Minimum Markup Laws and Sales-Below-Cost Laws:

Effects on Market Structure and Employment

Prepared By:

Dr. Jimmy Peltier
The Irvin L. Young Professor of Entrepreneurship
Professor of Marketing
President of Accredited Ph.D. Research
University of Wisconsin-Whitewater

Dr. Mark Skidmore
Department Chair
Professor of Public, Labor and Urban Economics
Fiscal and Economic Research Center
University of Wisconsin-Whitewater
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EXECUTIVE SUMMARY

Introduction
There is a growing body of research by Peltier, Skidmore, and colleagues showing that Fair Marketing Laws, particularly sales-below-cost laws and minimum markup laws (SBC/MM will be used to denote both sales-below-cost and minimum markup laws) benefit consumers. These studies are the most comprehensive to date and provide compelling evidence that states that adopt minimum markup laws and sales-below-cost laws see lower retail prices over time compared to states that do not or have repealed such laws. In this report we further examine the impact of gasoline SBC/MM laws on consumers, paying particular attention to better understanding why these laws lower the prices and markups consumers pay for gasoline. Hypothetically, SBC/MM laws are designed in part to positively impact market structure in terms of preserving the number of competing retailers and the intensity of competition between these competitors. Unfortunately, few studies have examined the impact of SBC/MM laws on market structure and competition, and except for Skidmore, Peltier, and Alm (2005), virtually no published studies have investigated market structure/market competition using transitional data over a significant period of time. Moreover, to our understanding, no study has investigated the extent to which SBC/MM laws affect employment numbers, certainly an important consideration for consumers and legislatures alike.

Research Objectives
Given lack of extensive and long-term and transitional studies investigating how SBC/MM laws affect market structure, employment, and wholesale and retail prices, the research reported here investigated the following questions:

1. Do minimum markup and sales-below-cost laws affect market structure, specifically in terms of market concentration (i.e., number and types of competing firms)?
2. Does market structure/industry concentration affect the wholesale and retail prices of gasoline?
3. Does market structure/industry concentration affect the markup consumers pay for gasoline?
4. Do minimum markup and sales-below-cost laws affect employment levels in the retail gasoline sector?

Hypotheses
Based on a review of the literature, a number of interrelated hypotheses were investigated.
H1: The adoption of gasoline SBC/MM laws leads to (a) more retail gasoline outlets than in the absence of the law, and (b) no impact will be found on the smallest retailers.
H2: A decrease in market concentration/an increase in the number of retail competitors leads to (a) lower retail gas prices and (b) lower markup over wholesale.
H3: A decrease/increase in the number of retail competitors leads to lower/higher wholesale gas prices.
H4: A decrease/increase in the number of retail competitors leads to lower/higher employment in the retail gasoline market.
H5: A decrease/increase in wholesale gasoline price leads to lower/higher retail price.
**Methods and Data**

Our overall goal was to examine the routes by which SBC/MM laws affect prices and to test our previously discussed hypotheses. Overall, there are 13 states that adopted (and/or repealed) motor fuel sales-below-cost laws during the 1983-2003 period, with adoptions occurring at different points in time. The key variables in our analysis are the inflation adjusted average monthly Retail Price of Unleaded Gasoline, the Markup of Unleaded Gasoline calculated as the difference between retail and wholesale prices, the Wholesale Price of Unleaded Gasoline, the number of retail gasoline establishments, as well as employment in the retail gasoline sector. We obtained information on retail and wholesale prices for the years 1983-2003 from *The Petroleum Marketing Monthly*, a report published by the U.S. Energy Information Administration. The number of retail outlets and employment for the years 1983-1997 were associated with Standard Industrial Classification (SIC) code 554. Data for North American Industry Classification System (NAIC) code 447 were used for the years 1998-2003 to reflect changes in the classification systems. Central to our analysis is a variable that marks the presence and the timing of the adoption of gasoline-specific SBC/MM laws: The natural logarithm of Years After SBC/MM Law. The natural logarithm specification of this variable accounts for the fact that, once a new equilibrium market structure emerges, any effects from the law may well diminish.

**Findings/Summary of Hypotheses**

H1a: Supported. SBC/MM laws result in a greater number of retailer establishments.

H1b: Not Supported. SBC/MM laws protect small firms, though not to consumer detriment.

H2a: Supported. A more competitive market leads to lower retail prices.

H2b: Supported. A more competitive market leads to lower markups.

H3: Supported. A more competitive market leads to lower wholesale prices.

H4: Supported. More retail establishments lead to greater employment.

H5: Supported. Lower wholesale prices lead to lower retail prices.

