

:EQ_JFPSBLD

@IDENTITY JFPSPUS  = JFPSPUS (-1)  + JFPSBLD
```

Appendix C. Regression results

Regression 1. MGWHUUS-BREPUUS, Gasoline Refiner Margin, U.S.

Dependent Variable: MGWHUUS-100*BREPUUS/42
Method: Least Squares
Date: 01/12/15 Time: 13:25
Sample: 2004M01 2014M06
Included observations: 126

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	11.48621	2.181052	5.266365	0.0000
(100/42)*(BREPUUS-BREPUUS(-1))	-0.128995	0.031073	-4.151405	0.0001
MGTSPUS(-1)-(MGTSPUS(-13)+MGTSPUS(-25)+MGTSPUS(-37)+MGTSPUS(-49))/4	-0.172972	0.068931	-2.509351	0.0138
@TREND(2003:12)	-0.048238	0.014382	-3.354045	0.0011
D0408	-13.79982	4.850187	-2.845214	0.0054
D0509	33.18591	4.998845	6.638716	0.0000
D0511	-16.52088	5.047414	-3.273138	0.0015
D0603+D0604+D0605+D0606+D0607	11.06042	2.232947	4.953283	0.0000
D0703+D0704	15.80117	3.463896	4.561675	0.0000
D0705	29.72497	4.936788	6.021115	0.0000
D08	-5.499065	1.580984	-3.478255	0.0008
D0809	36.65955	5.216844	7.027151	0.0000
D0811	-23.22925	5.358224	-4.335252	0.0000
D1106	-14.37389	4.788393	-3.001820	0.0034
D1111	-14.68381	4.922933	-2.982736	0.0036
D1209	16.46301	5.022178	3.278061	0.0015
D1211+D1212	-14.32487	3.524602	-4.064253	0.0001
D1302	16.05683	4.862692	3.302045	0.0014
D1308+D1309+D1310+D1311+D1312	-10.29652	2.345899	-4.389158	0.0000
JAN	4.482145	2.043918	2.192918	0.0308
FEB	5.797594	2.083821	2.782193	0.0065
MAR	11.60432	2.101143	5.522859	0.0000
APR	14.29669	2.144502	6.666672	0.0000
MAY	15.33925	2.223177	6.899698	0.0000
JUN	12.01066	2.395927	5.012952	0.0000
JUL	7.849281	2.335876	3.360316	0.0011
AUG	12.29324	2.270886	5.413413	0.0000
SEP	3.767716	2.429510	1.550813	0.1243
OCT	2.408964	2.216684	1.086742	0.2799
NOV	5.208471	2.266806	2.297714	0.0238
MGWHUUS(-1)-100*BREPUUS(-1)/42	0.499724	0.045750	10.92282	0.0000

R-squared	0.938604	Mean dependent var	31.21706
Adjusted R-squared	0.919215	S.D. dependent var	15.95312
S.E. of regression	4.534299	Akaike info criterion	6.070877
Sum squared resid	1953.188	Schwarz criterion	6.768692
Log likelihood	-351.4652	Hannan-Quinn criter.	6.354377
F-statistic	48.41075	Durbin-Watson stat	2.018990
Prob(F-statistic)	0.000000		

Regression 2. MGRARP1-MGWHUUS, Motor Gasoline Retail - Wholesale Price Spread, PADD1

Dependent Variable: MGRARP1-MGWHUUS
Method: Least Squares
Date: 01/12/15 Time: 13:57
Sample: 2003M01 2014M06
Included observations: 138

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	51.99967	2.954251	17.60164	0.0000
MGWHUUS-MGWHUUS(-1)	-0.258195	0.019894	-12.97838	0.0000
MGTSPP1(-1)-((MGTSPP1(-13)+MGTSPP1(-25)+MGTSPP1(-37)+MGTSPP1(-49))/4)	-0.598074	0.072458	-8.254052	0.0000
@TREND(2002:12)	0.113080	0.009627	11.74677	0.0000
D03	-3.691967	1.172011	-3.150114	0.0021
D0309+D0310	8.743703	2.474842	3.533034	0.0006
D0403	-7.985886	3.285098	-2.430943	0.0167
D0509	26.72741	3.287379	8.130310	0.0000
D0510	14.51125	3.324289	4.365219	0.0000
D0608+D0609	7.828318	2.353227	3.326631	0.0012
D08	5.739368	1.042598	5.504872	0.0000
D0811+D0812	-13.98278	2.704750	-5.169714	0.0000
D0903+D0904+D0905	-7.128411	1.842117	-3.869684	0.0002
D1202	9.608452	3.184785	3.016986	0.0032
D1205+D1206+D1207	-8.488106	1.908382	-4.447802	0.0000
D1305	-8.837348	3.290596	-2.685638	0.0084
D1312	10.14395	3.237190	3.133567	0.0022
D1401	10.05720	3.250277	3.094260	0.0025
JAN	0.385409	1.365623	0.282222	0.7783
FEB	-2.047219	1.361995	-1.503103	0.1357
MAR	-1.070612	1.403594	-0.762764	0.4473
APR	-2.504342	1.359714	-1.841815	0.0682
MAY	-1.017310	1.395395	-0.729048	0.4676
JUN	-3.380476	1.335566	-2.531118	0.0128
JUL	-3.769338	1.363532	-2.764392	0.0067
AUG	-4.409884	1.372339	-3.213408	0.0017
SEP	-3.675111	1.430064	-2.569894	0.0115
OCT	-4.563400	1.411709	-3.232537	0.0016
NOV	-0.907482	1.325311	-0.684731	0.4950
MGRARP1(-1)-MGWHUUS(-1)	0.067919	0.049301	1.377651	0.1712

R-squared	0.901872	Mean dependent var	61.76475
Adjusted R-squared	0.875523	S.D. dependent var	8.566028
S.E. of regression	3.022203	Akaike info criterion	5.239509
Sum squared resid	986.4405	Schwarz criterion	5.875869
Log likelihood	-331.5261	Hannan-Quinn criter.	5.498110
F-statistic	34.22784	Durbin-Watson stat	1.585384
Prob(F-statistic)	0.000000		

Regression 3. MGRARP2-MGWHUUS, Motor Gasoline Retail - Wholesale Price Spread, PADD2

Dependent Variable: MGRARP2-MGWHUUS
Method: Least Squares
Date: 01/12/15 Time: 13:50
Sample: 2003M01 2014M06
Included observations: 138

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	31.31451	3.318434	9.436530	0.0000
MGWHUUS-MGWHUUS(-1)	-0.036725	0.019421	-1.890938	0.0613
MGTSPP2(-1)-((MGTSPP2(-13)+MGTSPP2(-25)+MGTSPP2(-37)+MGTSPP2(-49))/4)	-0.481005	0.128858	-3.732837	0.0003
@TREND(2002:12)	0.067364	0.009219	7.306986	0.0000
D0509+D0510	7.110574	2.217697	3.206287	0.0018
D0705	16.78214	3.154978	5.319258	0.0000
D0707	7.845445	3.169957	2.474938	0.0149
D0809+D0810	10.17394	2.301161	4.421223	0.0000
D0811+D0812+D0901+D0902+D0903+D0904+D0905	-5.151097	1.245186	-4.136809	0.0001
D0908+D0909	-7.894560	2.237073	-3.528968	0.0006
D1105	11.91398	3.122837	3.815113	0.0002
D1206	10.08051	3.154539	3.195556	0.0018
D1301	-9.447204	3.132294	-3.016066	0.0032
D1305	12.06799	3.168393	3.808868	0.0002
D1306	15.97888	3.200119	4.993214	0.0000
D1307	-11.80991	3.419565	-3.453628	0.0008
JAN	1.832400	1.279548	1.432069	0.1550
FEB	0.493280	1.256863	0.392469	0.6955
MAR	1.681957	1.288035	1.305832	0.1943
APR	1.063609	1.264299	0.841264	0.4020
MAY	2.274274	1.337310	1.700634	0.0918
JUN	2.563071	1.318490	1.943945	0.0545
JUL	0.316445	1.352725	0.233931	0.8155
AUG	3.726071	1.291996	2.883965	0.0047
SEP	5.181358	1.331529	3.891284	0.0002
OCT	-1.910849	1.340159	-1.425837	0.1567
NOV	0.047288	1.257252	0.037612	0.9701
MGRARP2(-1)-MGWHUUS(-1)	0.357170	0.063755	5.602239	0.0000

R-squared	0.870853	Mean dependent var	58.70014
Adjusted R-squared	0.839153	S.D. dependent var	7.319125
S.E. of regression	2.935390	Akaike info criterion	5.170582
Sum squared resid	947.8169	Schwarz criterion	5.764517
Log likelihood	-328.7701	Hannan-Quinn criter.	5.411943
F-statistic	27.47186	Durbin-Watson stat	2.002135
