

# How a Gas Tax Increase Affects the Retail Pump Price

## An Economic Analysis of 2013-14 Market Impacts in 5 States

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### Executive Summary

This analysis is the first research that has looked at the:

- **Weekly fluctuation in the average retail price of a gallon of regular gasoline at the national and state levels since January 2005;** and the
- **Actual market impact gas tax increases in five states during 2013 and January 2014 had on the average state retail price of a gallon of regular gasoline** the day of and the day after enactment, as well as a month and year later. The states were Massachusetts, Maryland, Pennsylvania, Vermont and Wyoming.

Based on the real world pump price impacts observed at the state level, we can forecast with a high degree of confidence **the likely retail pump price impact of a 15 cent per gallon increase in the federal motor fuels excise.**

For the analysis, we used data obtained from the U.S. Energy Information Administration (EIA) and the Oil Price Information Service (OPIS), one of the world's most comprehensive sources for petroleum pricing and news information.

We found:

- **The national average retail price for a gallon of regular gasoline has fluctuated an average five cents-per-gallon week-to-week since January 2005.**
  - **Compared to the average state pump price for regular gas the day before the state gas tax increases went into effect:**

- **On the day the tax increase went into effect, the average state pump price increased by just over one cent-per-gallon, or 15 percent of the enacted tax hike;**
- **On the day after the increase went into effect,** the average state pump price increased only another 0.3 cents per gallon, to 1.4 cents, **a total of 22 percent of the enacted tax hike;**
- One month after the state increase went into effect, the average retail price of gas had risen nine cents per gallon—or 2.5 percent above the baseline price. Over the same period of time, however, the national average retail price of gas had risen 2.1 percent;
- **One year after the state gas tax had gone into effect, the average price for a gallon of regular gas in those states had dropped 13 cents-per-gallon below the average baseline price—a 3.7 percent decrease. Nationally, over the same period, the average pump price had dropped 3.3 percent.**

The findings corroborate the results of an empirical study of the same 2013 data using a fixed effects econometric model to examine 19 changes in state gasoline related tax rates on the retail price of gasoline. Our analysis included one-time changes as well as variable gas tax related rates.

In an interesting side note, EIA data show the U.S. average retail price for all grades of gasoline was \$1.045 per gallon the week before the federal gas tax was last adjusted by 4.3 cents (up to 18.4 cents) in October 1993. The retail price of gasoline increased to \$1.047 the week the increase took effect. A month after initiation of the adjustment, the average price per gallon had increased to \$1.09 per gallon, but prices fell again over the next four weeks to \$1.036 cents per gallon the first week of December, two months after the increase took effect.

Based on these findings, it is projected that **a 15 cents-per-gallon gas tax increase at the federal level would likely result in a 5.9 cents-per-gallon increase in the pump price the week of enactment plus an additional 2.4 cents-per-gallon within four weeks of enactment. Thereafter, it would be a relatively insignificant pricing factor. In fact, the impact of a 15 cent increase in the federal gas tax would likely be “lost” in the week-to-week price fluctuation that has occurred at the gas pump for the last 10 years.**

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## An Economic Analysis of 2013-14 Market Impacts

### Introduction

When it comes to highway and transit funding, Congress now faces a \$15 billion annual problem that is not going away. That's the gap that exists between the amount of user revenue the federal government collects for the Highway Trust Fund and the amount of money the government currently provides the states for surface transportation infrastructure improvements.

Two congressionally-mandated study commissions and virtually every organization representing transportation users, whether individuals or business, have concluded and support a seemingly simple solution to this problem—increase the per gallon federal gas and diesel tax.<sup>1</sup> The motor fuels tax rate, which is flat, has not been adjusted since 1993.

The motor fuels excise is a proven, highly efficient tax collection mechanism. And the latest forecasts from the U.S. Energy Information Administration (EIA) and the Congressional Budget Office show its revenue-generating potential remains predictable and substantial for at least the next decade.