**Conclusions**

Building on Peltier, Skidmore, and colleagues and Skidmore, Peltier, and Alm (2005), we utilized a simultaneous equation/systems approach to examine the direct and indirect impact of fair marketing laws on wholesale price, retail price, and markup, the number and size of competitors, and employment. We further tested whether the number and size of gasoline retail competitors affects wholesale price, retail markup/price, and employment. Lastly, completing the systems analysis we examined the relationship between wholesale price and retail price and markup. The data and analytical approach we utilized are considerably more extensive than those used in previous studies and help to more clearly understand how fair marketing laws promote competition, benefit consumers, and increase employment. Below are our overall conclusions.

- **Fair Marketing Laws Preserve Competition:** One of the most important theoretical justifications behind fair marketing laws is to preserve competition, which in turn is expected to result in a more price competitive environment. The twenty years of data utilized in this study supported the market preservation benefit of fair marketing laws. Specifically, five years after the enactment of a fair marketing law there is a 3.2% increase in retail establishments over states that didn’t have a fair marketing law.

  *Conclusion: fair marketing laws lead to a greater number of retail competitors.*
A More Competitive Retail Environment Lowers Wholesale Prices: Skidmore, Peltier, and Alm (2005), Hastings (2004), U.S. General Accounting Office (2004, 2005), and the United States Senate Permanent Subcommittee on Investigations (USSPS): Committee on Governmental Affairs (2002) all posited that a stronger retail sector, particularly with regard to independents, lowers wholesale prices through the greater ability of unbranded retailers to select their suppliers. Our findings support this perspective by showing that fair marketing laws lower wholesale prices by increasing the number of establishments, particularly the medium and large establishments.

Conclusion: More retail competitors lead to a more competitive wholesale sector. In turn, lower wholesale prices benefit consumers via lower retail prices and markups.

A More Competitive Retail Environment Increases Employment: Mostly ignored in the literature and in legislative discussions – the employment benefit that fair marketing laws might provide in terms of jobs and tax revenues. Our results show that fair marketing laws preserve competition in terms of the number of retail outlets, which in turn leads to an increase in employment of about 2.4%.

Conclusion: Fair marketing laws benefit residents vis-à-vis the creation of additional employment opportunities.

A More Competitive Retail Environment Lowers Retail Price/Margins: Greater competitive intensity at the retail level, as a result of preserving the number of competitors, is the driving theoretical force behind the posited benefits that fair marketing laws have on the price and markup consumers pay. Of all the significant relationships in the systems model, this link had the highest t-value.

Conclusion: Fair marketing laws preserve competition, and it is this preservation of the number of competitors that reduces retail prices and markups.

Fair Marketing Laws Are Good for States That Adopted Them: In combination, on average, those states that have adopted a fair marketing law have a more competitive retail structure in terms of the number of competitors, greater employment in those outlets, lower wholesale prices brought on by the enhanced competitive structure, and lower retail prices and markups vis-à-vis the increased number of competitors vying for market share.
INTRODUCTION

Growing Evidence of the Benefit of Fair Marketing Laws

There is a growing body of research by Peltier, Skidmore, and colleagues showing that Fair Marketing Laws, particularly sales-below-cost laws and minimum markup laws (as used in this report, SBC/MM will be used to denote both sales-below-cost and minimum markup laws) benefit consumers.¹ These studies are the most comprehensive to date and provide compelling evidence that states that adopt minimum markup laws and sales-below-cost laws see lower retail prices over time compared to states that do not or have repealed such laws. Although there have been some studies supporting contrary findings, virtually none of these studies is as comprehensive as those conducted by Peltier, Skidmore and colleagues. Importantly, a close examination of these contrary studies reveals a number of critical shortcomings. These shortcomings include: 1) failure to evaluate the effects of SBC/MM laws over the course of a number of years (i.e., not a long-run analysis), 2) failure to study transitions (i.e., before and after SBC/MM laws are adopted/repealed), 3) sampling problems (i.e., limited set of cities), 4) not controlling for other possible explanations, 5) a failure to examine wholesale prices/margins and retail prices/margins, (6) a failure to investigate the impact MM and SBC laws have on maintaining a competitive market, structure, and (7) a failure to address whether MM and SBC laws preserve jobs, an important economic variable that goes beyond pricing issues. Four of these problem areas are discussed below. For a detailed discussion see Peltier and Skidmore (2001a).

Lack of a Long-Term Investigation: Regardless of which side of the SBC/MM debate you are on, the effects of SBC/MM laws on prices and markups are indirect and are likely to take several years before any long-run effects are observed in the market place. Unfortunately, few studies have examined gasoline industry data over a significant number of years. This is surprising in that theoretically, SBC/MM laws are enacted in part with the goal of preserving competition over time.

Conclusion: It is only through the use of data over a significant number of years that the long-run effect of SBC/MM laws can be evaluated.