Prob(F-statistic)	0.000000		

Regression 4. MGRARP3-MGWHUUS, Motor Gasoline Retail - Wholesale Price Spread, PADD3

Dependent Variable: MGRARP3-MGWHUUS
Method: Least Squares
Date: 01/12/15 Time: 13:53
Sample: 2003M01 2014M06
Included observations: 138

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	41.90228	3.313198	12.64708	0.0000
MGWHUUS-MGWHUUS(-1)	-0.164418	0.023173	-7.095373	0.0000
MGTSPP3(-1)-((MGTSPP3(-13)+MGTSPP3(-25)+MGTSPP3(-37)+MGTSPP3(-49))/4)	-0.074112	0.111751	-0.663191	0.5086
@TREND(2002:12)	0.003437	0.008832	0.389171	0.6979
D03	-2.983005	1.240459	-2.404759	0.0178
D0509	12.81231	3.549575	3.609533	0.0005
D0510	22.58577	3.633135	6.216606	0.0000
D06	2.885349	1.077085	2.678849	0.0085
D0807	9.611295	3.447833	2.787633	0.0062
D0809	11.84934	3.543384	3.344075	0.0011
D0810	13.69731	3.829142	3.577122	0.0005
D1005	7.696145	3.492233	2.203789	0.0296
D1105	8.659941	3.517855	2.461711	0.0154
D1305	-7.741937	3.488372	-2.219355	0.0285
JAN	0.796578	1.397088	0.570170	0.5697
FEB	0.140470	1.397334	0.100528	0.9201
MAR	1.215594	1.432358	0.848666	0.3979
APR	2.552569	1.399577	1.823814	0.0708
MAY	0.347890	1.498948	0.232090	0.8169
JUN	0.684531	1.367593	0.500537	0.6177
JUL	-1.114363	1.438607	-0.774612	0.4402
AUG	1.260229	1.396879	0.902174	0.3689
SEP	0.087162	1.471583	0.059230	0.9529
OCT	-2.856036	1.471498	-1.940903	0.0548
NOV	-0.921747	1.396263	-0.660153	0.5105
MGRARP3(-1)-MGWHUUS(-1)	0.137129	0.062088	2.208638	0.0292

R-squared	0.743730	Mean dependent var	49.20591
Adjusted R-squared	0.686527	S.D. dependent var	5.826037
S.E. of regression	3.261921	Akaike info criterion	5.370567
Sum squared resid	1191.695	Schwarz criterion	5.922078
Log likelihood	-344.5691	Hannan-Quinn criter.	5.594687
F-statistic	13.00156	Durbin-Watson stat	1.439373
Prob(F-statistic)	0.000000		

Regression 5. MGRARP4-MGWHUUS, Motor Gasoline Retail - Wholesale Price Spread, PADD4

Dependent Variable: MGRARP4-MGWHUUS
Method: Least Squares
Date: 01/12/15 Time: 13:55
Sample: 2003M01 2014M06
Included observations: 138

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	30.32753	2.580859	11.75094	0.0000
MGWHUUS-MGWHUUS(-1)	-0.480786	0.025458	-18.88525	0.0000
MGTSPP4(-1)-((MGTSPP4(-13)+MGTSPP4(-25)+MGTSPP4(-37)+MGTSPP4(-49))/4)	-1.745237	0.809144	-2.156894	0.0333
@TREND(2002:12)	0.039357	0.009489	4.147577	0.0001
D0509	22.36688	4.129974	5.415742	0.0000
D0608+D0609	10.52113	2.944597	3.573030	0.0005
D0704+D0705+D0706	14.84122	2.337226	6.349928	0.0000
D0711	12.12580	4.105449	2.953586	0.0039
D0806+D0807	11.91005	2.904395	4.100698	0.0001
D0811+D0812	-24.00027	3.158380	-7.598916	0.0000
D0901	-10.47110	4.034358	-2.595480	0.0108
D0906	9.316168	4.128811	2.256380	0.0261
D1107	-13.70796	4.030429	-3.401116	0.0009
D1201+D1202	-20.61457	2.955991	-6.973826	0.0000
D1206	14.90138	4.166455	3.576512	0.0005
D1208	-10.26146	4.139299	-2.479034	0.0147
D1301	-28.92494	4.062132	-7.120631	0.0000
D1306	15.25865	4.099449	3.722123	0.0003
D1404+D1405	-9.346760	2.892979	-3.230843	0.0016
JAN	2.471330	1.737702	1.422183	0.1579
FEB	4.383179	1.738672	2.520993	0.0132
MAR	7.835889	1.740278	4.502664	0.0000
APR	8.270901	1.725273	4.793968	0.0000
MAY	11.83232	1.681709	7.035891	0.0000
JUN	6.147755	1.786715	3.440814	0.0008
JUL	8.420646	1.717789	4.902027	0.0000
AUG	9.818776	1.710475	5.740380	0.0000
SEP	11.84970	1.715564	6.907176	0.0000
OCT	7.770277	1.684243	4.613512	0.0000
NOV	4.294043	1.687847	2.544096	0.0124
MGRARP4(-1)-MGWHUUS(-1)	0.329125	0.034622	9.506133	0.0000

R-squared	0.939525	Mean dependent var	58.38866
Adjusted R-squared	0.922569	S.D. dependent var	13.68810
S.E. of regression	3.808900	Akaike info criterion	5.707408
Sum squared resid	1552.326	Schwarz criterion	6.364980
Log likelihood	-362.8112	Hannan-Quinn criter.	5.974629
F-statistic	55.41083	Durbin-Watson stat	1.808906
Prob(F-statistic)	0.000000		

Regression 6. MGRARP5-MGWHUUS, Motor Gasoline Retail - Wholesale Price Spread, PADD5

Dependent Variable: MGRARP5-MGWHUUS
Method: Least Squares
Date: 01/12/15 Time: 13:58
Sample: 2003M01 2014M06
Included observations: 138

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	52.03957	4.324480	12.03372	0.0000
MGWHUUS-MGWHUUS(-1)	-0.346327	0.031884	-10.86203	0.0000
MGTSPP5(-1)-((MGTSPP5(-13)+MGTSPP5(-25)+MGTSPP5(-37)+MGTSPP5(-49))/4)	-1.949270	0.262682	-7.420630	0.0000
@TREND(2002:12)	0.135802	0.014865	9.135669	0.0000
D0410	12.67055	5.578417	2.271352	0.0251
D0512	-14.92567	5.454861	-2.736215	0.0073
D0707+D0708+D0709	-15.11821	3.150505	-4.798662	0.0000
D0806	19.97483	5.506260	3.627658	0.0004
D0809	-29.15526	5.563286	-5.240655	0.0000
D0811+D0812	-21.01372	4.262389	-4.930033	0.0000
D0903	-22.03172	5.442567	-4.048038	0.0001
D0905	-16.17923	5.440869	-2.973648	0.0036
D1107	-17.83087	5.485873	-3.250325	0.0015
D1206	14.07972	5.592201	2.517742	0.0133
D1207	-14.03948	5.677586	-2.472791	0.0150
D1210	25.65985	5.480561	4.681975	0.0000
D1302	15.75795	5.537036	2.845917	0.0053
JAN	-0.374813	2.267094	-0.165327	0.8690
FEB	3.704427	2.340739	1.582588	0.1164
MAR	13.90010	2.368502	5.868731	0.0000
APR	8.947241	2.265756	3.948899	0.0001
MAY	9.298069	2.296231	4.049274	0.0001
JUN	3.565524	2.347722	1.518716	0.1317
JUL	5.656004	2.437635	2.320284	0.0222
AUG	2.478171	2.301507	1.076760	0.2840
SEP	10.06703	2.363114	4.260071	0.0000
OCT	2.712696	2.444178	1.109860	0.2695
NOV	3.264949	2.271863	1.437124	0.1535
MGRARP5(-1)-MGWHUUS(-1)	0.235341	0.053117	4.430635	0.0000

R-squared	0.877087	Mean dependent var	85.72986
Adjusted R-squared	0.845513	S.D. dependent var	13.07330
S.E. of regression	5.138438	Akaike info criterion	6.295759
Sum squared resid	2877.987	Schwarz criterion	6.910907
Log likelihood	-405.4074	Hannan-Quinn criter.	6.545740
F-statistic	27.77881	Durbin-Watson stat	1.734896
Prob(F-statistic)	0.000000		

Regression 7. MGEIAUS-MGRARUS, Motor Gasoline Retail Price Spread, All Types - Regular

Dependent Variable: MGEIAUS-MGRARUS
Method: Least Squares
Date: 11/13/14 Time: 13:43
Sample: 2009M01 2014M06
Included observations: 66

