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Gasoline Taxes:
Some History and Analysis

This brief reviews the state and federal taxes collected from gasoline sales and calculates the impact of fluctuating prices in several areas of the economy.

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Tags: #Transportation #Taxes

Introduction

The United States has taxed gasoline since the Great Depression, initially as a revenue source for dwindling tariff and income tax revenues. Though some states taxed gasoline prior to World War I, it was not until after the federal tax was established that most states began consistently taxing gasoline.[1]

In order to fund the newly authorized interstate highway system, the Highway Revenue Act of 1956 created the Highway Trust Fund and raised federal gasoline taxes from 2 cents per gallon to 3 cents per gallon. By 1963, Indiana implemented a gasoline tax, introducing an original excise tax of 2.0 cents per gallon, which increased to 18 cents today, just slightly below the federal rate of 18.4 cents per gallon in 2015.[2] The excise tax rates for both federal and Indiana have been raised several times since inception, but have also been eroded by the effects of inflation. *Figure 1* illustrates the inflation-adjusted tax per gallon of gasoline in 2014 dollars.

1. The Revenue Act of 1932 established the federal gasoline tax at 1.0 cent per gallon. See Brian Francis, Gasoline Excise Taxes, 1933-2000. Internal Revenue Service.

2. The federal government also levies a diesel fuel tax at $24.4 cents per gallon. State taxes on gasoline average $26.49 cents per gallon for gasoline and $27.24 cents per gallon for diesel (EIA, 2015).

Figure 1. Inflation-Adjusted Gasoline Excise Taxes, USA and Indiana (1932-2015)

Source: Bureau of Labor Statistics

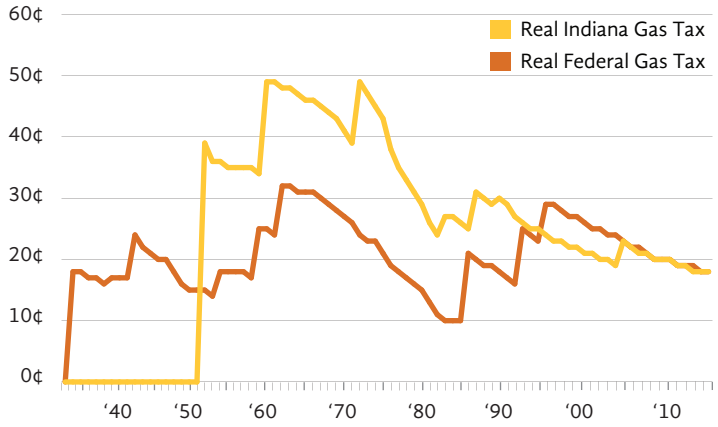
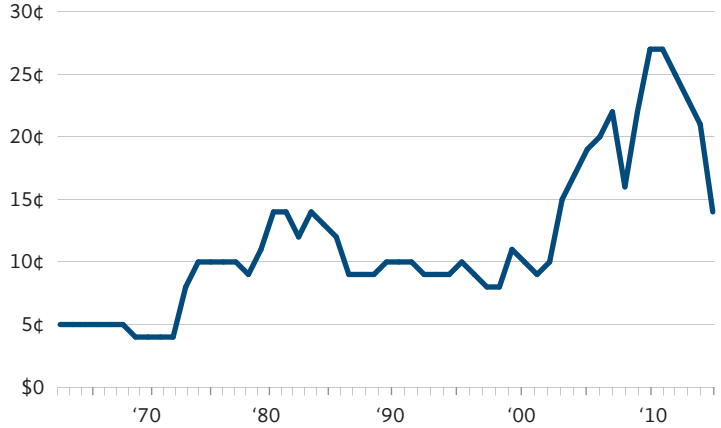


Figure 2. Sales Tax Cost per Gallon of Retail Gasoline in Indiana (1962-2015)

Source: Bureau of Labor Statistics



Indiana also collects a sales tax on gasoline. This is imposed at roughly the sales tax rate established by the state, the slight difference being due to averaging of sales. A more detailed explanation of this is outside the scope of this discussion. Unlike the excise tax, the sales tax is a percentage of total sales, and so associated revenue is influenced by both the price of gasoline and the rate. Adjusting these for inflation, I find that the cost per gallon of gasoline in Indiana is heavily influenced by gasoline prices (*Figure 2*).