Failure to Study Transitions: Excluding the work by Peltier, Skidmore and colleagues, almost nonexistent are studies that examine SBC/MM laws via “transitional” data. Transitional data, particularly those with a long-term horizon, can be utilized to show what happens in states after SBC/MM legislation is enacted/repealed relative to other states. Transitional data are important for two reasons. First, cross-sectional data contain potential confounds and thus fail to adequately assess and/or explain the impact of discrete changes (Hastings, 2004) similar to enacting or repealing SBC/MM legislation. For example, suppose a state decides to adopt an SBC/MM gasoline law because legislators believe that their state has gasoline prices that are higher than they should be or the state has a noncompetitive market structure. Prior to adopting the law they see that retail gas prices are on average $.06 lower in an adjacent state that doesn’t have an SBC/MM law. They then enact SBC/MM legislation, enforce the law, and note that five years later their average price is now only three cents higher than the comparison state. Merely comparing gas prices in the two states would lead to the erroneous conclusion that enacting a gasoline SBC/MM law injured consumers (i.e., non SBC/MM still has lower gas prices), when this enactment has in fact helped reduce the disparity in gas prices between their state and the comparison state. Second, because transitional data contain discrete/sharp changes in the legal environment (e.g., no law to having a law or having law to repeal) there is a greater ability to infer causality.

Conclusion: Transitional data (before and after law enactment/repeal) are needed to determine how SBC/MM laws affect prices and margins relative to states-years in which SBC laws do not exist.

Failure to Investigate Impact on Market Structure: Hypothetically, SBC/MM laws are designed in part to positively impact market structure in terms of preserving the number of competing retailers and the intensity of competition between these competitors. Unfortunately, few studies have examined the impact of SBC/MM laws on market structure and competition, and except for Skidmore, Peltier, and Alm (2005), virtually no published studies have investigated market structure/market competition using transitional data over a significant period of time. Of interest, two studies from the “anti-SBC/MM” literature show that SBC/MM laws have a direct and positive impact on maintaining a more extensive and competitive market. Anderson and Johnson (1999) state that “the number of outlets also appears to be somewhat higher” (p. 200) in states that have gasoline-specific SBC laws. They further stated that “it is possible that these laws have helped to maintain a stronger independent retailing sector” (p. 201). Similarly, Johnson (1999) indicated that the “presence of a motor-fuel SBC law is associated with a slower rate of decline in outlets” (p 4). Two recent studies from the state of California further support the view that the preservation of a competitive market structure enhances price competition in the gasoline market. Leffler and Pulliam (1999) concluded that the primary cause of high gasoline prices in California is the weak independent sector at both the refining and retail levels. In a study for the California Program on Workable Energy Regulation, Hastings (2004) found that a decrease in market share of independent gasoline retailers resulted in higher gasoline prices. Hastings argues, and we agree, that these findings have important implications for public policy regulations designed to enhance the competitive structure of the gasoline market.

Conclusion: Research is needed that supports or rejects the view that SBC laws create a more competitive environment and thus lower gas prices.
RESEARCH OBJECTIVES

Given lack of extensive and long-term and transitional studies investigating how SBC/MM laws affect market structure, employment, and wholesale and retail prices, the research reported here investigates the following questions:

1. Do minimum markup and sales-below-cost laws affect market structure, specifically in terms of market concentration (i.e., number and types of competing firms)?
2. Does market structure/industry concentration affect the wholesale and retail prices of gasoline?
3. Does market structure/industry concentration affect the markup consumers pay for gasoline?
4. Do minimum markup and sales-below-cost laws affect employment levels in the retail gasoline sector?

To accomplish these objectives we first provide a brief review of minimum markup and sales-below-cost laws. This is followed by a general discussion of literature investigating the relationship between market concentration and prices, transitioning on to research specific to the gasoline industry. From this discussion we present a set of hypotheses pertinent to our research objectives and present the findings of a longitudinal study using monthly gasoline prices and annual retail outlet counts from 1983 to 2003 for all 50 states to test these hypotheses.

MINIMUM MARKUP AND SALES-BELOW-COST LAWS:
THEORETICAL UNDERPINNINGS

Support for Sales-Below-Cost and Minimum Markup Laws

In the broadest sense, supporters of minimum markup and sales-below-cost laws in general, and gasoline-specific laws in particular, contend that such laws protect the competitive structure of the retail gasoline market in one of two ways. First, sales-below-cost laws foster competition by preventing large vertically integrated firms and high volume firms from posing a predatory threat to smaller and/or independent retailers. Thus, in the absence of such laws, larger firms could drive out smaller firms by lowering prices below costs. Once the smaller competitors have been purged from the market, market concentration increases, ultimately leading to higher prices than would exist in a more competitive environment. According to Church and Ware (2000):

“If the victim has limited financial resources to fight a predatory price war, as often occurs with new entrants, the predator may successfully be able to force it to exit. Future entry will be deterred by the same fate. . . . With just a small amount of uncertainty in an entrant’s mind about whether the incumbent will respond to entry aggressively, a dominant firm can deter future entrants by establishing a reputation for behaving aggressively” (p. 662).