Despite these facts, President Obama and the congressional leadership have made no moves, to date, to adjust the federal gas and diesel tax rates upward to resolve the Highway Trust Fund's structural problem and raise the additional revenue needed to address the nation's substantial, unmet highway, bridge and transit capital investment needs.

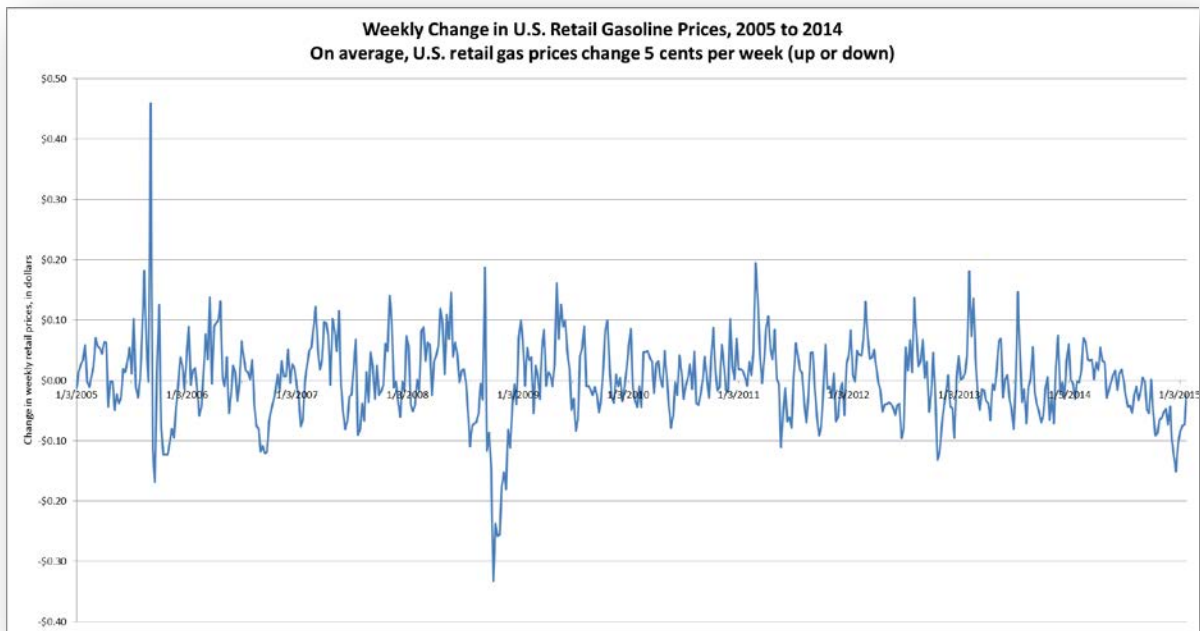
Both the Administration and the congressional leadership have expressed the opinion, repeatedly, that a gas tax hike is "not politically feasible." If the concern is that there will be voter backlash caused by an increase in the price they pay for gasoline resulting from a modest gas tax increase, our research of what actually happens in the marketplace shows that would likely not be the case.

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<sup>1</sup> The National Surface Transportation Infrastructure Financing Commission and the National Surface Transportation Policy and Revenue Study Commission.

## Gas Prices Change Significantly From Week to Week

Ask any American driver. They will tell you the price they pay for a gallon of gasoline can change significantly week to week. In fact, as the chart below illustrates, U.S. Energy Information Administration (EIA) data tracking the weekly national average retail price Americans paid for gasoline shows it has fluctuated an average five cents-per-gallon since January 2005.



The fluctuation has varied state-to-state. For example, our review of weekly price data compiled the EIA for nine states since January 2005 found:

- Ohio retail gasoline prices have fluctuated an average 10 cents-per-gallon weekly;
- In Minnesota the average weekly fluctuation has been seven cents-per-gallon;
- In California, Colorado, Florida, Texas and Washington, it matched the national average fluctuation of five cents-per-gallon; and
- The fluctuation in Massachusetts and New York was slightly lower than the national average at four-cents-per-gallon.

