Regulated and Unregulated Substitutes: Aversion Effects of an Ethanol Mandate

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Overview

One approach for handling more aggressive goals under an ethanol mandate is to use a "dual blend" mandate in which both the preferred new ethanol blend and the old (possibly ethanol-free) blend of gasoline coexist. Highlighting the case of New South Wales, Australia, we show the dual nature of such a mandate can potentially lead to significant costs when consumers are averse. We show consumers en masse rejected the new blend and paid 43 cents per gallon more to avoid it. Not even the second of the mandate's four targets could be reached, and the consumer cost was substantial.

Methods

Difference-in-differences estimation using three treatment periods (corresponding to the three different phases of the ethanol mandate) and other major Australian states as the control group.

Results

Consumers in New South Wales widely rejected the mandate and diverted en masse to the ethanol-free premium grade almost-perfect substitute.

Not only did consumers whose vehicles were listed as incompatible with E10 avoid E10, but also a substantial proportion of consumers whose vehicles were listed as compatible and safe for E10 rejected it as well.

So pronounced was the exodus that four years into the mandate premium grade gasoline became the number one selling grade in NSW.

From the inception of the mandate to the end of our sample less than six years later, the market share of premium more than doubled, from 18.4% to 38.6%. Premium is on track to reach 54.6%, triple its pre-mandate share, should ethanol-free regular be eliminated entirely.

The mandate failed to meet its goal in even the second phase of the four phase plan.

Consumer expenditures increased by over $300 million dollars over the first 5 years and continues to climb.

The typical method for calculating consumer costs is biased in the case of a dual blend mandate. The typical calculation involves comparing the higher energy-adjusted price of higher ethanol blends versus the lower blends they replace, and multiplying by the relevant quantity. However, we find the vast majority of the increased fuel cost -- 96% of the total -- was borne by consumers who rejected the new ethanol blend and diverted to premium instead of switching to the new blend.

Dual blend mandates can yield unusually severe diminishing marginal returns. In NSW, costs rose from $1.2 million per month in 2009 to $12.3 million per month in 2013.

Early suggestions of a relatively smooth consumer transition from regular to E10 proved misleading. The reason is that consumers are heterogeneous in their aversion to ethanol. By the time of the third phase of the mandate, 60%, or three out of every five consumers who lost access to regular chose to reject E10 and instead diverted to premium, even though it cost an additional 12 cents per liter (cpl), or about 43.1 U.S. cents per gallon. We show that in NSW adding one more liter of E10 to the overall fuel supply cost forty-five times as much in 2013 as it did in 2009.

Conclusions

The New South Wales mandate is an interesting and extreme example of the unintended consequences of regulation. An effort to implement the mandate before all vehicles were ready to handle it or, alternately, before consumers were fully confident in adopting it, led to significant ethanol avoidance and cost. The avoidance was made tractable because both ethanol blends had to simultaneously coexist at different prices at the same time. The simultaneous coexistence of both blends -- regulated and unregulated almost-perfect substitutes -- was in turn made necessary by the aggressiveness of the mandate relative to the state of the vehicle fleet. We conclude that the potential for consumer avoidance and consumer aversion costs, largely ignored in past calculations, should be given serious consideration in the greater cost-benefit analysis whenever a mandate, and a selective ethanol mandate in particular, is being contemplated.

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