Similarly, Pepal, Richards, and Norman (2000) state that “In short, there is some reason to believe that predatory actions can and do occur, and that they often work to preserve monopoly power” (p. 338). Second, even in the absence of predatory pricing, which is very difficult to prove, proponents maintain that sales-below-cost laws/minimum markup laws reduce market concentration by either maintaining the number of competitors in the market or by reducing
market share held by the largest firms (Mueller and Paterson, 1986; Skidmore, Peltier and Alm, 2005). The end result of leveling the playing field is a more price-competitive market.

**Criticisms of Sales-Below-Cost Laws**

Opponents of sales-below-cost laws argue that they protect inefficient firms from competitive forces and thus lead to prices and markups that are higher than they otherwise would be. This view is grounded on the belief that the elimination of weaker firms would enhance market efficiencies and lead to lower prices over time (Anderson, 1999; Anderson and Johnson, 1999; Brannon 2003; Calvani, 1999; Fenil and Lane, 1985). Inherent in this view is the belief that the elimination of less efficient firms, while potentially reducing the number of competitors, ultimately benefits consumers.

**Countering Views of the Benefit/Harm of Reduced Market Concentration**

Of interest, both supporters and critics of minimum markup laws and sales-below-cost laws contend that these laws decrease market concentration (i.e., result in more competitors in the market). From the point of view of the critic, SBC/MM laws are to the detriment of consumers via the protection of inefficient retailers, but for the proponent these laws are to the benefit of consumers by enhancing local competition. Given these disparate viewpoints, research is needed that empirically investigates whether: 1) SBC laws protect or do not protect small and possibly inefficient retailers to the benefit/detriment of consumers; and 2) SBC laws either protect or do not protect market concentration and/or the number of retailers in the market. In the following section we discuss the market concentration literature.

**GENERAL MARKET CONCENTRATION LITERATURE**

**Defining Market Concentration**

The market concentration index is the most widely used measure for describing market structure and its impact on competition, prices and profitability (McCoughan and Abounooriz, 2003). Although a variety of concentration indices exist, the United States Anti-Trust Department uses the Herfindahl-Hirschman Index (HH) to decide whether mergers and acquisitions create an anti-competitive market environment (“Horizontal, Merger, Guidelines,” U.S. Department of Justice and the Federal Trade Commission, Issued: April 2, 1992, Revised: April 8, 1997). The Herfindahl-Hirschman Index for a particular industry is calculated by first squaring the market-share of competing firms and then creating a summed total of these individual squared market shares. The formula for the Herfindahl-Hirschman Index is shown below:

\[
\text{Herfindahl-Hirschman Index} = (\% \text{Share Firm 1})^2 + (\% \text{Share Firm 2})^2 + (\% \text{Share Firm 3})^2 + \ldots + (\% \text{Share Firm n})^2
\]

When evaluating the competitive impact of mergers, the Department of Justice considers Herfindahl-Hirschman indices less than 1,000 to not be concentrated, 1,000 to 1,800 is viewed as being moderately concentrated, those exceeding 1,800 are seen to be highly concentrated. The Department of Justice, moreover, views changes in the HH index caused by a reduction in the number of competitors (i.e., through merger) in excess of 100 to be anti-competitive.

Although the Herfindahl-Hirschman Index is useful for measuring industry concentration, its primary value to the current study is not for assessing mergers within the gasoline industry but in
highlighting the theoretical importance that the “number of competing firms” has on market concentration and competitive intensity. Specifically, industry/market concentration measured via the HH Index increases in one of two ways: (1) as the number of firms in a particular market decreases, and its impact on competition, prices and profitability (McCoughan and Abounooriz, 2003), and (2) as the market shares of the competing firms become increasingly disparate (U.S. Department of Justice and the Federal Trade Commission, 1997; McCoughan and Abounooriz, 2003; Mazzeo, 2002; Michelini and Pickford, 1985; Naldi, 2003; Nauenberg and Basu, 2000).

The Department of Justice and the Federal Trade Commission developed guidelines for ensuring that excessive market power vis-à-vis market concentration is not exercised and thus harmful consequences are mitigated:

Market power to a seller is the ability profitably to maintain prices above competitive levels for a significant period of time. In some circumstances, a sole seller (a “monopolist”) of a product with no good substitutes can maintain a selling price that is above the level that would prevail if the market were competitive. Similarly, in some circumstances, where only a few firms account for most of the sales of a product, those firms can exercise market power, perhaps even approximating the performance of a monopolist, by either explicitly or implicitly coordinating their actions. Circumstances also may permit a single firm, not a monopolist, to exercise market power through unilateral or non-coordinated conduct – conduct the success of which does not rely on the concurrence of other firms in the market or on coordinated responses by those firms. In any case, the result of the exercise of market power is a transfer of wealth from buyers to sellers or a misallocation of resources.2