Politicians often cite concerns about raising prices at the pump as a reason to oppose a gas tax increase. But given the weekly volatility of retail gas prices, would a modest gas tax increase even be noticed by consumers when they purchase motor fuel? We analyzed the retail price impact of recent gas tax increases in five states—Massachusetts, Maryland, Pennsylvania, Vermont and Wyoming—to find out. But first, an understanding of the factors that determine pricing for a gallon of gasoline at the retail level is helpful and provides necessary context.

## Market Dynamics Are the Major Drivers of Gasoline Prices

The four factors that drive the retail price Americans pay at the gas pump, according to the EIA, are: (1) the price of crude oil; (2) refining costs and profit margins; (3) retail and distribution costs and profit margins; and (4) taxes.<sup>2</sup> The EIA concludes most of the variability in retail gasoline prices is from the price of crude oil, refining costs and profit margins.

The Association for Convenience and Petroleum Retailing says factors that contribute to different retail gasoline prices within a given geographic area include distribution costs, regulatory mandated fuel blend requirements, business costs, market conditions, the brand of fuel, taxes and the pricing strategy of the individual retail outlet.<sup>3</sup>

## What Previous Academic Research Has Found

While ours is the first analysis to look at the immediate, short- and longer-term impact of a state gas increase on the retail price of gasoline, there are a number of academic studies that have analyzed U.S. gasoline pricing. Among the key findings and conclusions:

- Gas prices can be “sticky,” in that the “fundamentals driving the price change continuously and prices change only occasionally” [emphasis added]. This study concludes a retail firm’s decision to change wholesale gasoline prices is based on the “benefits of having an optimal price” and the strategic considerations of “how customers and competitors will react to a particular change.”<sup>4</sup>
- Another study found retail gasoline prices are largely “unpredictable” and “depend primarily on developments in the global crude oil market.”<sup>5</sup>

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<sup>2</sup> U.S. Energy Information Administration, *What Drives U.S. Gasoline Prices?*, October 2014.

<sup>3</sup> NACS Gas Price Kit

<sup>4</sup> Michael C. Davis, & James D. Hamilton, *Why Are Prices Sticky? The Dynamics of Wholesale Gasoline Prices*.

<sup>5</sup> Lutz Kilian, *Explaining Fluctuations in Gasoline Prices: A Joint Model of the Global Crude Oil Market and the U.S. Retail Gasoline Market*, September 2, 2009.

- 2004 research shows gasoline prices respond to crude oil price shocks in different ways—prices adjust quickly to shocks that are considered long-term changes and do not adjust if the increase in the crude price is seen as temporary.<sup>6</sup> As part of their analysis, the authors included a variable to take into account that the federal gasoline tax rate had increased on October 1, 1993, which might be considered a possible long term shock to the market that, in theory, would affect gasoline prices. The model results, however, showed the 4.3 cents per gallon tax increase was insignificant, having no impact on retail prices.
- Other work suggests although the retail gasoline market may appear to be competitive, there are a number of “institutional features” that actually deter some competitive characteristics of the market.<sup>7</sup> The authors note pricing decisions by retail gasoline stations are influenced by demographics, local competition and consumer travel costs. They observe that while fuels tax rates vary across states “the extent of taxes passed onto consumers will depend on how relatively inelastic state demand for gasoline actually is.”

## **An Empirical Analysis—Short Run Impact of Gasoline-Related Taxes on Retail Prices**

Our analysis, however, is the first to examine the changes that occur in daily retail gasoline prices after a gas tax increase goes into effect. A Harvard University study looked at monthly retail gasoline prices and concluded the “pass-through” rate for gasoline and diesel taxes to retail prices is affected by such things as “supply elasticity, including refinery capacity utilization, inventory levels, gasoline content regulations, and the utilization of diesel for home heating.”<sup>8</sup>

For our analysis, we obtained daily average retail gasoline price data for all U.S. states from December 1, 2012, through December 31, 2013, from the Oil Price Information Service (OPIS), which is recognized as one of the world’s most comprehensive sources for petroleum prices and news information. Its client list includes the top 200 oil companies, thousands of distributors, traders, government and commercial buyers of petroleum products.