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.422115	0.648346	3.735839	0.0005
MGRARUS	-0.000928	0.001124	-0.826123	0.4128
@TREND(2008:12)	0.012081	0.005777	2.091399	0.0418
D1210+D1211+D1212+D13ON	0.462820	0.106050	4.364178	0.0001
D1302	-0.670929	0.192051	-3.493498	0.0010
D1305	-1.048806	0.181307	-5.784695	0.0000
JAN	-0.160428	0.098870	-1.622606	0.1112
FEB	-0.070754	0.102540	-0.690011	0.4935
MAR	-0.293357	0.099494	-2.948507	0.0049
APR	-0.161137	0.100444	-1.604241	0.1152
MAY	-0.062578	0.104444	-0.599151	0.5519
JUN	-0.255341	0.100767	-2.533981	0.0146
JUL	-0.005078	0.108065	-0.046994	0.9627
AUG	-0.116174	0.103939	-1.117711	0.2693
SEP	-0.106184	0.103703	-1.023918	0.3110
OCT	-0.019831	0.105334	-0.188270	0.8515
NOV	0.009916	0.102745	0.096515	0.9235
MGEIAUS(-1)-MGRARUS(-1)	0.580407	0.090414	6.419420	0.0000

R-squared	0.974955	Mean dependent var	6.025000
Adjusted R-squared	0.966085	S.D. dependent var	0.876716
S.E. of regression	0.161457	Akaike info criterion	-0.582155
Sum squared resid	1.251282	Schwarz criterion	0.015024
Log likelihood	37.21110	Hannan-Quinn criter.	-0.346181
F-statistic	109.9139	Durbin-Watson stat	2.086349
Prob(F-statistic)	0.000000		

Regression 8. MGTSP1BLD, Regional total gasoline stock build, PADD1

Dependent Variable: MGTSP1BLD
Method: Least Squares
Date: 11/13/14 Time: 13:45
Sample: 2008M01 2014M06
Included observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.230019	0.827728	6.318527	0.0000
MGTSPP1(-1)-((MGTSPP1(-13)+MGTSPP1(-25)+MGTSPP1(-37)+MGTSPP1(-49))/4)	-0.389520	0.055962	-6.960444	0.0000
D0809	-6.016999	2.042776	-2.945502	0.0047
D0902	-6.300419	1.996140	-3.156301	0.0026
D0909	6.516448	2.040093	3.194193	0.0023
D1008	5.390143	2.013861	2.676522	0.0098
D1012	-6.042294	2.005565	-3.012765	0.0039
D1402	-5.761099	1.999007	-2.881981	0.0056
D1405	5.788441	1.977026	2.927852	0.0050
D1103+D1104	-5.038580	1.404587	-3.587232	0.0007
D12	-2.679934	0.646234	-4.147000	0.0001
D1304	5.802709	1.981945	2.927784	0.0050
JAN	-1.552771	1.065355	-1.457515	0.1507
FEB	-3.191662	1.150229	-2.774805	0.0075
MAR	-7.163338	1.083591	-6.610743	0.0000
APR	-5.690206	1.125607	-5.055235	0.0000
MAY	-4.025371	1.101396	-3.654790	0.0006
JUN	-4.005720	1.065352	-3.759998	0.0004
JUL	-4.949599	1.102080	-4.491142	0.0000
AUG	-6.380645	1.151177	-5.542716	0.0000
SEP	-6.447096	1.221714	-5.277090	0.0000
OCT	-6.628113	1.102428	-6.012289	0.0000
NOV	-1.840805	1.103612	-1.667982	0.1010

R-squared	0.812474	Mean dependent var	0.041731
Adjusted R-squared	0.737464	S.D. dependent var	3.549200
S.E. of regression	1.818549	Akaike info criterion	4.274323
Sum squared resid	181.8917	Schwarz criterion	4.969250
Log likelihood	-143.6986	Hannan-Quinn criter.	4.552515
F-statistic	10.83150	Durbin-Watson stat	2.192836
Prob(F-statistic)	0.000000		

Regression 9. MGTSP2BLD, Regional total gasoline stock build, PADD2

Dependent Variable: MGTSP2BLD
Method: Least Squares
Date: 11/13/14 Time: 13:55
Sample: 2008M01 2014M06
Included observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.308663	0.627542	2.085378	0.0413
MGTSPP2(-1)-((MGTSPP2(-13)+MGTSPP2(-25)+MGTSPP2(-37)+MGTSPP2(-49))/4)	-0.396850	0.079652	-4.982277	0.0000
D0802	3.189247	1.359931	2.345153	0.0223
D0809	-2.888940	1.377705	-2.096922	0.0402
D0812	-3.459349	1.413967	-2.446556	0.0174
D1001	3.337093	1.352794	2.466816	0.0165
D1212	4.323656	1.404375	3.078706	0.0031
JAN	1.488785	0.807189	1.844408	0.0701
FEB	-1.397705	0.807430	-1.731053	0.0886
MAR	-4.887215	0.784578	-6.229097	0.0000
APR	-3.419942	0.784923	-4.357041	0.0001
MAY	-2.647605	0.786453	-3.366513	0.0013
JUN	-0.478756	0.784996	-0.609884	0.5442
JUL	-1.478591	0.807248	-1.831646	0.0720
AUG	-2.251937	0.808880	-2.784019	0.0072
SEP	0.063281	0.838842	0.075438	0.9401
OCT	-3.579308	0.807228	-4.434072	0.0000
NOV	-0.616332	0.807142	-0.763599	0.4481

R-squared	0.804896	Mean dependent var	-0.038474
Adjusted R-squared	0.749617	S.D. dependent var	2.498925
S.E. of regression	1.250419	Akaike info criterion	3.484008
Sum squared resid	93.81284	Schwarz criterion	4.027864
Log likelihood	-117.8763	Hannan-Quinn criter.	3.701724
F-statistic	14.56053	Durbin-Watson stat	2.046301
Prob(F-statistic)	0.000000		

Regression 10. MGTSP3BLD, Regional total gasoline stock build, PADD3

Dependent Variable: MGTSP3BLD
Method: Least Squares
Date: 11/13/14 Time: 13:56
Sample: 2008M01 2014M06
Included observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.362576	0.899676	3.737541	0.0004
MGTSPP3(-1)-((MGTSPP3(-13)+MGTSPP3(-25)+MGTSPP3(-37)+MGTSPP3(-49))/4)	-0.479546	0.088597	-5.412695	0.0000
D0808	-6.332201	2.293510	-2.760922	0.0076
D10	1.458784	0.668827	2.181107	0.0330
D1208	-6.128442	2.277308	-2.691090	0.0091
JAN	-0.067108	1.126602	-0.059566	0.9527
FEB	-4.155874	1.130628	-3.675722	0.0005
MAR	-2.113403	1.135949	-1.860473	0.0676
APR	-3.231025	1.126627	-2.867876	0.0056
MAY	-2.245493	1.132493	-1.982787	0.0518
JUN	-1.929796	1.130784	-1.706599	0.0929
JUL	-1.265693	1.170154	-1.081647	0.2836
AUG	-2.737817	1.308858	-2.091760	0.0406
SEP	-0.123806	1.168982	-0.105909	0.9160
OCT	-0.834052	1.170327	-0.712665	0.4787
NOV	-0.086064	1.170176	-0.073548	0.9416

R-squared	0.558447	Mean dependent var	0.071821
Adjusted R-squared	0.451620	S.D. dependent var	2.733937
S.E. of regression	2.024554	Akaike info criterion	4.429258
Sum squared resid	254.1267	Schwarz criterion	4.912685
Log likelihood	-156.7410	Hannan-Quinn criter.	4.622783
F-statistic	5.227573	Durbin-Watson stat	1.982733
Prob(F-statistic)	0.000001		

Regression 11. MGTSP4BLD, Regional total gasoline stock build, PADD4

Dependent Variable: MGTSP4BLD
Method: Least Squares
Date: 11/13/14 Time: 13:58
Sample: 2008M01 2014M06
Included observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.141587	0.117824	1.201686	0.2345
MGTSPP4(-1)-((MGTSPP4(-13)+MGTSPP4(-25)+MGTSPP4(-37)+MGTSPP4(-49))/4)	-0.398576	0.071678	-5.560638	0.0000
D0904	-0.804831	0.275941	-2.916678	0.0051
D0910	-0.748779	0.280167	-2.672613	0.0098
D0912	-1.004410	0.274563	-3.658208	0.0006