Market concentration in the gasoline market is local in nature and is influenced in part by what has been termed “zone pricing.” The United States Senate Permanent Subcommittee (USSPS) on Investigations: Committee on Governmental Affairs (2002) published a report entitled, “Gas Prices: How Are They Really Set,” in which zone pricing is discussed in detail. In this report, zone pricing and its relationship to industry concentration was conceptualized in terms of how oil companies charge different prices to gasoline retailers deemed “outside of a prescribed geographic area.” Many factors go into the calculation of how far a pricing zone extends within a particular city and/or rural area including location, geographic characteristics, traffic volume, population, strength of demand for a product and competition. Depending on the number of competitors in a local area, pricing zones can range from a single retail outlet to many. The USSPS report (2002) noted that to maximize profits, pricing zones are commonly defined in terms of price competition to the smallest area possible. Relating price competition to market structure and concentration, firms forecast the price elasticity of consumers pertaining to how much customers within a specific geographic area will pay for gas before they go outside of that local market area and/or pricing zone.

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2 U.S. Department of Justice, Federal Trade Commission, Horizontal Merger Guidelines, April 1997 Revision, Sec. 0.1.
Relationship Between Market Concentration, Market Power, and Prices

There is a widespread consensus that increased market concentration has the potential to negatively impact competition and consumers. The greatest danger is found in those instances in which increased concentration allows incumbent firms to exercise market power that is detrimental to competitive forces, particularly with regard to consumer welfare (Chen and Lii, 2005; Maasoumi and Slottje, 2003), and is the driving force behind Department of Justice guidelines for assessing anticompetitive market and behaviors. Based in part on the dominant firm/competitive fringe model (see Church and Ware, 2000), laws protecting and preserving smaller or independent retailers can benefit consumers if the resulting transfer of market share from larger to smaller competitors is correlated with enhanced competition (Sen, 2005).

Although the market concentration literature largely supports the view that increases in concentration dampen competition, legislation designed to preserve the number of competitors could have a negative impact on consumers if the transfer of market share into the hands of less dominant and/or smaller firms creates significant market inefficiencies (Azzam and Rosenbaum, 2001; Frech and Mobley, 2000; Maasoumi and Slottje, 2003; Mazzeo, 2002; Peltzman, 1977; Sen, 2005). Consistent with this view, Demsetz (1973, 1974) criticized research findings supporting the hypothesis that leading firms in concentrated industries were disproportionately profitable. Demsetz contended that firms within a particular industry have different capabilities and cost structures, and as a consequence, the strongest and most efficient competitors should be expected to outperform and dominate their less efficient counterparts. He concluded that a positive correlation between market concentration and profitability is not due to a lessened state of competition and is instead the logical consequence of the competitive advantage that highly efficient firms gain in the marketplace. In essence, Demsetz posited a reversed causal relationship between concentration and profitability, with increased concentration the result of less efficient firms being ousted from the market. In response, Weiss (1989) reviewed over 100 empirical studies in industries with relatively homogeneous product offerings that explored the relationship between market structure and price. Weiss argued that compared to firm profitability, which is in part a function of operating superiority, price is a market-driven phenomenon that more directly measures how concentration affects consumers. Upon completing this extensive review of studies utilizing price equations containing some measure of concentration while controlling for variables associated with market level costs, Weiss concluded that there was overwhelming evidence that increased concentration leads to higher prices.

More recently, research showing that higher (lower) market concentration leads to higher (lower) prices has been found in such diverse industries as the hospitality market (Mazzeo, 2002), air travel (Stavins, 2001), health care (Young, Desai, and Hellinger; 2002), telephone service (Madden and Savage, 2000), clothing and household furnishings (Claycombe, 2000), motorcycles (Chen and Lii, 2005), supermarkets and groceries (Smith, 2004), and manufacturing (Azzam and Rosenbaum, 2001; Maasoumi and Slottje, 2003; Webster, 1996). Excluding the gasoline market, a number of recent studies within energy-related industries have provided varying degrees of corroborating evidence that energy prices are correlated with market concentration (Borenstein et al., 2002; Bunn and Martocchia, 2005; Cremer and Laffont, 2002; Dalton, 1997; Joskow and Kahn, 2002; Morris, 2000, Overbye et al., 2001; Rudkevich et al., 1998).
CONCENTRATION LITERATURE: GASOLINE MARKETS

Although there is convincing evidence captured over a long period of time and from a multitude of product and service categories that market concentration leads to higher prices, how this relationship unfolds with respect to the gasoline industry is less well understood (Sen, 2005). However, concerns have been raised regarding whether wholesale and retail pricing behavior is consistent with the principles of competitive market behavior. For example, Bacon (1991), Borenstein and Shepard (2002), Borenstein et al. (1997), and Eckert (2002) noted that gasoline prices rise and fall asymmetrically with increases/decreases in crude oil prices, with retail prices responding faster to wholesale increases than to decreases. Researchers have also been concerned with price uniformity across competitors and price volatility in the gasoline retailing market (Eckert and West, 2005). In attempting to explain these and other pricing behaviors, a stream of research is developing that investigates the extent to which market power is related to tacit collusion among competitors and how the preservation of a competitive market structure could mitigate collusive behaviors (Borenstein and Shepard, 1996; Cremer and Kaffont, 2002; Eckert and West, 2004; Sen 2003, 2005).3