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<sup>6</sup> Stanislav Radchenko, *Lags in the response of gasoline prices to changes in crude oil prices: the role of short-term and long-term shocks.*, January 2004

<sup>7</sup> Mark Holmes, Jesus Otero & Theodore Panagiotidis, *Of the Dynamics of Gasoline Market Integration in the United States: Evidence Form A Pair-Wise Approach.*

<sup>8</sup> Justin Marion & Erich Muehlegger, *Fuel Tax Incidence and Supply Conditions*, HKS Faculty Research Working Paper Series, RWP 10-014, John F. Kennedy School of Government, Harvard University.

We also obtained source information on 19 changes in state gasoline tax rates (both the excise and/or any related fees that are calculated as a cents-per-gallon change) that occurred in 13 states during 2013.

Our econometric model estimated the daily change in retail gasoline prices at the state level with a fixed effects model using state panel data. The independent variables include the daily difference in state gasoline-related excise tax rates and the lagged daily difference in the national price of Brent crude oil for a period of 30 days prior to each observation. State- and time-fixed effects were included individually and as an interactive variable. This was to account for any seasonal and state-specific supply and demand factors that could impact the retail price of gasoline, such as the local competitive environment, refinery capacity and utilization, gasoline inventories, different fuel blends, seasonal demand and differences in state economic factors.

The gasoline-related tax rate adjustments in the 13 states included legislatively-approved changes and variable rates that occur automatically based on a price index. States with variable rates set their cents-per-gallon rate either annually, every six-month or each quarter.

Four of the changes tracked in the model were newly-enacted increases, including new tax rates in Massachusetts, Maryland, Vermont and Wyoming. Variable rates were increased in California, Florida, Georgia, Kentucky, Nebraska, New York, North Carolina and West Virginia.

There were four decreases in gasoline tax rates that occurred in states that review their rates more than once a year — Georgia, Nebraska, North Carolina and Vermont. There was also a decline in the Virginia rate.

The model included all of these changes.

Although not always understood by consumers, media, or politicians, the motor fuels tax, while folded into the overall price at the pump, is not collected by retail sales outlets. The federal and most state gasoline taxes are collected either when motor fuel is removed from the bulk storage terminal or at the distributor level.<sup>9</sup>

As previously noted, there are a number of factors that are taken into account when refineries and distributors set the wholesale price of gasoline they charge gas stations. These include the sensitivity of consumers and the retail outlets themselves to price changes.

Our econometric model showed that when you hold all other factors constant, on average, about 39 percent of an increase in state gas related taxes is passed through to the retail price of gasoline the day the tax goes into effect.

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<sup>9</sup> U.S. Federal Highway Administration, Motor Fuel Tax Compliance Outreach.

The model estimates that an additional 16 percent of the gas tax increase is passed through over the next 30 days.

The results did not show any price impact after 30 days, which is consistent with other studies that have found factors considered long term price changes are usually realized within 30 days.<sup>10</sup> Changes in the lagged daily price of crude oil for up to one month were also significant, as expected.

These results also confirm previous research that suggest state gas taxes are just one component of a complex pricing scheme that includes consideration of the price of crude oil and other state specific factors.