D1004	0.554981	0.279077	1.988628	0.0516
D1105	0.643725	0.271657	2.369627	0.0212
D1310	0.733032	0.279966	2.618292	0.0113
D1402	-0.602634	0.271456	-2.220007	0.0304
D1406	-0.700083	0.272790	-2.566382	0.0129
JAN	-0.042749	0.147997	-0.288849	0.7737
FEB	-0.301911	0.156469	-1.929533	0.0586
MAR	-0.413212	0.153703	-2.688371	0.0094
APR	-0.440283	0.159396	-2.762204	0.0077
MAY	-0.029594	0.152324	-0.194280	0.8466
JUN	0.206623	0.155487	1.328874	0.1892
JUL	-0.351533	0.153771	-2.286085	0.0260
AUG	-0.096863	0.153134	-0.632542	0.5296
SEP	0.182779	0.152965	1.194907	0.2371
OCT	0.087124	0.169515	0.513961	0.6093
NOV	0.633563	0.152045	4.166953	0.0001

R-squared	0.775644	Mean dependent var	-0.005551
Adjusted R-squared	0.696922	S.D. dependent var	0.454540
S.E. of regression	0.250235	Akaike info criterion	0.291975
Sum squared resid	3.569212	Schwarz criterion	0.926473
Log likelihood	9.612994	Hannan-Quinn criter.	0.545976
F-statistic	9.853013	Durbin-Watson stat	1.674193
Prob(F-statistic)	0.000000		

Regression 12. MGTSP5BLD, Regional total gasoline stock build, PADD5

Dependent Variable: MGTSP5BLD
Method: Least Squares
Date: 11/13/14 Time: 13:59
Sample: 2009M01 2014M06
Included observations: 66

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.170877	0.432782	5.016100	0.0000
MGTSPP5(-1)-((MGTSPP5(-13)+MGTSPP5(-25)+MGTSPP5(-37)+MGTSPP5(-49))/4)	-0.266346	0.064326	-4.140593	0.0001
D0907	-2.503700	1.058893	-2.364451	0.0223
D1002	3.557256	1.042487	3.412280	0.0014
D1008	3.414444	1.064600	3.207255	0.0024
D1010	-2.531073	1.097428	-2.306368	0.0256
D1103	2.946385	1.037407	2.840143	0.0067
D1204	-2.838126	1.036204	-2.738965	0.0087
D1210+D1211	2.307931	0.759795	3.037569	0.0039
JAN	-0.438434	0.575672	-0.761604	0.4502
FEB	-3.454524	0.604591	-5.713819	0.0000
MAR	-4.051943	0.605214	-6.695062	0.0000
APR	-3.535215	0.604263	-5.850455	0.0000
MAY	-3.186419	0.581579	-5.478914	0.0000
JUN	-1.732138	0.588442	-2.943599	0.0051
JUL	-2.197981	0.645308	-3.406098	0.0014
AUG	-3.141280	0.641982	-4.893098	0.0000
SEP	-1.754686	0.604164	-2.904320	0.0056
OCT	-2.069404	0.674542	-3.067866	0.0036
NOV	-0.831175	0.619170	-1.342402	0.1861

R-squared	0.801094	Mean dependent var	-0.001136
Adjusted R-squared	0.718937	S.D. dependent var	1.784197
S.E. of regression	0.945899	Akaike info criterion	2.971686
Sum squared resid	41.15736	Schwarz criterion	3.635217
Log likelihood	-78.06563	Hannan-Quinn criter.	3.233879
F-statistic	9.750768	Durbin-Watson stat	1.972274
Prob(F-statistic)	0.000000		

Regression 13. MBPSPUS/MGTSPUS, Gasoline Blending Component Inventory Share of Total Gasoline Inventory

Dependent Variable: MBPSPUS/MGTSPUS
Method: Least Squares
Date: 11/13/14 Time: 14:00
Sample: 2006M04 2014M06
Included observations: 99

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.412177	0.007699	53.53536	0.0000
EOTCPUS/MGTCPUSX	0.601891	0.143870	4.183576	0.0001
D08ON*@TREND(2007:12)	0.006469	0.000221	29.32442	0.0000
D11ON*@TREND(2010:12)	-0.003976	0.000291	-13.64996	0.0000
D0712+D0801	0.041877	0.006050	6.922295	0.0000
D0802+D0803	0.020659	0.006177	3.344847	0.0013
D0810	-0.019992	0.008403	-2.379102	0.0198
D0901+D0902+D0903	0.037315	0.004867	7.666677	0.0000
D1003+D1004	-0.019512	0.005940	-3.284729	0.0015
D1106+D1107+D1108	0.022445	0.004913	4.568748	0.0000
D1309+D1310+D1311+D1312+D14ON	0.035167	0.003970	8.858590	0.0000
FEB	0.006643	0.003950	1.681640	0.0967
MAR	0.013687	0.004045	3.384071	0.0011
APR	0.018381	0.003907	4.704869	0.0000
MAY	0.008992	0.003852	2.334258	0.0222
JUN	0.003690	0.003926	0.939759	0.3503
JUL	0.004365	0.004032	1.082523	0.2824
AUG	-0.003330	0.004042	-0.823867	0.4126
SEP	0.001375	0.003954	0.347900	0.7289
OCT	0.005054	0.004076	1.239984	0.2187
NOV	0.002240	0.003965	0.565013	0.5737
DEC	0.001693	0.003876	0.436889	0.6634

R-squared	0.997600	Mean dependent var	0.636936
Adjusted R-squared	0.996945	S.D. dependent var	0.138042
S.E. of regression	0.007629	Akaike info criterion	-6.720460
Sum squared resid	0.004482	Schwarz criterion	-6.143767
Log likelihood	354.6628	Hannan-Quinn criter.	-6.487129
F-statistic	1524.021	Durbin-Watson stat	1.387032
Prob(F-statistic)	0.000000		

Regression 14. MGTCXP1, Regional motor gasoline consumption share, PADD 1

Dependent Variable: MGTCXP1
Method: Least Squares
Date: 11/20/14 Time: 10:26
Sample: 2008M01 2014M06
Included observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.352444	0.001902	185.3164	0.0000
D0801	0.015985	0.004575	3.493623	0.0009
D1012	0.011911	0.004630	2.572753	0.0125
D1103+D1104	0.015793	0.003247	4.864009	0.0000
D13ON	-0.012071	0.001159	-10.41085	0.0000
JAN	0.008847	0.002561	3.455179	0.0010
FEB	0.005306	0.002474	2.145243	0.0359
MAR	0.008093	0.002519	3.212916	0.0021
APR	0.006263	0.002519	2.486287	0.0156
MAY	0.007732	0.002474	3.126049	0.0027
JUN	0.008891	0.002474	3.594418	0.0006
JUL	0.004408	0.002556	1.724585	0.0896
AUG	0.001340	0.002556	0.524026	0.6021
SEP	0.006574	0.002556	2.571734	0.0125
OCT	0.005234	0.002556	2.047383	0.0449
NOV	-0.000599	0.002556	-0.234173	0.8156

R-squared	0.774964	Mean dependent var	0.355776
Adjusted R-squared	0.720520	S.D. dependent var	0.007984
S.E. of regression	0.004221	Akaike info criterion	-7.916836
Sum squared resid	0.001105	Schwarz criterion	-7.433408
Log likelihood	324.7566	Hannan-Quinn criter.	-7.723311
F-statistic	14.23411	Durbin-Watson stat	2.139351
Prob(F-statistic)	0.000000		

Regression 15. MGTCXP2, Regional motor gasoline consumption share, PADD 2

Dependent Variable: MGTCXP2
Method: Least Squares
Date: 11/20/14 Time: 10:27
Sample: 2008M01 2014M06
Included observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.284378	0.001330	213.7403	0.0000
D0908	-0.010012	0.003570	-2.804417	0.0067
D1001	-0.011475	0.003520	-3.259893	0.0018
D1103	-0.014648	0.003520	-4.161152	0.0001
D1311	-0.009217	0.003570	-2.581717	0.0122
JAN	-0.004381	0.001882	-2.328296	0.0232
FEB	-0.005140	0.001813	-2.834825	0.0062
MAR	-0.005387	0.001882	-2.862947	0.0057
APR	-0.007455	0.001813	-4.111851	0.0001
MAY	-0.001075	0.001813	-0.593095	0.5553
JUN	0.001276	0.001813	0.703898	0.4841