The U.S. General Accounting Office (2005) noted that the retail gasoline industry has been in a retrenching mode for years, with U.S. gasoline outlets decreasing from over 202,000 in 1994 to 163,000 in 2003, a 17 percent decrease. This decrease is due in great part to tighter environmental regulations, drastic reductions in revenues associated with auto services, and the emergence of giant stations. This shrinkage in retail gasoline outlets along with continued pressure on smaller retailers have generated recent research interest in whether preserving the number and types of gasoline retailers enhances competition and consumer welfare (Barron et al., 2004; Hastings, 2004; Sen 2003, 2005). Below we summarize some key research findings from recent studies that have investigated pricing behaviors specific to the number and type of competitors in the gasoline supply chain. The focus on this set of citations is on those research findings that are most relevant to the issues of the number, size, and spatial distribution of competitors, key ingredients to the notion of market concentration and market power.4

Price Uniformity and Price Volatility: Eckert and West (2004) noted that the retail gasoline market in Canada has been found to exhibit price volatility and price dispersion, or price rigidity and uniformity. They gathered data from two large metropolitan areas (Vancouver and Ottawa) in an attempt to determine whether pricing differences could be explained in terms of market structure, conduct and spatial patterns. They noted that tacit collusive behavior is more likely to be found in those markets where mergers have taken place and as a consequence has raised market concentration. Extending this line of research, Eckert and West (2005) rejected a competitive market model for the Vancouver metropolitan area and instead found evidence consistent with tacitly collusive gasoline pricing behavior. Two findings were particularly important: (1) prices were higher in more concentrated markets and (2) prices were higher as the distance between competitors increased. This last finding would be consistent with the notion of zone pricing.

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3 Tacit collusion occurs when firms refrain from aggressive competition behavior even though such behavior may be profitable in the short run, because of the anticipated response to this behavior in the long-run (Eckert and West, 2004).

4 Given that the gasoline market has changed dramatically over the past decade, we focus primarily on recent research that is more relevant to today’s economic conditions.
Importance of the Independent Retail Sector: Hastings (2004) investigated retail gasoline prices in California as a consequence of the conversion of independent retail gasoline outlets to branded vertically integrated stations. She found that a decrease in the market share of independent gasoline retailers resulted in higher gasoline prices. Her analysis provided strong evidence that preserving the independent retail sector acts to decrease local retail gasoline prices through increased price competition. Hastings argues, and we agree, that these findings have important implications for public policy regulations designed to enhance the competitive structure of the gasoline market. Similarly, Sen (2005) compared the market share of retail gasoline outlets in 11 Canadian cities from 1991 to 1997. Consistent with Hastings (2004), Sen found that a stronger independent retailer sector leads to lower gasoline prices. He found two divergent findings: although more aggregate market share by independent retailers was correlated with higher retail prices, there was an analogous and indirect reduction of prices through a decrease in market concentration. Of significance, the effect size related to a decrease in market share of larger, branded firms was greater in magnitude than that associated with a higher share for independent retailers, contributing to lower overall prices.

The Potential for Asymmetrical Gasoline Prices: Borenstein et al. (1997) and Borenstein and Shepard (2002) noted a puzzling empirical pattern in the movement of gasoline prices, most notably that wholesale gasoline prices adjust more slowly to decreases in crude oil prices than to price increases. Their findings support this phenomenon. They also concluded that market power has the potential to negatively impact the cost-price relationship. Also of importance, firms with market power adjusted prices more slowly, particularly when price-cost margins were higher. Specific to market structure, Eckert (2003) found broad support for the empirical finding that the presence of small chains reduced price rigidity.

Additional Studies on Market Concentration, Market Power, and Price: There is an extensive and ongoing stream of literature studying the effects of concentration on market power and the price. From the review of the general concentration literature there is overwhelming evidence that in many industries increased market concentration places power in the hands of a reduced set of competitors, which in turn often leads to higher prices. In varying degrees, the recent gasoline pricing studies noted above pertaining to price uniformity and price volatility, the importance of the independent retail sector, and the potential for asymmetrical gasoline prices by Eckert and West (2004, 2005), Hastings (2004), Sen (2005), and Eckert (2002, 2003), all highlighted the importance of maintaining a competitive balance of competitors. Supporting this gasoline pricing literature is research by Sen (2003), Barron et al. (2004), Slade (1987, 1992) van Meerbeeck (2003), Leffler and Pulliam (1999), and the U.S. General Accounting Office (2004, 2005). Sen (2003) studied Canadian gas prices from 1991 to 1997 and found empirical evidence that local market concentration was positively correlated with higher retail prices. Barron et al. (2004) investigated the relationship between the number of retail outlets on gasoline prices and price dispersion in the liquefied petroleum gas market. Controlling for station-level characteristics they found that an increase in station density (i.e., more stores/less concentration) decreased price. Earlier work by Slade (1987, 1992) noted that brand status and location provide sufficient market power to induce higher prices and that station owners are sufficiently sophisticated for exploiting this power, a finding corroborated by Shepard (1990). In a study of the Belgian retail gasoline market, van Meerbeeck (2003) provided a discussion of how independent and integrated firms compete in the gasoline market, noting that competition authorities in European countries have shown that integrated firms utilize collusive agreements to restrict price competition, particularly in locales with a limited set of competitors. Leffler and
Pulliam (1999) conducted an economic analysis of why California had gasoline prices that were far above the national average. They concluded that the primary cause of these high gasoline prices is the weak independent sector in California at both the refining and retail levels.