State Gas Tax Changes between December 2012 and December 2013									
State	Date of Change	Type of Change	Gas Tax Rate Before			Change Amount (cents)	Gas Tax Rate After Change		
			Excise Tax	Other Tax	Total Tax		Excise Tax	Other Tax	Total Tax
California	7/1/2013	Variable Rate	36.0	7.0	43.0	3.5	39.5	7.0	46.5
Florida	1/1/2013	Variable Rate	4.0	12.6	16.6	0.3	4.0	12.9	16.9
Georgia (1)	1/1/2013	Variable Rate	7.5	12.1	19.6	-0.1	7.5	12.0	19.5
Georgia (2)	7/1/2013	Variable Rate	7.5	12.0	19.5	0.6	7.5	12.6	20.1
Kentucky	7/1/2013	Variable Rate	28.5	1.4	29.9	2.4	30.9	1.4	32.3
Massachusetts	7/1/2013	Gas Tax Increase	21.0	0.0	21.0	3.0	24.0	0.0	24.0
Maryland	7/1/2013	Gas Tax Increase	23.5	0.0	23.5	3.5	23.9	3.1	27.0
Nebraska (1)	1/1/2013	Variable Rate	26.2	0.9	27.1	-1.6	24.6	0.9	25.5
Nebraska (2)	7/1/2013	Variable Rate	24.6	0.9	25.5	1.7	26.3	0.9	27.2
New York	1/1/2013	Variable Rate	8.0	17.8	25.8	0.8	8.0	18.6	26.6
North Carolina (1)	7/1/2013	Variable Rate	37.5	0.3	37.8	0.1	37.6	0.3	37.9
North Carolina (2)	10/1/2013	Variable Rate	37.6	0.3	37.9	-0.1	37.5	0.3	37.8
Vermont (1)	1/1/2013	Variable Rate	19.0	7.5	26.5	0.2	19.0	7.7	26.7
Vermont (2)	4/1/2013	Variable Rate	19.0	7.7	26.7	-0.1	19.0	7.6	26.6
Vermont (3)	5/1/2013	Gas Tax Increase	19.0	7.6	26.6	5.9	18.2	14.3	32.5
Vermont (4)	10/1/2013	Variable Rate	18.2	14.3	32.5	-0.3	18.2	14.0	32.2
Virginia	7/1/2013	Gas Tax Increase	17.5	0.0	17.5	-6.4	11.1	0.0	11.1
West Virginia	1/1/2013	Variable Rate	20.5	12.9	33.4	1.3	20.5	14.2	34.7
Wyoming	7/1/2013	Gas Tax Increase	13.0	1.0	14.0	10.0	23.0	1.0	24.0

Source: ARTBA Analysis of data from the Federation of Tax Administrators, state DOT websites and news sources

## Real World Short Run Market Impacts of Changes in State Gasoline Taxes

To test the results found with our model, we looked at “real world” occurrences of changes in the daily price of retail gasoline at the state level.

Five states enacted gas tax increases or reforms in 2013 and January 2014 that translated into higher cents-per-gallon rates—Massachusetts (3 cents per gallon), Maryland (4 cents); Pennsylvania (9.8 cents), Vermont (6 cents) and Wyoming (10 cents).

<sup>10</sup> Stanislav Radchenko, *Lags in the response of gasoline prices to changes in crude oil prices: the role of short-term and long-term shocks*, January 2004



By using daily retail price data obtained from OPIS, we were able to compare changes in the price of gasoline the day before the enacted increase with prices the day of the increase, the day after the increase and again after one week, one month and one year. The overall price change would take into effect both the increase in the state gas related tax, as well as all the other market dynamics affecting supply and demand.

The data show the following:

- **The state gas tax rates increased an average 6.5 cents for the five states.**
- **On average, the pump price for gasoline increased only one cent-per-gallon the day the increase went into effect**, an increase of 0.3 percent, compared to the baseline price from the day before.
- **The day after the gas tax increase went into effect, the average pump price compared to the baseline was only 1.4 cents**, or up just 0.4 percent.
- **One month after the tax increase had gone into effect**, the average pump price had risen by nine cents per gallon, or 2.5 percent, compared to the baseline price. **The change, however, was, in each case, in line with that which had occurred in the national average price of gasoline over the same time period**, which was up 4.2 percent.
- **One year after the tax increase had gone into effect, the average pump price had dropped 13 cents-per-gallon below the baseline pump price, a decline of 3.7 percent.** Again, this was in line with the national average pump price, which had dropped 3.3 percent.