Combining the price of one gallon of gasoline (retail) along with the federal and state excise taxes and the Indiana sales tax, I find that the tax share of the pump price of one gallon of gasoline is now well below its peak of 27 percent in the late 1990s. At that time, more than a quarter of the pump price of a gallon of gasoline was comprised of state and federal taxes. See *Figure 3*.

However, these data mask the effects of increased fuel efficiency of modern vehicles. Examining the cost of driving 100 miles from the 1930s to today (*Figure 4*), we see the total cost is roughly half what it was in the Great Depression and less than a third the cost of driving that distance during the early 1970s when gasoline price increased dramatically.

From the Great Depression to the present, gasoline excise taxes are levied to construct, maintain and expand the highway system. In general, state taxes on gasoline are partially used to maintain and expand non-federal highways while providing state matching funds for federal highway funding. Over the past 75 years or longer, the lower cost of transportation has been a boon to both households and businesses. As fuel and overall transportation costs have been dropping, in real terms, the cost of moving people and goods is much lower than it was than at any time other than the late 1980s and early 1990s. This trend has held, even with substantial periods of higher gasoline and other transportation fuel costs.

With gasoline taxes static or declining due to inflation, the costs of constructing and maintaining roadways and developing congestion relief has grown. The cost per mile of road maintenance has increased roughly 22 percent since the late 1990s and will certainly

Figure 3. Combined Expense of 1 Gallon of Retail Gasoline, USA and Indiana (1932-2015)

Source: Bureau of Labor Statistics

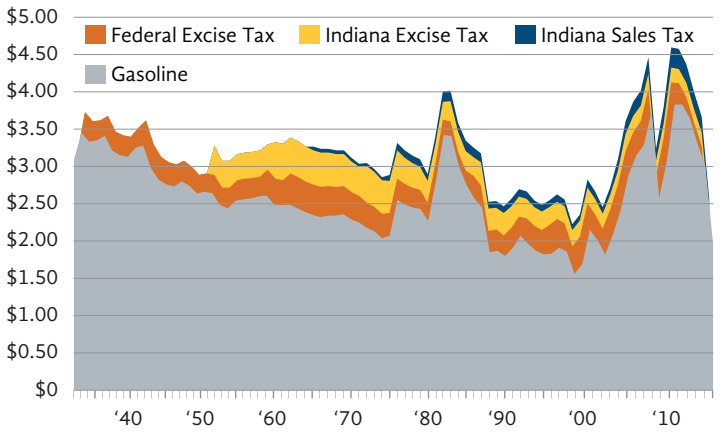
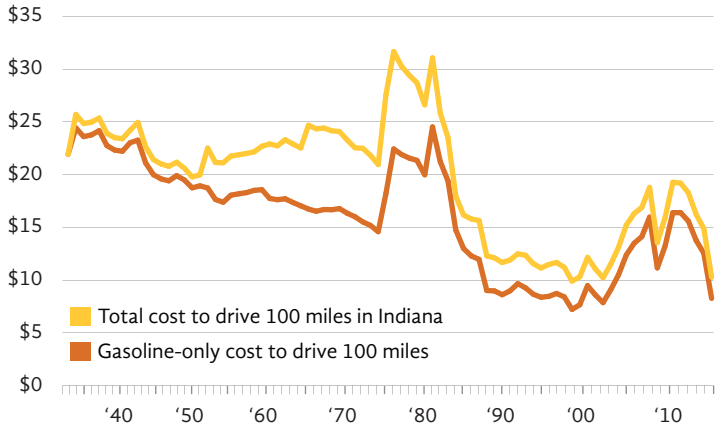


Figure 4. Real Costs for 100 Miles of Driving (1932-2015)

Source: Bureau of Labor Statistics



continue to grow in the coming years (ITEP, 2013). The real (inflation-adjusted) reduction in the gasoline excise tax reduces the state's ability to fund highway construction, operations, maintenance

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and relieve congestion. In addition, there have been other issues that affect the stability of the gasoline excise tax revenue. These are increasing fuel economy and higher vehicle weights. The increasing fuel efficiency of vehicles decreases the amount of gasoline used and associated tax revenue. Heavier commercial vehicles lead to more road damage increasing maintenance costs. Both of these issues serve to weaken the link between tax incidence and cost of providing and maintaining public infrastructure.