JUL	0.001922	0.001882	1.021674	0.3109
AUG	-0.000481	0.001973	-0.243496	0.8084
SEP	-0.002245	0.001882	-1.193195	0.2373
OCT	-0.000282	0.001882	-0.150032	0.8812
NOV	0.003199	0.001973	1.621191	0.1101

R-squared	0.669660	Mean dependent var	0.281971
Adjusted R-squared	0.589739	S.D. dependent var	0.005088
S.E. of regression	0.003259	Akaike info criterion	-8.434103
Sum squared resid	0.000659	Schwarz criterion	-7.950676
Log likelihood	344.9300	Hannan-Quinn criter.	-8.240579
F-statistic	8.379031	Durbin-Watson stat	1.990196
Prob(F-statistic)	0.000000		

Regression 16. MGTCXP3, Regional motor gasoline consumption share, PADD 3

Dependent Variable: MGTCXP3
Method: Least Squares
Date: 11/20/14 Time: 10:24
Sample: 2008M01 2014M06
Included observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.156861	0.002558	61.31201	0.0000
D13ON	0.012292	0.001691	7.270223	0.0000
JAN	-0.003911	0.003471	-1.126813	0.2640
FEB	5.54E-05	0.003471	0.015947	0.9873
MAR	-0.003783	0.003471	-1.089928	0.2798
APR	-0.000116	0.003471	-0.033419	0.9734
MAY	-0.005144	0.003471	-1.481962	0.1432
JUN	-0.010259	0.003471	-2.955415	0.0043
JUL	-0.008830	0.003596	-2.455407	0.0168
AUG	-0.000740	0.003596	-0.205805	0.8376
SEP	-0.007004	0.003596	-1.947694	0.0558
OCT	-0.003455	0.003596	-0.960824	0.3402
NOV	0.001361	0.003596	0.378374	0.7064

R-squared	0.548524	Mean dependent var	0.156183
Adjusted R-squared	0.465175	S.D. dependent var	0.008517
S.E. of regression	0.006229	Akaike info criterion	-7.168302
Sum squared resid	0.002522	Schwarz criterion	-6.775517
Log likelihood	292.5638	Hannan-Quinn criter.	-7.011063
F-statistic	6.581029	Durbin-Watson stat	2.031995
Prob(F-statistic)	0.000000		

Regression 17. MGTCXP4, Regional motor gasoline consumption share, PADD 4

Dependent Variable: MGTCXP4
Method: Least Squares
Date: 11/20/14 Time: 10:30
Sample: 2008M01 2014M06
Included observations: 78

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.031832	0.000448	70.97832	0.0000
@TREND(2007:12)-D12ON*@TREND(2011:12)	7.03E-05	6.72E-06	10.45455	0.0000
D1005	-0.002899	0.001000	-2.899927	0.0052
D1007	0.002900	0.001013	2.862116	0.0057
D1402	-0.002517	0.001007	-2.499101	0.0151
JAN	0.000682	0.000516	1.322936	0.1907
FEB	0.001367	0.000536	2.551014	0.0132
MAR	-0.000903	0.000515	-1.752073	0.0847
APR	-0.001115	0.000515	-2.165580	0.0342
MAY	-0.000669	0.000534	-1.252499	0.2151
JUN	-0.000263	0.000515	-0.509971	0.6119
JUL	0.001066	0.000560	1.902623	0.0617
AUG	0.001014	0.000534	1.898386	0.0623
SEP	-0.000812	0.000534	-1.519841	0.1336
OCT	-0.000820	0.000534	-1.535335	0.1298
NOV	-0.001704	0.000534	-3.191162	0.0022

R-squared	0.772397	Mean dependent var	0.033979
Adjusted R-squared	0.717332	S.D. dependent var	0.001740
S.E. of regression	0.000925	Akaike info criterion	-10.95281
Sum squared resid	5.31E-05	Schwarz criterion	-10.46938
Log likelihood	443.1594	Hannan-Quinn criter.	-10.75928
F-statistic	14.02696	Durbin-Watson stat	1.496707
Prob(F-statistic)	0.000000		

Regression 18. MGTCXP5, Regional motor gasoline consumption share, PADD 5

Dependent Variable: MGTCXP5
Method: Least Squares
Date: 11/20/14 Time: 10:32
Sample: 2009M03 2014M06
Included observations: 64

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.169981	0.001302	130.5784	0.0000
D1108	0.010560	0.003254	3.244798	0.0021
JAN	0.002441	0.001841	1.326030	0.1907
FEB	0.001766	0.001841	0.959516	0.3418
MAR	0.003318	0.001763	1.882349	0.0655
APR	0.002272	0.001763	1.288734	0.2033
MAY	0.001741	0.001763	0.987833	0.3279
JUN	0.001428	0.001763	0.809908	0.4218
JUL	0.001876	0.001841	1.018923	0.3130
AUG	-0.000983	0.001953	-0.503393	0.6169
SEP	0.003838	0.001841	2.084512	0.0421
OCT	0.001399	0.001841	0.759735	0.4509
NOV	0.000713	0.001841	0.387263	0.7002

R-squared	0.261580	Mean dependent var	0.171830
Adjusted R-squared	0.087835	S.D. dependent var	0.003048
S.E. of regression	0.002911	Akaike info criterion	-8.661577
Sum squared resid	0.000432	Schwarz criterion	-8.223054
Log likelihood	290.1705	Hannan-Quinn criter.	-8.488820
F-statistic	1.505535	Durbin-Watson stat	1.863911
Prob(F-statistic)	0.152950		

Regression 19. DSWHUUS-BREPUUS, Diesel Fuel Refiner Margin, U.S.

Dependent Variable: DSWHUUS-(100*BREPUUS/42)
Method: Least Squares
Date: 01/16/15 Time: 15:24
Sample: 2006M01 2014M06
Included observations: 102

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	24.35492	3.264528	7.460471	0.0000
BREPUUS-BREPUUS(-1)	-0.003042	0.063360	-0.048009	0.9618
DFTCPUS-(DFTCPUS(-12)+DFTCPUS(-24))/2	8.652616	1.850195	4.676596	0.0000
DFPSPUS(-1)-(DFPSPUS(-13)+DFPSPUS(-25)+DFPSPUS(-37)+DFPSPUS(-49))/4	-0.258833	0.034560	-7.489414	0.0000
D0601	-11.26414	4.261295	-2.643361	0.0100
D0608	10.63243	4.226874	2.515435	0.0140
D06+D07	8.997870	1.330545	6.762544	0.0000
D08	27.19457	2.877458	9.450901	0.0000
D0801+D0802	-19.90626	3.763376	-5.289468	0.0000
D0809	18.15277	4.468054	4.062792	0.0001
D0901	12.03749	4.508358	2.670040	0.0093
D1209+D1210	11.84083	3.115230	3.800949	0.0003
D1310+D1311	-8.988168	3.116241	-2.884298	0.0051
D1406	-13.26244	4.159806	-3.188234	0.0021
JAN	2.761655	2.102740	1.313360	0.1930
FEB	6.144280	1.945258	3.158595	0.0023
MAR	7.010915	1.915337	3.660408	0.0005
APR	9.156040	1.890878	4.842215	0.0000
MAY	8.575229	1.883777	4.552146	0.0000
JUN	8.143565	1.937463	4.203212	0.0001
JUL	5.233093	1.940731	2.696454	0.0086
AUG	7.473655	2.012127	3.714306	0.0004
SEP	5.335390	2.052846	2.599022	0.0112
OCT	9.191626	2.042120	4.501022	0.0000
NOV	8.857361	1.977782	4.478431	0.0000
DSWHUUS(-1)-(100*BREPUUS(-1)/42)	0.184349	0.075618	2.437894	0.0171

R-squared	0.940749	Mean dependent var	42.88769
Adjusted R-squared	0.921259	S.D. dependent var	13.69760
S.E. of regression	3.843670	Akaike info criterion	5.746297
Sum squared resid	1122.809	Schwarz criterion	6.415408
Log likelihood	-267.0611	Hannan-Quinn criter.	6.017243
F-statistic	48.26716	Durbin-Watson stat	1.848403
Prob(F-statistic)	0.000000		

Regression 20. D2WHUUS-DSWHUUS, Distillate Fuel Wholesale Price Spread, Heating Oil Minus Diesel Fuel, U.S.