In a 2004 report entitled “Office Report to the Ranking Minority, Effects of Mergers and Market Concentration in the U.S. Petroleum Industry Report to the Ranking Minority Member, Permanent Subcommittee on Investigations, Committee on Governmental Affairs,” the U.S. General Accounting Office (GAO) noted that market concentration in the oil industry has increased wholesale and retail gasoline prices. The report also highlighted two major changes in U.S. gasoline marketing following the more than 2,600 mergers (the greatest portion involved with exploration and production) that have taken place in the petroleum industry: (1) a considerable drop in unbranded gasoline at the retail level and (2) a consolidation in distributor and retail markets. Another report by the GAO in 2005 entitled “Motor Fuels: Understanding the Factors That Influence the Retail Price of Gasoline,” the GAO remarked that vertically integrated/name brand gasoline is generally higher priced than unbranded gasoline. The GAO also noted that unbranded retailers may also pay lower wholesale prices in that they have traditionally been able to shop around in the wholesale market place.5 Lastly, the report by The United States Senate Permanent Subcommittee (USSPS) on Investigations: Committee on Governmental Affairs (2002) highlighted that highly concentrated gasoline markets leads to higher wholesale and retail gasoline prices.

FAIR MARKETING LAWS AND INDUSTRY CONCENTRATION

To date there has been relatively little research on the impact of sales-below-cost laws and minimum markup laws on wholesale and consumer gasoline price. Even fewer studies have investigated the extent to which SBC/MM laws affect industry structure and market concentration. As early as 1986, Mueller and Paterson found that grocery markets in states that have general SBC/MM laws, especially in those states in which SBC/MM laws were enforced most aggressively, are more competitively structured. In particular, Mueller and Paterson found that markets with SBC/MM laws were less concentrated, with the largest firms having less market share than in non- SBC/MM states. Mueller and Paterson contended that SBC/MM laws place firms with different financial resources on a more equal footing. As a consequence, an equally efficient but less powerful firm can compete more effectively in markets with SBC/MM laws.

Two more recent studies provided corroborating evidence that SBC/MM laws maintain intra-industry competition. Specifically, in a study of the impact of SBS/MM laws on gasoline prices, Anderson and Johnson (1999) state that “the number of outlets also appears to be somewhat higher” (p. 200) in states that have gasoline-specific SBC/MM laws. They further state that “it is possible that these laws have helped to maintain a stronger independent retailing sector” (p. 201). Johnson (1999) also found support that such laws protect the competitive nature of the gasoline market. Specifically, using findings from his most comprehensive regression model testing the impact of gasoline-specific SBC/MM laws on market structure, states that the “results in column

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5The GAO opined that this may be changing because some wholesale suppliers of unbranded gasoline are requiring buyers to agree to binding contracts to guarantee their supply.
suggest that the presence of a motor-fuel SBC/MM law is associated with a slower rate of decline in outlets (p. 4). He then notes that the statistical significance of this effect was reduced when less comprehensive models were tested. Using the most extensive data to date, Skidmore, Peltier, and Alm (2005) examined the relationship between the presence or absence of SBC/MM laws and the number of retail gasoline outlets. Although no relationship was examined between the number of outlets and price, the total number of outlets was greater in the presence of the law.

One of the main criticisms that opponents cite against enactment of SBC/MM laws is that they protect small and/or inefficient sellers. If true, opponents of SBC/MM laws would need to provide empirical evidence that such laws actually protect the smallest firms to the detriment of consumers. However, the little empirical research that does examine the protection of such firms shows just the opposite to be true. Mueller and Paterson (1986) found that small, inefficient grocery retailers fared no better or worse in states with or without SBC/MM laws. Three other studies reached the same conclusion. Specifically, Houston (1981) found that SBC/MM laws had no impact on determining the viability of small resellers (in this case, retailers) in an absolute or relative sense, nor did SBC/MM laws play a significant role in minimizing bankruptcies. Similarly, Johnson (1999) found that SBC/MM laws do not enhance or diminish the viability of the smallest gasoline retailers. Lastly, Skidmore, Peltier, and Alm (2005) found that although SBS/MM laws help to preserve the number of retail gasoline outlets, no statistical difference was found regarding the preservation of the smallest gasoline retailers.