The lesson to absorb from these data is that gasoline excise tax revenues have not kept pace with the economy as a whole due to inflation and changes to technology that reduce revenues without an associated impact on costs. This strongly suggests that a reexamination of the current rate structure is warranted.

In order to evaluate the landscape that would influence a change in the gasoline excise tax rate, I report analysis from Hicks (2005), which examined the impact higher taxes would have on total economic activity. In that study of the lower 48 states and District of Columbia, I found that gasoline tax collections among the sample were most affected by real personal income and population in the states. Rising incomes and populations increased gasoline consumption.

These were offset also by increased fuel efficiency, a trend that persisted through the study period. The impact of increased efficiency, at the margin, was lower than both real income and population increases. However, on a per capita basis, gas tax collections declined as population increased. This suggests residents of more populated states likely have other transportation options than those in less populated states.

My 2005 study also found that higher excise tax rates had very small to unmeasurable impacts on consumption when correcting for most other factors. The responsiveness of gasoline consumption to federal gas tax rates was not statistically different from zero. For state tax rates, the impact was virtually zero with an elasticity of –0.03, meaning that a 1.0 percent increase in the state gasoline tax rate is associated with a 0.03 percent decrease in consumption.

Table 1. Short Run Elasticity of Gasoline Demand, with Respect to Price

Source: Author research

Study	Value	Subject
Hicks, 2005, 2006	-0.127	Total gasoline usage, in study of 48 states
Goodwin, 1992	-0.27	Total gasoline usage, United Kingdom
Luk & Hepburn, 1993	-0.12	Total gasoline usage, Australia
Johansson & Schipper, 1997	-0.10 to –0.40	Various studies
Mayeres, 2000	-0.16	Essential trips in the U.S. (commuter traffic)
DeJong & Gunn, 2001	-0.06 (-0.20)	Business (commuting) in Europe
Hagler Bailly, 1999	-0.15	Canadian road gasoline

Table 2. Midwest Gasoline Taxes

Source: Tax Policy Center, 2015

State	State Gasoline Excise Tax	Other Tax	Comments
Indiana	18 cents/gallon	-	Sales tax of roughly 7 percent on retail purchases
Illinois	19 cents/gallon	1.1 cent/gallon	Environmental fees
Michigan	19 cents/gallon	-	Sales tax of roughly 6 percent on retail purchases
Ohio	28 cents/gallon	-	-
Kentucky	26.2 cents/gallon	1.4 cents/gallon	Environmental fee
Wisconsin	30.9 cents/gallon	2 cents/gallon	Inspection fee

The price elasticity of demand was around (in absolute value terms) four times as large as the tax elasticity demand, of roughly –0.12. Notably state and federal taxes are, on average, between a quarter and a third of total consumer gasoline prices as of this writing. This supports most a priori beliefs regarding gas price elasticity of demand. See *Table 1* for a review of other elasticity studies.

The impact of rates in surrounding states was also minimal to non-existent. This most likely reflects the reality that rate changes across states are closely timed. My 2005 study reported that gas tax changes occurred as prices in real terms were low and happened to cluster very closely across states. The anecdotal evidence for this is that gas tax increases are now a topic for discussion in most state legislatures. A brief review of gasoline tax rates in surrounding states provides context for this discussion in the Midwest. See *Table 2*.

These findings offer some important policy considerations for Indiana policymakers. Among these is balancing the trend in real gasoline tax rates with expectations regarding road maintenance, operations and construction in the state. Any increase in Indiana's gasoline excise tax would likely generate nearly proportional revenue increases.

A brief comment on alternative fuel taxes is warranted. While there are increasing interests in alternative fuels, it seems highly unlikely that anything is likely to present itself in the short term to seriously impact gas tax revenues.