Dependent Variable: D2WHUUS-DSWHUUS
Method: Least Squares
Date: 02/03/15 Time: 08:45
Sample: 2005M01 2014M06
Included observations: 114

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.824193	0.828818	2.200958	0.0304
DSWHUUS-DSWHUUS(-1)	-0.139488	0.013937	-10.00810	0.0000
DFPSPUS(-1)-(DFPSPUS(-13)+DFPSPUS(-25)+DFPSPUS(-37)+DFPSPUS(-49))/4	0.013929	0.011937	1.166932	0.2464
(QHFO_NEC*(ZWHD_NEC-ZWHN_NEC)/ZSAJQUS+QHFO_MAC*(ZWHD_MAC-ZWHN_MAC)/ZSAJQUS)/(QHFO_NEC+QHFO_MAC)	0.131732	0.088519	1.488173	0.1403
D0510	-11.94272	2.419953	-4.935104	0.0000
D0605+D0606+D0607	-6.456763	1.409842	-4.579777	0.0000
D0611	-8.592642	2.435824	-3.527611	0.0007
D0703	-8.199352	2.392341	-3.427334	0.0009
D0806	6.828290	2.421491	2.819871	0.0059
D0809+D0810	-10.37770	1.809186	-5.736116	0.0000
D0902	9.686691	2.456916	3.942622	0.0002
D1202	8.396732	2.469868	3.399668	0.0010
D1206	-6.886609	2.473169	-2.784528	0.0066
D1304+D1305	-9.526500	1.728110	-5.512669	0.0000
D1401	6.173336	2.450720	2.518988	0.0136
JAN	-1.487523	1.108548	-1.341866	0.1831
FEB	-7.725526	1.168705	-6.610327	0.0000
MAR	-5.762238	1.110299	-5.189808	0.0000
APR	-6.568995	1.089380	-6.030030	0.0000
MAY	-4.632705	1.083333	-4.276346	0.0000
JUN	-5.599580	1.137128	-4.924317	0.0000
JUL	-5.289056	1.103415	-4.793351	0.0000
AUG	-8.833608	1.093347	-8.079421	0.0000
SEP	-4.832418	1.135730	-4.254898	0.0001
OCT	-4.046705	1.149102	-3.521625	0.0007
NOV	-2.517153	1.111900	-2.263831	0.0261
D2WHUUS(-1)-DSWHUUS(-1)	0.606483	0.041481	14.62063	0.0000

R-squared	0.921585	Mean dependent var	-9.317544
Adjusted R-squared	0.898151	S.D. dependent var	7.070095
S.E. of regression	2.256339	Akaike info criterion	4.668758
Sum squared resid	442.9228	Schwarz criterion	5.316805
Log likelihood	-239.1192	Hannan-Quinn criter.	4.931764
F-statistic	39.32622	Durbin-Watson stat	1.988972
Prob(F-statistic)	0.000000		

Regression 21. DSRTUUS-DSWHUUS, Diesel Fuel Retail Margin, U.S.

Dependent Variable: DSRTUUS-DSWHUUS
Method: Least Squares
Date: 01/16/15 Time: 15:30
Sample: 2006M01 2014M06
Included observations: 102

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	59.35543	3.085880	19.23452	0.0000
DSWHUUS-DSWHUUS(-1)	-0.354921	0.020766	-17.09121	0.0000
@TREND(2005:12)	0.225892	0.015221	14.84084	0.0000
D06	2.029456	1.015890	1.997713	0.0491
D0711	10.40165	2.927308	3.553317	0.0006
D0803	12.18359	2.893052	4.211326	0.0001
D0805+D0806+D0807	10.00370	1.711931	5.843517	0.0000
D0810	11.78130	3.084578	3.819421	0.0003
D0905	-6.533092	2.830596	-2.308027	0.0235
JAN	0.230978	1.329546	0.173727	0.8625
FEB	0.256555	1.337363	0.191836	0.8484
MAR	2.712993	1.358813	1.996590	0.0492
APR	2.272301	1.341943	1.693292	0.0942
MAY	1.957916	1.337689	1.463656	0.1472
JUN	1.224263	1.320697	0.926982	0.3567
JUL	-1.511715	1.374594	-1.099753	0.2747
AUG	-0.701563	1.332685	-0.526428	0.6000
SEP	-1.366471	1.320195	-1.035052	0.3037
OCT	-4.787443	1.385903	-3.454386	0.0009
NOV	-2.487028	1.366221	-1.820370	0.0724
DSRTUUS(-1)-DSWHUUS(-1)	0.106973	0.043973	2.432694	0.0172

R-squared	0.944083	Mean dependent var	79.79328
Adjusted R-squared	0.930276	S.D. dependent var	9.978925
S.E. of regression	2.634958	Akaike info criterion	4.956853
Sum squared resid	562.3833	Schwarz criterion	5.497288
Log likelihood	-231.7995	Hannan-Quinn criter.	5.175693
F-statistic	68.37883	Durbin-Watson stat	1.858770
Prob(F-statistic)	0.000000		

Regression 22. D2RCAUS-D2WHUUS, Heating Oil Retail Margin, U.S.

