Environmental Regulation and the Market for Motor Fuels: Unintended Consequences

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Note: Views expressed are solely those of the authors and do not represent the views of their respective employers.
Environmental Regulation Changes Focus to Motor Fuels

• 1990 Clean Air Act and amendments heralded a new focus on regulating fuel content – previous focus had been engine design and efficiency standards
• Division of jurisdiction between federal and states led to proliferation of fuel types
• Unintended consequences including higher and more volatile prices are the result
What is a Special Blend of Gasoline?

• Ways in which motor fuels have been differentiated as a result of content regulation include
  – Addition of oxygenates – reduces CO emissions
    • MTBE, Ethanol
  – Reducing Reid Vapor Pressure – reduces VOCs and has implications for engine performance
  – Removal of toxics – sulfur, benzene, etc.
Special Gasoline Blends—Summer 2004

Legend:
Numbers in parenthesis indicate the number of counties

- 7.0 RVP (8)
- 7.0 RVP, 30 ppm sulfur (44)
- 7.2 RVP (3)
- 7.8 RVP (184)
- AZ CBG (3)
- CA CBG (38)
- Oxygenated fuel (87)
- RFG-North (59)
- RFG-North w/Ethanol (37)
- RFG-South (60)
- RFG/CA CBG (20)

Source: GAO analysis of data provided by EPA, ExxonMobil, the Oil Price Information Service, and state environmental agencies.
Market Shares for the Various Gasoline Blends Used in 2001

- Conventional, 48%
- 7.8 RVP, 13%
- RFG, South, 9%
- RFG, North, 8%
- RFG, North w/Ethanol, 3%
- CBG/RFG, CA, 7%
- CBG, CA, 3%
- CBG, AZ, 3%
- 7.0 RVP 30 ppm Sulfur, 2%
- Ethanol Mandate, 2%
- 7.2 RVP, 1%
- 7.0 RVP, 1%
Effects on the Supply Chain

• Changes to supply chain to accommodate new fuels include
  – Billions of dollars of refining upgrades
  – Changes in markets for gasoline components—seasonally and geographically
  – Reduction of pipeline and terminal storage capacity
  – Shrinking of the size of wholesale/retail markets
Gasoline Supply and Demand, September 2004

Map of Key Pipelines and Refineries, 2004

Source: GAO analysis based on data from the Department of Transportation and the Energy Information Administration.
Regression Model

• Panel data model of weekly gasoline prices across 99 cities (OPIS data)
  – Sample: 12/07/2000-10/28/2004; 204 weeks
  – 99 cross sections used
  – Total panel (balanced) size: 20196

• Dependent variable is gasoline price

• RHS variables include fuel specific attributes and city market attributes
## Regression Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t - Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>WTI (¢ per gallon)</td>
<td>1.169201</td>
<td>0.004212</td>
<td>277.5680</td>
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<td>Dist. To Sub. Fuel</td>
<td>0.003912</td>
<td>0.000959</td>
<td>4.077237</td>
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<td>Low sulfur</td>
<td>5.071134</td>
<td>1.377933</td>
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<tr>
<td>RVP 9.0</td>
<td>5.841131</td>
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<td>RVP 7.8</td>
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<td>12.22028</td>
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<td>RVP 7.2</td>
<td>9.674229</td>
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<tr>
<td>Ethanol 5-5.7%</td>
<td>1.034584</td>
<td>1.354990</td>
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<td>Ethanol 10%</td>
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<tr>
<td>RFG MTBE RVP 8.2</td>
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<tr>
<td>RFG MTBE RVP 7.2</td>
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<td>RFG Ethanol RVP 7.2</td>
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<tr>
<td>Variable</td>
<td>Coefficient</td>
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</tr>
<tr>
<td>--------------------------</td>
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<tr>
<td>Akron/Canton, OH</td>
<td>8.707963</td>
<td>0.739922</td>
<td>11.76876</td>
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<tr>
<td>Albuquerque, NM</td>
<td>11.26660</td>
<td>0.757700</td>
<td>14.86946</td>
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<tr>
<td>Anacortes, WA</td>
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<tr>
<td>Anchorage, AK</td>
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<td>25.11993</td>
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<td>Tucson, AR</td>
<td>19.29393</td>
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<td>Tulsa, OK</td>
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<tr>
<td>Wichita, KS</td>
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<tr>
<td>Wilmington, DE</td>
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<td>Wood River, IL</td>
<td>6.712616</td>
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<td>7.545390</td>
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</tbody>
</table>

R-squared=0.821904; Log likelihood= -74256.72; F-statistic=842.6497
Conclusions

• Lack of coherent jurisdictional boundaries for regulation lead to chaotic environment
• Proliferation of motor fuels has led to higher and more volatile prices
• Lack of regulatory certainty makes investment in infrastructure suboptimal
• Problem will get worse before it gets better
  – ULSD and new gasoline stds will further stress the infrastructure
  – 8-hour ozone rule will further spread of fuels
Map of Areas Not Meeting New 8-Hour and Former 1-Hour Ozone Standard, 2004

Source: GAO analysis based on data from EPA.
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