
The effects of resale price maintenance laws on petrol prices and station attrition: empirical evidence from Wisconsin

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The state of Wisconsin's Unfair Sales Act prevents the sale of any item below cost in order to attract business, and specifically requires petrol (gasoline) stations to mark up their prices by at least 6% over the wholesale price. While the ostensible reason for this law is to protect small, independent retailers and thus enhance competition, the evidence suggests that the primary result of this law has been to inflate the price of petrol for Wisconsin consumers and facilitate tacit collusion in retail petrol markets. Petrol prices in two major markets in the state are examined, as well as in one market outside of the state where no minimum markup is required. The data show that when the penalties for violating the Unfair Sales Act were strengthened, the average markup of retail petrol over the wholesale price increased significantly in Wisconsin without a commensurate change in the average markup in the market outside of Wisconsin. It is also found that price dispersion is significantly lower over a two-year period in the protected Wisconsin market than in the unprotected markets.

I. INTRODUCTION

A myth that continues to exist in the minds of the public and most government regulators is the notion of predatory pricing, or 'cutthroat' competition. The idea is that competition among businesses for customers can become so fierce that a market with several competitors may eventually reach the point where only one victor is left standing, allowing that firm to reap the spoils of monopoly profits. While predatory pricing may be intuitively appealing, especially to politicians, proven instances of predatory pricing are quite rare and the methods of preventing it often impose a social cost higher than any monopoly. The basic problem with the premise is that unless the remaining firm can keep other competitors from entering the market in the future, it does not stand to gain much from predatory pricing. A voluminous literature on contestable markets has developed to examine this very question, but economists' knowledge on this matter has yet to trickle down from the academy.

To prevent predatory pricing in the retail petrol market, the state of Wisconsin enacted a number of laws designed

to ensure 'reasonable' profits and prevent 'excessive' competition among petrol stations. To that end, Wisconsin's Unfair Sales Act (100.30(2)) requires that every petrol retailer mark up the price of petrol by at least 6% a gallon over the wholesale price, or 9.18% from the posted terminal 'rack' rate at the terminal closest to the station. To further encourage some but not too much competition, all petrol stations are required to explicitly post all prices so as to be easily visible from the street, and stations may not change prices more than once every 24 hours.

It is argued in this paper that these regulations effectively transfer income from consumers to sellers via higher prices and profits by facilitating tacit collusion among the retail petrol stations in Wisconsin. The primary objective of this paper is to quantify the effect of the State of Wisconsin's Unfair Sales Act on the price of retail petrol. A secondary objective is to determine whether the Unfair Sales Act prevented the demise of small, independent petrol stations throughout the state, as was its intent.

Using data obtained from the Oil Price Information Service, it is estimated that strengthening the penalties associated with violating the Unfair Sales Act added

approximately 2¢ to 3¢ to the price of a gallon of petrol, costing Wisconsin drivers approximately \$50 million a year in higher petrol prices. Evidence is also found that the Unfair Sales Act generally lowers the variation of prices in a given market, which, it is argued, is also a manifestation of tacit collusion among retailers.

II. BACKGROUND

The Wisconsin Unfair Sales Act has existed in some form since the 1930s, a vestige of the state's strong socialist tradition as well as the New Deal's interventionist attitude, when government price fixing was thought of as a possible solution to the unemployment of the great depression. The current law generally prohibits any selling of a retail good at a price 'below cost,' and additionally mandates that retailers mark up fuel at least 6% over the wholesale price, or 9.18% over the posted terminal price, whichever is higher.¹

Until recently enforcement was irregular and the penalties for violating the law amounted to a small fine. However, effective 1 August 1998 the damages for violating the Unfair Sales Act can amount to either three times the amount of any loss sustained or \$2000 multiplied by each day of violation, plus attorney fees. The law was also amended to allow anyone harmed by a violation of the Unfair Sales Act to bring an action against the violator. The new law also plugged a loophole in the law that essentially exempted vertically integrated firms (that is, retailers owned by their suppliers).²

The intent of the Unfair Sales Act, as stated by the sponsors of the new legislation (Milam, 1997) is to prevent predatory pricing, which describes the situation where larger firms reduce prices and suffer short-term losses in order to draw customers away from competitors and thus bankrupt smaller firms, subsequently reaping monopoly profits. The idea underlying predatory pricing is that in the long run, the profits earned by the larger petrol station and the prices consumers pay outweigh the losses earned while undercutting smaller rivals. Hence, the justification for this law is that by protecting the smaller stations competition will be enhanced, forcing petrol prices lower and keeping a greater number of independently run petrol stations in business than would otherwise be the case.