Dependent Variable: D2WHUUS-DSWHUUS
Method: Least Squares
Date: 01/28/15 Time: 09:54
Sample: 2005M01 2014M06
Included observations: 114

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.824193	0.828818	2.200958	0.0304
DSWHUUS-DSWHUUS(-1)	-0.139488	0.013937	-10.00810	0.0000
DFPSPUS(-1)-(DFPSPUS(-13)+DFPSPUS(-25)+DFPSPUS(-37)+DFPSPUS(-49))/4	0.013929	0.011937	1.166932	0.2464
(QHFO_NEC*(ZWHD_NEC-ZWHN_NEC)/ZSAJQUS+QHFO_MAC*(ZWHD_MAC-ZWHN_MAC)/ZSAJQUS)/(QHFO_NEC+QHFO_MAC)	0.131732	0.088519	1.488173	0.1403
D0510	-11.94272	2.419953	-4.935104	0.0000
D0605+D0606+D0607	-6.456763	1.409842	-4.579777	0.0000
D0611	-8.592642	2.435824	-3.527611	0.0007
D0703	-8.199352	2.392341	-3.427334	0.0009
D0806	6.828290	2.421491	2.819871	0.0059
D0809+D0810	-10.37770	1.809186	-5.736116	0.0000
D0902	9.686691	2.456916	3.942622	0.0002
D1202	8.396732	2.469868	3.399668	0.0010
D1206	-6.886609	2.473169	-2.784528	0.0066
D1304+D1305	-9.526500	1.728110	-5.512669	0.0000
D1401	6.173336	2.450720	2.518988	0.0136
JAN	-1.487523	1.108548	-1.341866	0.1831
FEB	-7.725526	1.168705	-6.610327	0.0000
MAR	-5.762238	1.110299	-5.189808	0.0000
APR	-6.568995	1.089380	-6.030030	0.0000
MAY	-4.632705	1.083333	-4.276346	0.0000
JUN	-5.599580	1.137128	-4.924317	0.0000
JUL	-5.289056	1.103415	-4.793351	0.0000
AUG	-8.833608	1.093347	-8.079421	0.0000
SEP	-4.832418	1.135730	-4.254898	0.0001
OCT	-4.046705	1.149102	-3.521625	0.0007
NOV	-2.517153	1.111900	-2.263831	0.0261
D2WHUUS(-1)-DSWHUUS(-1)	0.606483	0.041481	14.62063	0.0000

R-squared	0.921585	Mean dependent var	-9.317544
Adjusted R-squared	0.898151	S.D. dependent var	7.070095
S.E. of regression	2.256339	Akaike info criterion	4.668758
Sum squared resid	442.9228	Schwarz criterion	5.316805
Log likelihood	-239.1192	Hannan-Quinn criter.	4.931764
F-statistic	39.32622	Durbin-Watson stat	1.988972
Prob(F-statistic)	0.000000		

Regression 23. DFPSP1BLD, Regional total distillate fuel stock build, PADD1

Dependent Variable: DFPSP1BLD
Method: Least Squares
Date: 10/29/14 Time: 16:12
Sample: 2007M01 2013M12
Included observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.257149	1.041616	-0.246875	0.8058
(QHFO_NEC*(ZWHD_NEC-ZWHN_NEC)+QHFO_MAC*(ZWHD_MAC-ZWHN_MAC)+QHFO_SAC*(ZWHD_SAC-ZWHN_SAC))/(QHFO_NEC+QHFO_MAC+QHFO_SAC)	-0.002156	0.003650	-0.590585	0.5569
DFPSPP1(-1)-((DFPSPP1(-13)+DFPSPP1(-25)+DFPSPP1(-37)+DFPSPP1(-49))/4)	0.012411	0.020461	0.606551	0.5463
D0702	-10.47484	2.398679	-4.366917	0.0000
D0802	-6.296891	2.243686	-2.806493	0.0067
D0902+D0903+D0904+D0905	4.934752	1.138555	4.334224	0.0001
D0912	-9.624722	2.371296	-4.058844	0.0001
D1012	-7.545155	2.384129	-3.164742	0.0024
D1205+D1206	-4.073523	1.583737	-2.572095	0.0125
D1212	6.200080	2.334662	2.655665	0.0100
JAN	-3.318832	1.293122	-2.566527	0.0127
FEB	-4.137426	1.388480	-2.979824	0.0041
MAR	-4.038700	1.301646	-3.102763	0.0029
APR	-0.957745	1.302346	-0.735400	0.4648
MAY	1.794700	1.330175	1.349221	0.1821
JUN	3.769162	1.322643	2.849721	0.0059
JUL	4.104662	1.291135	3.179110	0.0023
AUG	3.504255	1.288426	2.719795	0.0084
SEP	0.282180	1.284306	0.219714	0.8268
OCT	-0.605389	1.282531	-0.472027	0.6385
NOV	0.749162	1.288471	0.581435	0.5630

R-squared	0.814616	Mean dependent var	-0.353381
Adjusted R-squared	0.755764	S.D. dependent var	4.122908
S.E. of regression	2.037551	Akaike info criterion	4.473692
Sum squared resid	261.5516	Schwarz criterion	5.081396
Log likelihood	-166.8951	Hannan-Quinn criter.	4.717984
F-statistic	13.84176	Durbin-Watson stat	2.073258
Prob(F-statistic)	0.000000		

Regression 24. DFPSP2BLD, Regional total distillate fuel stock build, PADD2

Dependent Variable: DFPSP2BLD
Method: Least Squares
Date: 10/29/14 Time: 16:15
Sample: 2007M01 2013M12
Included observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.015340	0.427087	9.401699	0.0000
(QHFO_ENC*(ZWHD_ENC-ZWHN_ENC)+QHFO_WNC*(ZWHD_WNC-ZWHN_WNC))/(QHFO_ENC+QHFO_WNC)	-0.000914	0.001319	-0.692531	0.4911
DFPSPP2(-1)-((DFPSPP2(-13)+DFPSPP2(-25)+DFPSPP2(-37)+DFPSPP2(-49))/4)	-0.332705	0.077715	-4.281077	0.0001
D0707	-2.527577	1.110223	-2.276639	0.0262
D09	1.487541	0.491092	3.029045	0.0035
D0912	-3.418799	1.146016	-2.983204	0.0040
D1108	-4.436268	1.103003	-4.021992	0.0002
D12	-0.810194	0.351371	-2.305806	0.0244
D13	-1.022197	0.361792	-2.825375	0.0063
JAN	-2.071069	0.570195	-3.632215	0.0006
FEB	-4.155060	0.569712	-7.293269	0.0000
MAR	-5.587684	0.584713	-9.556287	0.0000
APR	-4.047763	0.574353	-7.047520	0.0000
MAY	-3.849073	0.581575	-6.618356	0.0000
JUN	-4.378625	0.570360	-7.676948	0.0000
JUL	-2.640213	0.591466	-4.463845	0.0000
AUG	-3.243919	0.591213	-5.486890	0.0000
SEP	-4.174974	0.570269	-7.321065	0.0000
OCT	-6.374162	0.570143	-11.17994	0.0000
NOV	-3.569501	0.571171	-6.249448	0.0000

R-squared	0.780797	Mean dependent var	0.028429
Adjusted R-squared	0.715721	S.D. dependent var	1.904415
S.E. of regression	1.015392	Akaike info criterion	3.072684
Sum squared resid	65.98537	Schwarz criterion	3.651450
Log likelihood	-109.0527	Hannan-Quinn criter.	3.305343
F-statistic	11.99826	Durbin-Watson stat	1.641793
Prob(F-statistic)	0.000000		

Regression 25. DFPSP3BLD, Regional total distillate fuel stock build, PADD3

Dependent Variable: DFPSP3BLD
Method: Least Squares
Date: 10/29/14 Time: 16:18
Sample: 2007M01 2013M12
Included observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.176155	0.550327	5.771401	0.0000
(QHFO_ESC*(ZWHD_ESC-ZWHN_ESC)+QHFO_WSC*(ZWHD_WSC-ZWHN_WSC))/(QHFO_ESC+QHFO_WSC)	0.010915	0.002637	4.139390	0.0001
DFPSPP3(-1)-((DFPSPP3(-13)+DFPSPP3(-25)+DFPSPP3(-37)+DFPSPP3(-49))/4)	-0.006799	0.024520	-0.277296	0.7825
D07	-0.125967	0.445338	-0.282858	0.7783
D0712+D0801	-3.130003	1.071832	-2.920236	0.0049
D0902	4.347896	1.509384	2.880577	0.0055
D0908	4.269150	1.519210	2.810112	0.0067
D0911	-5.154215	1.573848	-3.274913	0.0018
D1001	-6.514832	1.554992	-4.189625	0.0001
D11	-1.761381	0.533339	-3.302554	0.0016
D1103	4.712191	1.561454	3.017822	0.0038
D1108	7.750793	1.584256	4.892385	0.0000
D1110	-4.613822	1.565447	-2.947287	0.0046
D1306	-5.466503	1.486766	-3.676773	0.0005
JAN	-2.024213	0.762552	-2.654525	0.0102
FEB	-4.946873	0.784688	-6.304256	0.0000
MAR	-2.975609	0.784968	-3.790739	0.0004
APR	-3.268430	0.747968	-4.369747	0.0001
MAY	-1.185968	0.747483	-1.586615	0.1179
JUN	-2.047066	0.777932	-2.631419	0.0108