These finding corroborate the results found with our empirical fixed effects model. They also **strongly suggest that that any additional increase in retail pump prices caused by a gas tax increase will likely be “lost” in the weekly price fluctuation that has been documented over the past 10 years.**

Although our model estimated that 55 percent of any change in state gas tax-related rates would be passed on through the retail price of gasoline within 30 days of initiation, in the real world this change is countered by other market dynamics related to overall supply and demand.

State	Date gas tax increase went into effect	Per gallon gas tax increase enacted	BASELINE average pump price of gas in state <u>day before</u> tax rate hike	Average pump price of gas in state <u>day</u> <u>tax rate went into effect</u>	Plus/Minus cents from BASELINE	% pump price increase/decrease in state from BASELINE	BASELINE national average pump price of gas <u>day before</u> tax rate hike	Average national pump price of gas <u>day tax rate went into effect</u>	% change in national average prices from national Baseline
Massachusetts	7/31/2013	\$0.030	\$3.74	\$3.73	-\$0.005	-0.1%	\$3.65	\$3.67	0.7%
Maryland	7/1/2013	\$0.040	\$3.46	\$3.46	\$0.005	0.1%	\$3.52	\$3.52	0.0%
Pennsylvania	1/1/2014	\$0.098	\$3.51	\$3.52	\$0.016	0.5%	\$3.33	\$3.33	0.0%
Vermont	7/1/2013	\$0.059	\$3.55	\$3.56	\$0.007	0.2%	\$3.52	\$3.52	0.0%
Wyoming	7/1/2013	\$0.100	\$3.57	\$3.61	\$0.033	0.9%	\$3.52	\$3.52	0.0%
Average		\$0.065	\$3.57	\$3.58	\$0.011	0.3%	\$3.51	\$3.51	0.1%

State	Date gas tax increase went into effect	Per gallon gas tax increase enacted	BASELINE average pump price of gas in state <u>day before</u> tax rate hike	Average pump price of gas in state <u>the day after</u> <u>tax rate hike</u>	Plus/Minus cents from BASELINE	% pump price increase/decrease <u>the day after</u> from Baseline	BASELINE national average pump price of gas <u>day before</u> tax rate hike	Average national pump price of gas <u>the day after</u> <u>tax rate hike</u>	% change in national average prices from national Baseline
Massachusetts	7/31/2013	\$0.03	\$3.74	\$3.74	-\$0.002	-0.1%	\$3.65	\$3.66	0.4%
Maryland	7/1/2013	\$0.04	\$3.46	\$3.46	\$0.001	0.0%	\$3.52	\$3.51	-0.2%
Pennsylvania	1/1/2014	\$0.098	\$3.51	\$3.55	\$0.04	1.2%	\$3.33	\$3.33	0.0%
Vermont	7/1/2013	\$0.06	\$3.55	\$3.55	-\$0.002	-0.1%	\$3.52	\$3.51	-0.2%
Wyoming	7/1/2013	\$0.10	\$3.57	\$3.60	\$0.03	0.8%	\$3.52	\$3.51	-0.2%
Average		\$0.07	\$3.57	\$3.58	\$0.01	0.4%	\$3.51	\$3.51	0.0%

State	Date gas tax increase went into effect	Per gallon gas tax increase enacted	BASELINE average pump price of gas in state <u>day before</u> tax rate hike	Average pump price of gas in state <u>one month after</u> tax rate hike	Plus/Minus cents from BASELINE	% pump price increase/decrease <u>one month after</u> from Baseline	BASELINE national average pump price of gas <u>day before</u> tax rate hike	Average national pump price of gas <u>one month after</u> tax rate hike	% change in national average prices from national Baseline
Massachusetts	7/31/2013	\$0.03	\$3.74	\$3.70	-\$0.04	-1.0%	\$3.65	\$3.63	-0.4%
Maryland	7/1/2013	\$0.04	\$3.46	\$3.65	\$0.19	5.5%	\$3.52	\$3.66	4.1%
Pennsylvania	1/1/2014	\$0.098	\$3.51	\$3.50	-\$0.004	-0.1%	\$3.33	\$3.29	-1.1%
Vermont	7/1/2013	\$0.06	\$3.55	\$3.75	\$0.19	5.5%	\$3.52	\$3.66	4.1%
Wyoming	7/1/2013	\$0.10	\$3.57	\$3.66	\$0.09	2.5%	\$3.52	\$3.66	4.1%
Average		\$0.07	\$3.57	\$3.65	\$0.09	2.5%	\$3.51	\$3.58	2.1%