Economists have a number of problems with the rationale behind predatory pricing. First, the idea of a contestable market disputes the idea that the survivor of a price war would ever be allowed to survive in the market without

subsequently facing competition. Markets where firms earn high, above-normal profits will invariably draw competitors unless the entry costs are too high. Baumal *et al.* (1982) point out that even if new firms do not enter into the market, the mere possibility of new firms entering the market may be enough to force stations to keep prices (and profits) lower to deter such entry.

Bork (1978) points out that for an economic predator to recoup losses requires economic conditions that are rarely met, and certainly don't exist in the retail petrol market. To wit, the barriers to new entrants today are not that high. While it is true that the cost of constructing a new petrol station today is a considerable investment, in a market wracked by predatory pricing a substitute for a new station readily exists in the old stations driven out of business. Given that the National Association of Convenience Stores reports that at a minimum at least 1000 new stations were added in 1998 (National Petroleum News *Market Facts* 1999), such costs cannot be deemed prohibitive.

Thomas (1997) reports that courts are generally wary of claims of predatory pricing, and that even evidence suggesting that smaller firms exited an industry subsequent to a larger firm dramatically cutting prices is not sufficient to prove predatory pricing. American Airlines, for instance, dramatically cut its prices as part of its 'value pricing' plan in 1992 with the explicit forecast that while some competitors would go bankrupt, long-term profits would not make up for the short-term loss accruing from the lower prices. Such an apparently irrational, non-profit-maximizing move by a CEO as respected as Robert Crandall is attributed to weak corporate governance and a compensation structure that weighted market share more than profits. The courts concluded that this was not predatory pricing: customers benefited greatly from this strategy at the expense of the airline firms.

While many petrol stations have failed in the past twenty years, this simple fact cannot be considered *prima facie* evidence of predatory pricing in the retail petrol market. Instead, blame for this can be put on a changing industry and on stringent new regulations placed on station owners. Beginning in 1988, the federal government began imposing strict environmental regulations on petrol stations to minimize environmental damage from leaking petrol tanks, and the costs of adhering to these regulations drove many smaller, less efficient stations out of business. New double-hulled fibreglass tanks, elaborate spill-catch systems, and systems that prevent pipes from freezing have all become required in the past 10 years. The result is that the government essentially weeded out the smaller

¹ Soft drinks, alcohol, milk, and tobacco also have more stringent regulations regarding price setting.

² Vertically integrated firms that do not sell gas to other companies were exempt from this law, as they effectively had no wholesale price. Clark Oil Company did cease its outside sales for a while and in fact their ability to circumvent the law in such a way was a factor in getting the law strengthened.

stations that did not have the cash flow capable of supporting such a large fixed investment, and any stations currently selling petrol should have no problem meeting environmental standards for some time.

And while petrol stations were closing in the last twenty years, new petrol stations were opening to take their place. In fact, by some estimates there are now in fact *more* stations today in the USA than there were fifteen years ago, according to the National Petroleum Marketers' Association 1999 *Fact Book*. These stations scarcely resemble the stations of the 1970s. In the last twenty years, the complementary product offered to customers buying petrol is no longer a lube job or a tune-up but rather lottery tickets, cigarettes, and snack food. The stations of today have more pumps and sell a greater volume of petrol, offer a greater variety of goods, and in general are cleaner and more pleasant than those of a generation ago. The average station of today pumps twice as much petrol as the average station of a generation ago.