JUL	-0.681408	0.747994	-0.910982	0.3660
AUG	-4.438087	0.821237	-5.404147	0.0000
SEP	-4.041384	0.747574	-5.406001	0.0000
OCT	-3.903672	0.781873	-4.992720	0.0000
NOV	-2.342376	0.785677	-2.981348	0.0042

R-squared	0.766409	Mean dependent var	0.106845
Adjusted R-squared	0.671389	S.D. dependent var	2.387801
S.E. of regression	1.368797	Akaike info criterion	3.707700
Sum squared resid	110.5427	Schwarz criterion	4.431157
Log likelihood	-130.7234	Hannan-Quinn criter.	3.998524
F-statistic	8.065773	Durbin-Watson stat	2.382912
Prob(F-statistic)	0.000000		

Regression 26. DFPSP4BLD, Regional total distillate fuel stock build, PADD4

Dependent Variable: DFPSP4BLD
Method: Least Squares
Date: 10/29/14 Time: 16:20
Sample: 2007M01 2013M12
Included observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.261125	0.076586	3.409570	0.0011
ZWHD_MTN-ZWHN_MTN	-0.000879	0.000418	-2.104930	0.0391
DFPSPP4(-1)-((DFPSPP4(-13)+DFPSPP4(-25)+DFPSPP4(-37)+DFPSPP4(-49))/4)	-0.597197	0.073867	-8.084738	0.0000
D1105	0.909145	0.199224	4.563431	0.0000
D1109	-0.614719	0.196422	-3.129587	0.0026
D1111+D1112+D1201+D1202+D1203	0.390744	0.091464	4.272129	0.0001
D1307	-0.450230	0.196413	-2.292259	0.0251
JAN	-0.170418	0.097229	-1.752750	0.0843
FEB	-0.067070	0.097320	-0.689172	0.4931
MAR	-0.176428	0.099485	-1.773422	0.0808
APR	-0.091083	0.098719	-0.922652	0.3595
MAY	-0.014262	0.102766	-0.138786	0.8900
JUN	-0.187084	0.100265	-1.865901	0.0665
JUL	-0.210072	0.104467	-2.010882	0.0484
AUG	-0.217019	0.100574	-2.157818	0.0346
SEP	-0.054453	0.104926	-0.518962	0.6055
OCT	-0.228945	0.098901	-2.314886	0.0237
NOV	0.290926	0.104022	2.796766	0.0068

R-squared	0.742584	Mean dependent var	0.006750
Adjusted R-squared	0.676279	S.D. dependent var	0.319565
S.E. of regression	0.181821	Akaike info criterion	-0.384176
Sum squared resid	2.181892	Schwarz criterion	0.136714
Log likelihood	34.13538	Hannan-Quinn criter.	-0.174783
F-statistic	11.19964	Durbin-Watson stat	2.066498
Prob(F-statistic)	0.000000		

Regression 27. DFPSP5BLD, Regional total distillate fuel stock build, PADD5

Dependent Variable: DFPSP5BLD
Method: Least Squares
Date: 10/29/14 Time: 16:21
Sample: 2008M01 2013M12
Included observations: 72

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.246562	0.226260	5.509428	0.0000
ZWHD_PAC-ZWHN_PAC	0.002157	0.001583	1.362682	0.1789
DFPSPP5(-1)-((DFPSPP5(-13)+DFPSPP5(-25)+DFPSPP5(-37)+DFPSPP5(-49))/4)	-0.548195	0.078362	-6.995665	0.0000
D0808	2.180535	0.513509	4.246343	0.0001
D0811	1.924184	0.533009	3.610041	0.0007
D0902	1.798280	0.510859	3.520112	0.0009
D1003	-1.490480	0.526843	-2.829075	0.0066
D1107	2.109860	0.512829	4.114156	0.0001
D1204	-1.123735	0.521030	-2.156757	0.0357
JAN	-1.116083	0.274157	-4.070965	0.0002
FEB	-2.074608	0.283481	-7.318337	0.0000
MAR	-1.316971	0.282516	-4.661585	0.0000
APR	-1.366946	0.283704	-4.818216	0.0000
MAY	-1.058027	0.277062	-3.818741	0.0004
JUN	-0.854915	0.288464	-2.963679	0.0046
JUL	-1.320628	0.304840	-4.332197	0.0001
AUG	-2.437458	0.304965	-7.992591	0.0000
SEP	-0.495674	0.301456	-1.644265	0.1062
OCT	-1.282947	0.280153	-4.579450	0.0000
NOV	-0.586762	0.285374	-2.056116	0.0448

R-squared	0.835724	Mean dependent var	0.003222
Adjusted R-squared	0.775699	S.D. dependent var	0.983861
S.E. of regression	0.465960	Akaike info criterion	1.540701
Sum squared resid	11.29020	Schwarz criterion	2.173109
Log likelihood	-35.46525	Hannan-Quinn criter.	1.792464
F-statistic	13.92314	Durbin-Watson stat	1.763114
Prob(F-statistic)	0.000000		

Regression 28. JKTCUUS-DSWHUUS, Jet Fuel Retail Margin, U.S.

Dependent Variable: JKTCUUS-DSWHUUS
Method: Least Squares
Date: 01/13/15 Time: 12:32
Sample: 2000M01 2014M06
Included observations: 174

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.920432	1.931126	2.547960	0.0118
DSWHUUS-DSWHUUS(-1)	-0.066275	0.019204	-3.451115	0.0007
RGDPQ_WORLD	-0.025439	0.018705	-1.359992	0.1758
D0609	9.520915	3.632681	2.620906	0.0096
D0703	-8.074052	3.408211	-2.369000	0.0191
D0806+D0807	11.46667	2.421491	4.735377	0.0000
D1105	8.891935	3.441262	2.583917	0.0107
D1305	-15.33662	3.434077	-4.466010	0.0000
JAN	-0.032236	1.271705	-0.025349	0.9798
FEB	-3.663020	1.304022	-2.809017	0.0056
MAR	-2.932361	1.281571	-2.288100	0.0235
APR	-4.203383	1.245417	-3.375080	0.0009
MAY	-2.286852	1.277167	-1.790566	0.0753
JUN	-3.028761	1.241007	-2.440567	0.0158
JUL	-3.857175	1.274570	-3.026256	0.0029
AUG	-4.380870	1.263483	-3.467296	0.0007
SEP	-2.354233	1.282388	-1.835820	0.0683
OCT	-4.292050	1.252853	-3.425820	0.0008
NOV	-3.220511	1.243267	-2.590362	0.0105
JKTCUUS(-1)-DSWHUUS(-1)	0.352056	0.064096	5.492662	0.0000

R-squared	0.556581	Mean dependent var	-0.354023
Adjusted R-squared	0.501873	S.D. dependent var	4.656397
S.E. of regression	3.286397	Akaike info criterion	5.325243
Sum squared resid	1663.262	Schwarz criterion	5.688353
Log likelihood	-443.2961	Hannan-Quinn criter.	5.472543
F-statistic	10.17374	Durbin-Watson stat	1.866485
Prob(F-statistic)	0.000000		

Regression 29. JFPSBLD, U.S. total jet fuel stock build

Dependent Variable: JFPSBLD
Method: Least Squares
Date: 01/26/15 Time: 06:25
Sample: 2006M01 2014M06
Included observations: 102

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.114519	0.404851	-0.282866	0.7780
ZWHDPUS-ZWHNPUS	-0.000120	0.002245	-0.053319	0.9576
JFPSPUS(-1)-((JFPSPUS(-13)+JFPSPUS(-25)+JFPSPUS(-37)+JFPSPUS(-49))/4)	-0.079705	0.040877	-1.949891	0.0545
D0809	-4.543407	1.222723	-3.715812	0.0004
D0901+D0902	2.577038	0.859725	2.997514	0.0036
D1208	3.205965	1.247718	2.569462	0.0119
JAN	0.598434	0.564122	1.060823	0.2918
FEB	-0.540729	0.568831	-0.950598	0.3445
MAR	-0.520017	0.556513	-0.934421	0.3527
APR	0.786361	0.556487	1.413081	0.1613
MAY	0.762533	0.557741	1.367181	0.1752
JUN	-0.461420	0.556411	-0.829278	0.4093
JUL	1.312852	0.572825	2.291889	0.0244
AUG	-0.256672	0.595472	-0.431040	0.6675
SEP	1.507477	0.594033	2.537698	0.0130
OCT	-0.763357	0.575735	-1.325882	0.1884
NOV	-1.887437	0.574027	-3.288065	0.0015

R-squared	0.529767	Mean dependent var	-0.053412
Adjusted R-squared	0.441252	S.D. dependent var	1.530022
S.E. of regression	1.143683	Akaike info criterion	3.257396
Sum squared resid	111.1809	Schwarz criterion	3.694892
Log likelihood	-149.1272	Hannan-Quinn criter.	3.434553
F-statistic	5.985083	Durbin-Watson stat	2.188894
Prob(F-statistic)	0.000000		