State	Date gas tax increase went into effect	Per gallon gas tax increase enacted	BASELINE average pump price of gas in state <u>day before</u> tax rate hike	Average pump price of gas in state <u>one year after</u> tax rate hike	Plus/Minus cents from BASELINE	% pump price increase/decrease <u>one year after</u> from Baseline	BASELINE national average pump price of gas <u>day before</u> tax rate hike	Average national pump price of gas <u>one year after</u> tax rate hike	% change in national average prices from national Baseline
Massachusetts	7/31/2013	\$0.03	\$3.74	\$3.63	-\$0.11	-3.0%	\$3.65	\$3.54	-2.9%
Maryland	7/1/2013	\$0.04	\$3.46	\$3.69	\$0.23	6.7%	\$3.52	\$3.70	5.2%
Pennsylvania	1/1/2014	\$0.098	\$3.51	\$2.54	-\$0.96	-27.5%	\$3.33	\$2.30	-31.0%
Vermont	7/1/2013	\$0.06	\$3.55	\$3.74	\$0.18	5.1%	\$3.52	\$3.70	5.2%
Wyoming	7/1/2013	\$0.10	\$3.57	\$3.57	\$0.00	0.0%	\$3.52	\$3.70	5.2%
Average		\$0.07	\$3.57	\$3.43	-\$0.13	-3.7%	\$3.51	\$3.39	-3.3%

## **Estimating the Retail Price Impact of a 15 Cents per Gallon Increase in the Federal Gas Tax**

The American Road & Transportation Builders Association (ARTBA) has proposed enactment of a 15 cents-per-gallon increase in the federal motor fuels tax to put the Highway Trust Fund back on solid financial footing and provide the first significant increase in federal surface transportation investment revenues since 1993. The ARTBA proposal would fund a six-year, \$401 billion federal highway and transit investment authorization and permanently eliminate the program's \$15 billion per year "funding gap."

To mitigate any perceived political backlash that might be caused by the proposed gas tax rate increase, ARTBA suggests the Congress provide American tax filers with an annual income of \$100 thousand or less with an annual tax rebate of \$90 for the six-year authorization period. The rebate would return to 94 percent of all tax filers the \$90 per year they would pay, on average, in additional federal gas tax.

The federal government gave much larger tax rebates to middle and lower income tax filers in 2001 and 2008.

Our econometric model suggests a 15 cents-per-gallon increase in the federal gas tax would result in the following retail market impacts:

- Holding all other factors constant, the retail price of gasoline would increase just under six cents per gallon the day of the rate increased.
- It would increase an additional 1.2 cents as a result of the tax increase after a two week period.
- An additional 0.4 cents and 0.8 cents would be paid by consumers at the pump in weeks three and four, respectively.
- In total, the model estimates that 55 percent of the gas tax increase—about 8.2 cents—would be passed on to consumers through the retail price of gasoline over a one month period following the rate increase. "Real world" observation of that actually happened in the five states that increased their highway user fee in 2013, however, suggests the increase at the pump could likely be less than estimated by our model.

## **Conclusion**

ARTBA's empirical analysis and examination of daily price data strongly suggest that changes in gasoline-related taxes are a small part of the overall dynamics driving the retail price of gasoline. Our fixed effects model, which is the first to examine the impact of a change in state

gasoline-related taxes on the daily retail price of gasoline, suggests that just over half of an increase in gasoline-related taxes is actually passed through to the consumer at the retail pump.