What happened to petrol stations in the 1980s and 1990s is similar to the experience of drug stores and supermarkets in the same period of time. Larger, more modern stores proved to be appealing to consumers, and the lower prices such stores generally offered were below what the smaller, more traditional, stores could offer, driving the small firms out of business. While many bemoaned of the fate of the small mom-and-pop businesses, consumers generally enjoyed the convenience and low prices too much to put up much of a fight. Few suggest that prices today are higher in supermarkets or drugstores because of this evolution.³

In the midst of the record high petrol prices in the summers of 2000 and 2001 a group of Wisconsin Assembly members attempted to hold a special session in order to repeal the portion of the Unfair Sales Act that applies to petrol, without success.

III. PRICE COMPETITION IN RETAIL PETROL MARKETS

Economists usually begin analysis of a particular market by assuming that the market resembles the standard, perfectly competitive model, where the good being sold is homogeneous, there are many atomistically small buyers and sellers who have perfect price information, and prices are perfectly flexible. The theoretical implications of a perfectly competitive market are that firms will earn no economic profit and operate at an efficient level. No type of

government intervention in the market could improve upon the equilibrium attained by pure competition.

While no market contains *all* of the characteristics of the perfectly competitive ideal, the retail petrol market seems to share *none* of these characteristics. For instance, while there are many different buyers of petrol there are relatively few sellers in a given market. Each station does have some degree of market power, meaning that it is not constrained to charge the same price as its rivals.

Also, while the petrol itself is largely homogeneous,⁴ firms can distinguish their product in other ways, such as by offering a superior location, easy credit, or desirable services such as full-service stations or inexpensive car washes. This, too, gives each seller of petrol a modicum of market power.

Finally, despite laws that require the posting of prices in most states, neither consumers nor retailers have perfect price information at any time. Consumers cannot costlessly search for the lowest price in a market, typically, and firms also must expend resources trying to find their competitors' prices as well.

Nevertheless, it is a mistake in logic to argue that since petrol markets do not approximate the efficient, perfectly competitive model, it is necessary for the government to intervene in the market. Most of the empirical research done on retail petrol markets suggests that the primary problem in the market is not predatory pricing but rather a propensity towards price collusion.

For instance, Borenstein and Shepard (1993) theorize that collusion in retail markets will be stronger and lead to higher prices when there are predictable demand increases and/or cost decreases. In the USA, the summer vacation season creates just such a demand increase. In such situations, they argue, the benefits of collusion are higher while the long-term costs of cheating the cartel scarcely change. They find reasonable support for their hypothesis using highly aggregated retail petrol price data (by time and location) from the late 1980s.

A related issue concerns the so-called 'rockets and feathers' phenomenon, where retail petrol prices quickly rise but slowly fall in response to wholesale price changes. The fact that wholesale prices are the same for all petrol stations and are common knowledge is one cause, but the unfair sales act may exacerbate this problem. Borenstein *et al.* (1992) examine data from several markets during short-term changes in wholesale petrol prices and find that a retail price change asymmetry does exist that cannot be fully explained by wholesale prices, wholesaler market power, or inventory adjustment costs. They conclude that

³ Those few that do suggest this have found an ear in the Wisconsin Legislature, as prices are circumscribed in these two markets as well in the state.

⁴ While gasoline chains constantly tout their gasoline as superior in advertising campaigns, few in the industry seem to believe that there is any material difference in the gasoline sold at different stations, and consumers tend to behave likewise.

this must indicate market power among retailers. Bacon (1991) establishes a similar 'rockets and feathers' pattern in UK petrol prices. In short, the fact that there are certain predictable patterns in the demand for petrol, combined with a wholesale cost shared by all retailers, creates an environment ripe for retailers to increase their retail markup and increase profits. Given that the minimum markup provision provides each retailer with the knowledge of what the petrol price floor will be whenever wholesale prices change, the law undoubtedly exacerbates this problem.