A Quick Model of a Gas Tax Increase

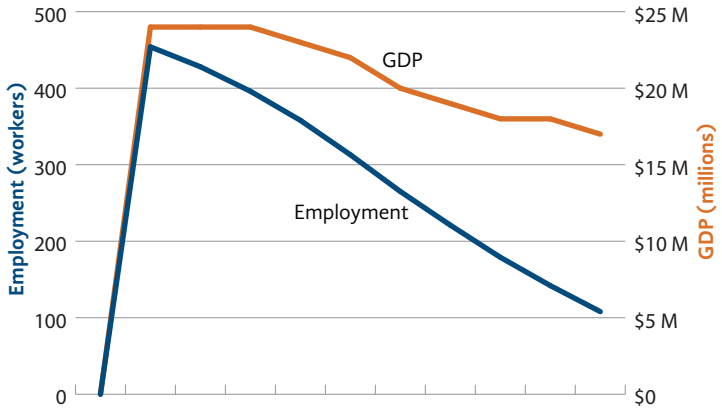
Modeling the impact of a state excise tax offers a relatively straightforward exercise in economic simulations. At the heart of any taxation question is the role of expenditures and the relative elasticity of consumers to the tax increase. To perform this analysis, we use a regional computable general equilibrium model constructed by REMI, Inc. This model details the Indiana economy, allowing us to simulate the effect of a tax increase and dedicated expenditures. We choose a tax increase of the gasoline excise tax of 5 cents, for both its ease of interpretation and because it is one such proposal currently under consideration.

I estimate that an increase of 5 cents per gallon on the gasoline excise tax will raise roughly $157 million per year in additional revenue. I then assume that the full revenue from that tax will be spent on infrastructure construction and maintenance. The higher tax will reduce employment, while the increase expenditure on infrastructure will both increase employment and offer other benefits. At issue is then the net effect.

Assumptions are critical to economic modeling. In this model the regional linkages between taxes, expenditure and employment and GDP growth are derived from historical data and widely accepted among economists. The gas tax elasticity's are known to be low (see *Table 1*) and the likelihood of increased regional loss in gasoline sales is rather small. Even with a gasoline tax rate increase, both Illinois and Michigan will have higher tax rates on gas, Ohio nearly equal and Kentucky lower. A 5-cent increase in gasoline excise taxes will not change the relative position of Indiana gas taxes with any neighboring state. For that reason, a very small loss of retail gas sales should be anticipated. We also assume no administrative costs for the new tax. There are surely some, but both private and public costs are a small, and largely a one-time share of the total change. In essence, these findings are not particularly sensitive to assumptions in this model.

We report two values in *Figure 5*: the net employment effect and the net change in state gross domestic product from 2016 through 2025 of a 5-cent increase in gasoline taxes. The first year impact is an increase in GDP of roughly $24 million and net job growth of roughly 450 workers. Both increases are in the construction sector. These impacts diminish over time, so that by 2025, the continuation of the tax would result in GDP increases of roughly $17 million per year, and employment of just over 100 workers per year. This GDP estimate does not capture the impact of better maintained transportation infrastructure. So, this estimate does not capture economic outcomes and quality of life improvements associated with expanded and better maintained transportation infrastructure.

Figure 5. Net Employment and GDP Effect of a 5-Cent Increase in Gasoline Excise Tax (2015-2025)
Source: Author calculations



The most tractable conclusion from this simulation is that at this time, a 5-cent gasoline excise tax increase will have no noticeable impact on either employment or GDP. While these numbers are positive, they are so small as to be unrecognizable against a state with 3.4 million workers and GDP in excess of $300 billion per year.

Summary and Final Thoughts

Gasoline prices are now very low and most estimates suggest that they will stay low for a lengthy period of time. The cost of driving 100 miles is now half what it was in the 1930s and, according to generally accepted economic models, an increase in gasoline taxes of 5 cents will have no appreciable impact on key measures of employment or GDP in Indiana.

This policy brief explains some of the dynamics regarding gasoline taxes in Indiana, but it is not designed to be exhaustive. There are many issues of importance, not least of which is the potential state of infrastructure, the requirements for new construction and the continued need for congestion relief to accommodate growth in Indiana's expanding urban areas.

At this juncture there are only two clear conclusions from this analysis. First, in the short run, there are few economic ramifications of a decision to alter or change the gasoline tax. Nearly all the meaningful impacts accrue farther into the future. Second, if there is a long-term need to increase gasoline taxes to pay for infrastructure maintenance and construction, the current low prices, increasing fuel efficiency and long-term decline in real tax revenues suggest this is a good time to enact such an increase.

A final, but critical point, is that higher tax rates are not necessarily viewed negatively by businesses and residents. Higher taxes deployed to purchase more or better quality public services positively affect economic outcomes (Wasylenko 1997). Both tax rates

and the quality and quantity of public services matter in economic outcomes for regions. The problem with higher taxes is not the tax themselves but any absence in improvement in public goods or services associated with them.

Credits

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