Furthermore, the likely impact of a 15 cents-per-gallon increase in the federal gas tax would likely be in line with the weekly retail gasoline price fluctuations that Americans have experienced over the last 10 years.

In an interesting side note, EIA data show the U.S. average retail price for all grades of gasoline was \$1.06 per gallon the week before the federal gas tax was last adjusted by 4.3 cents (up to 18.4 cents) in August 1993. In each of the following three weeks, the average national price variation—up and down—was within a penny. A month after initiation of the adjustment, the average price per gallon had decreased a half-cent below the baseline.

## **About OPIS**

Oil Price Information Service (OPIS) is one of the world's most comprehensive sources for petroleum pricing and news information. OPIS began covering petroleum news in 1977 with the launch of the award-winning Oil Express Newsletter. In 1980, OPIS pioneered "rack" price discovery for thousands of wholesalers, and now maintains the world's most comprehensive database of U.S. wholesale petroleum prices, publishing more than 30,000 rack prices each day at over 1,500 terminals in nearly 400 market locations.

In 1981, OPIS began providing spot price assessments for all refined products. Today, OPIS spot gasoline, diesel and jet fuel prices are highly benchmarked in the U.S. West Coast and other key markets. OPIS's refinery feedstock and LPG prices are also considered a preferred benchmark by many U.S. and international traders. All OPIS spot and rack prices are available historically to customers via our web-based TimeSeries database.

In 1999, OPIS launched the first retail fuel pricing database in North America. With its unique ability to map retail prices back to wholesale markets, it quickly launched a retail margin service. OPIS now receives daily gasoline and diesel prices for more than 130,000 retail outlets in the U.S. and Canada. OPIS prices are used by AAA, Microsoft (MSN Autos), Garmin, MapQuest and dozens of other website and mapping companies, in addition to its core oil company base.

OPIS is comprised of more than 50 information specialists, including the most experienced editors in the business, combining over 200 years of industry experience. Our editors not only

cover the market, and report breaking stories — but also provide inside analysis on what the trends mean and how they could affect prices and purchasing decisions.

The OPIS client list includes the top 200 oil companies, thousands of distributors, traders, government and commercial buyers of petroleum products.

### **About the Model**

A fixed effects regression model includes a series of group-specific constant terms to take into account unobserved characteristics that do not change over time. The model can be expanded to include a time trend variable to capture time-specific effects. By using a fixed effect specification, the model takes into account unique factors at the state level and over different time periods that would have an impact on the state level retail price of gasoline. For example, if a state is located near a refinery, that would have a consistent impact on the competitive environment and an individual state's retail price of gasoline.

The model estimates the difference in the state level retail price of gasoline. The independent variables are the lagged daily difference in the price of Brent crude oil for 30 days prior to each observation, the difference in the state gas tax related rate and a series of dummy variables to capture the impact of the rate change for a 30 day period. The model also includes fixed effects for states and each month of the year, plus an interactive term to capture any combined state and monthly time effects.

### **About the Author & ARTBA Team**

This research was conducted by a team led by Dr. Alison Premo Black, senior vice president and chief economist for the American Road & Transportation Builders Association (ARTBA) in Washington, D.C. Dr. Black, who earned her PhD. in economics at The George Washington University in the Nation's Capital, also holds an M.A. in International Economics and Latin American Studies from the Johns Hopkins School of Advanced International Studies. She graduated magna cum laude from Syracuse University, where she was a member of Phi Beta Kappa and the Golden Key Honors Society, with majors in International Relations, Latin American Studies and Spanish. Since joining ARTBA in 2000, Dr. Black has led teams and authored over 60 studies examining state transportation funding and investment patterns. The ARTBA team working on this project also included Market Research Associate Lital Shair, Manager of the Transportation Investment Advocacy Center Carolyn Kramer and Senior Writer/Editor Eileen Houlihan.