The National Petroleum Marketer's Association reported that as of 1 May 1999 there were approximately 180 000 stations, indicating a substantial increase during the decade. The Association also reports that Wisconsin had 3946 stations as of May 1998, down slightly from 4250 in 1993. In 1972, the Census Bureau reported 5182 stations in Wisconsin.⁵

IV. HOW MUCH DOES THE UNFAIR SALES ACT INCREASE PRICES?

The primary hypothesis is that the Unfair Sales Act, in combination with other laws inhibiting competition among stations in the State of Wisconsin, increases the price of petrol. While at first glance it may seem easily testable, it is incorrect to merely take a random sample of petrol prices at stations throughout Wisconsin and a few other states and compare the averages. The problem with this is that a random sample does not take into account such vagaries as tax differences, wholesale cost differences, transportation costs, and the effects of certain government mandates, such as the requirement to sell reformulated petrol in major metropolitan areas. For instance, simple comparisons of the average price of petrol in Wisconsin and Illinois, as reported by AAA, usually show that petrol prices are similar in the two states. However, this difference is driven largely by the Chicago market, where wholesale costs, operating costs, and taxes are much higher than in most other markets.

A problem with a comparison of retail petrol prices between Minnesota and Wisconsin is that Minnesota mandated the sale of petrol blended with 10% ethanol in all

stations in the state, mainly because of peculiar funding incentives found in federal transportation funding provisions (Kelly and Brannon, 1996). Given that wholesale prices for ethanol are roughly triple those of petrol over the years of the study, this adds anywhere between 5 and 10 cents to the price at the pump.⁶

A more relevant comparison across states requires a more highly disaggregated data set, meaning that the data are collected from different stations in different markets in a number of states relatively frequently. Rather than merely reporting an overall average price, the richness of the data can be exploited in many different ways to create a more meaningful comparison of relative petrol prices across states and markets.

Towards that end, data were obtained from the Oil Price Information Service that includes retail and wholesale prices from Beloit and Eau Claire, Wisconsin as well as Duluth, Minnesota from February 1996 until February 1999. Similar-sized cities were chosen in order to control for general operating costs. The cities were chosen from states contiguous to Wisconsin both for practicality and also because petrol transportation costs are similar. Also, petrol taxes in each state are similar and Minnesota does not have a minimum-markup law.⁷ Beloit and Eau Claire were chosen in order to contrast the competition in one Wisconsin market that is close enough to the border that it must compete with stations in other states with one that does not face this threat.⁸ For the 3 years covered by our study, prices are available for 843 different dates. On average, there are about 10 observations for each market for each date observed.

Since the penalties associated with violating the unfair sales act recently increased, this is used as a natural experiment to determine how the change in the law affects prices. By comparing the average markup over the wholesale price at petrol stations 6 months after the change in the law to the prior 6 months, one can get a good indication as to how the change in the law affected the level of competition in the petrol markets. In order to control for other extraneous factors that may impinge on the overall retail petrol markets, Duluth is used as the control market. The hypothesis is that Beloit, with its location relatively close to an uncontrolled petrol market, will exhibit more competition than Eau Claire before the law change, and thus will be dispro-

⁵ The methods of calculating the number of stations has changed slightly over time; the earlier count excludes stations that receive less than half their income from gasoline, resulting undoubtedly in an underestimate of the true number of stations in the earlier years.

⁶ For example, if the price of a gallon of gasoline from the refiner is 50¢ and the price of a gallon of ethanol is \$1.50 (both good approximations of true prices over the study) then replacing 1/10 of the gasoline (subtract 5¢) with ethanol (add 15¢) will increase the price by 10¢.

⁷ Even though each state's gas tax rate is incorporated into the data analysis, there are other advantages to having similar taxes. Minnesota eliminated its minimum markup law in 1994. Due to the cost of acquiring the data, only a subset of the prices in each state could be used.

⁸ Also, Beloit, Eau Claire and Duluth each had a relatively large number of observations compared to other cities in Wisconsin and Minnesota.

portionately impacted subsequent to the law taking effect. It is also expected that the average markup of prices will increase more in the Wisconsin markets than in Duluth.

A comparison of price markups is only one way to discern the effect of the Unfair Sales Act on petrol markets. Another manifestation of higher petrol prices and tacit collusion is a less dispersed distribution of prices within a given market. The market for retail petrol is a monopolistically competitive market; while each station is selling what is basically a commodity, the sellers are able to differentiate their product by any one of a number of ways. The actual product offered by various stations differs by service, the type and price of any ancillary products, the availability of credit extended to the customer, and by the location of the station. These differences allow firms to increase prices above a rival retailer in the same market and still maintain sufficient sales.

If the Unfair Sales Act enhances the ability of retail petrol stations to tacitly collude, then the markets would exhibit less price variability in spite of the difference in products across stations. Minor price differences make it difficult for collusion to exist, as it becomes difficult for firms to determine whether a lower-priced firm is attempting to undercut the market or simply has a less desirable product and thus has less market power with which to raise prices. The Federal Trade Commission used the existence of uniform pricing within certain markets as evidence of collusion in the Ethyl Corporation case (Carlton and Perloff, 1994), and economists used this same argument in the defeat of the minimum markup law in Montana (Romstad, 1998). Even without finding significantly higher prices in Wisconsin, lower dispersion in petrol prices in the Eau Claire market relative to Beloit and Duluth would suggest that firms are able to use the law to coordinate petrol prices in retail markets.

In order to determine whether the claim that the Unfair Sales Act actually protects small 'mom and pop' stations, we are left with fewer devices. One problem is that before the recent changes in the Unfair Sales Act, the law actually worked to the detriment of stations that were independently owned. The previous law called for a 6% markup from the wholesale price; however, the 'wholesale' price for a station that is owned and operated by the producer of petrol is an accounting construct and hence is somewhat artificial. The vertically integrated station could perpetually charge itself a lower wholesale price and thus be able to permanently sell petrol at a lower retail price without the independent station allowed to match its price.⁹ Hence, until this anomaly was overcome in the 1998 revision the law had the perverse affect of actually facilitating predatory pricing.

Also, government mandates have significantly increased the cost of operating a station over the past ten years, and the recent December 1998 deadline for stations to replace older tanks drove many stations out of business. Separating the myriad factors that affect the cost of operating a station as well as taking into account the vagaries of the Unfair Sales Act over time make it difficult to quantify the efficacy of the law at preserving small stations. Hence, calculating the proportion of stations that are independently owned and operated cannot really answer this question.

One broad measure, the number of stations per resident, fails to detect any glaring lack of competition in the state. Data from the *National Petroleum News* shows that Wisconsin has one station for every 775 residents, which is close to similar Midwestern states such as Minnesota (one for every 1100 residents), Iowa (1:792) and Indiana (1:750).

V. RESULTS

Dispersion of petrol prices

The contention is that if the strengthening of the Unfair Sales Act leads to a reduction in competition in Wisconsin petrol markets, then one would expect to see a lower dispersion of prices and higher markups in Wisconsin. First the dispersion of prices in the three retail markets is examined.

The contention that the Unfair Sales Act should reduce the dispersion of prices is tested in two different ways. First, the number of days in the sample when all the stations in a given market post the same price is compared. The results are reported for the entire 3 years of the data in Table 1. As expected, Eau Claire has many more dates without any price variability in the dates reported, with such an event occurring 14% of the time. In the other three markets such an occurrence is considerably more infrequent, with such an event occurring only 3% of the time in Beloit and 9.9% in Duluth. Again, it is posited that the proximity of Beloit to Illinois makes its market more competitive than Eau Claire, the representative Wisconsin market.

The second method for comparing the overall dispersion of prices between the three markets is to compare the standard deviation of prices between the three markets, which is done in Table 2. Again, over the span of the data set it is found that Eau Claire has the lowest dispersion of prices, with a standard deviation of 0.0089 and a coefficient of

⁹This was only allowed as long as the wholesaler did not sell gasoline to stations other than its own, in which case its wholesale price for its own station was determined to be the same as the wholesale price it charged to others. The Clark Oil Company did stop selling its gasoline to non-Clark stations, presumably to avoid this restriction.

Table 1. *Price variability in retail gasoline markets, 1996–1999*

Market	Number of dates with no price variance	Proportion of dates with $\sigma = 0$
Beloit	13	0.030
Eau Claire	116	0.138
Duluth	83	0.099

Table 2. *Dispersion in retail gasoline markets, 1996–1999*

Market	Standard deviation	Gross mean price	Coefficient of variation
Beloit	0.028	1.17	2.41
Eau Claire	0.009	1.20	0.74
Duluth	0.015	1.21	1.21

variation of 0.74, both significantly below the other two markets.

In short, a significant lack of price variation in the protected Wisconsin market is detected, which it is contended, is a manifestation of the Unfair Sales Act and a signal of a lack of competitive pressures.

Changes in the markup

Due to the myriad cost differences between stations that exist in different markets, the task of constructing a meaningful comparison of retail prices across different markets is beyond the level of these data. For instance, a higher retail price in Eau Claire than in Duluth might be due any one of a number of cost factors, not all of which can be precisely measured.

Instead, in order to discern how strengthening the penalties for violating the Unfair Sales Act affected prices in Wisconsin, we look at how the markup in retail prices over the wholesale price changed when the law went into effect on 1 August 1998. It is still necessary to control for exogenous factors such as taxes, transportation costs, and the general wholesale price of petrol. By focusing on the change in the markup, any unmeasured factor does not impinge on the results if that factor did not change over the period of time of the study.

The hypothesis is that Beloit, previously subject to a relatively competitive market, will see the greatest change in the average difference between wholesale and retail prices, excluding taxes. Duluth serves as the control city; if the average markup in the Duluth market is seen to increase substantially, then it indicates that an exogenous factor is affecting petrol prices besides the change in the law.

Table 3 shows that while virtually no change occurs in the markup of the Duluth market, significant increases are

Table 3. *Average markup of gasoline prices in the 6 months before and after the change in the Unfair Sales Act*

Market	Before 1 August 1998	After 1 August	Change
Beloit	0.109	0.137	0.028
Eau Claire	0.136	0.156	0.020
Duluth	0.139	0.142	0.003

seen in the markup of prices in both Wisconsin markets. In Beloit, the markup increases almost 3¢ for the 6 months after the change in the law as compared to the previous 6 months, while in Eau Claire this change is about 2¢. This number probably underestimates the true effect of the Unfair Sales Act a bit, since it was previously argued that even before the penalties for violating the act increased, the law presumably impacted prices.

OPIS calculates and privately publishes a monthly newsletter comparing the markups between retail and wholesale markets in the various states. In the years 1998–2000 the markup between Illinois and Wisconsin does not show any discernable pattern, which is attributed to the fact that Milwaukee and Chicago, both subject to EPA regulations requiring the use of reformulated petrol, dominate each state's market. It is again argued that the only legitimate way to make meaningful price comparisons is to exclude these markets and examine data at a more disaggregated level.

VI. CONCLUSION

The main test of whether the Unfair Sales Act is serving its intended purpose ought to be whether prices are substantially lower due to its existence. If it is shown that this is not the case, then it should be acknowledged that the State of Wisconsin enacted a policy that implicitly taxes its citizens for the benefit not just of small independent stations but also for the large multinational oil companies that operate in Wisconsin. Our data suggest that the law has indeed kept petrol prices higher than would otherwise be the case. It is estimated that prices are approximately 2¢ to 3¢ higher, on average, in Wisconsin due to this law. It is also found that dispersion within protected Wisconsin petrol markets is markedly less than in similar-sized markets in other states as well as in border communities of Wisconsin, where competition is higher.

Those who fought to strengthen the penalties associated with violating the Unfair Sales Act are attacking a symptom rather than the cause of station woes. As is argued here, the government's strict environmental regulations and the changing nature of the industry at large were the main causes of the station failures of the 1980s and 1990s. The data indicate that this trend has for the most part run its course. Whenever the government has attempted to

arrest market forces, the result has been merely a postponing of the inevitable at a significant cost to consumers, which I submit is precisely the case here.

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