**Conclusion Regarding SBC Laws and Market Structure**

It is logical to conclude that opponents need not fear that SBC laws protect the most inefficient gasoline resellers. As a consequence, small firms that survive must be efficient enough to compete in the ever-changing gasoline market. Moreover, the studies discussed above (Anderson and Johnson, 1999; Johnson, 1999; Leffler and Pulliam, 1999; Mueller and Paterson, 1986; Skidmore, Peltier and Alm, 2005) all suggest that a main benefit of SBC laws is that they protect the competitive structure of the market, where equally efficient, though less powerful retailers are given the opportunity to compete. This finding, coupled with the results found in general and gasoline specific market concentration studies, suggests that enhanced competition resulting from SBC/MM laws is the likely driver of lower gasoline prices in those states that have adopted a fair marketing law.
MODEL DEVELOPMENT

Skidmore, Peltier, and Alm (2005) used panel data for the years 1983-2002\(^6\) to explore the relationship between SBC/MM laws, wholesale price, retail price, and markup over wholesale. Although this study provided strong evidence of the benefit of gasoline SBS/MM laws to consumers, still unclear is the key theoretical rationale driving these findings. To this end, using simultaneous equation modeling we examine both the direct and indirect relationships between SBC/MM laws, the number and size of retail establishments, wholesale price, retail price, and markup over wholesale price. Based on the extensive review of the literature that is summarized above, we developed several hypotheses as illustrated in Figure 1. These hypotheses are described in greater detail below.

Figure 1
SBC Laws, Market Structure/Concentration, Wholesale and Retail Prices

In addition to the work by Skidmore, Peltier, and Alm (2005) showing that SBC/MM laws reduce the retail price and markup, the market concentration and power literature provides a basis for positing that SBC/MM laws affect retail prices indirectly through the preservation of a strong retailing sector. We therefore hypothesize that SBC/MM laws affect market structure, specifically through the preservation of the number of firms competing in the market, which in turn leads to more competitive wholesale and retail gasoline sectors. Of interest, supporters and opponents of the SBC/MM laws both contend that fair marketing laws protect competitors to either the detriment (i.e., protecting inefficient retailers) or the benefit (i.e., more competitors equals lower price) of consumers. A better understanding of the relationship between SBC/MM laws, the structure of the retail sector, and price has important implications for public policy regulations, particularly if the route to lower prices is through market size and structure. Specific hypotheses are presented next.

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\(^6\) SIC data on gasoline retailers were limited to the period 1983-1997.
Impact of Fair Marketing Laws on Market Structure

Dating back to 1986, Mueller and Paterson found that grocery store markets with SBC/MM laws were less concentrated than in non-SBC/MM states. Within retail gasoline markets, Anderson and Johnson (1999) noted that the number of retailers was higher “in states that have gasoline-specific SBC/MM laws and may help to maintain a stronger independent retailing sector” (p. 201). Johnson (1999) found empirical support that the presence of a motor-fuel SBC/MM laws slowed the rate of decline in retail outlets. Using a comprehensive set of data for all 50 states over the 1983 to 1997 period, Skidmore, Peltier, and Alm (2005) found that the total number of retail outlets was greater in the presence of SBC/MM laws. Specific to whether fair marketing laws protect the smallest competitors, Houston (1981) showed that SBC/MM laws did not impact the viability of small resellers. Pertaining to gasoline retailers, Johnson (1999) provided empirical support that SBC/MM laws do not enhance or diminish the viability of the smallest gasoline retailers. Though Skidmore, Peltier, and Alm (2005) found that SBC/MM laws lead to lower industry concentration, the smallest gasoline retailers were neither aided nor damaged by these laws.

H1: The adoption of gasoline SBC/MM laws leads to (a) more retail gasoline outlets than in the absence of the law and (b) no impact will be found on the smallest retailers.

Impact of Industry Structure on Retail Prices and Markups

One of the primary contributions of this study is in the investigation of the direct and indirect effect that SBC/MM laws have on the number of competitors, the wholesale and retail market place, and consumers. The expansive general market concentration and market power literature and the recent empirical investigations in the gasoline industry by Barron et al. (2004), Eckert (2002, 2003), Eckert and West (2004, 2005), Hastings (2004), Leffler and Pulliam (1999), Sen (2003, 2005), Slade (1987), van Meerbeeck (2003), and the U.S. General Accounting Office (2004, 2005) provide a strong argument base on which to posit that an increase in the number of gasoline retailers corresponds with a reduction in the price consumers pay at the pump. Specific to margins, the United States Senate Permanent Subcommittee on Investigations: Committee on Governmental Affairs (2002) indicated that “the ‘key variables’ in determining retail margins (i.e., the difference between the retail price and the wholesale price) are the presence of major oil companies in the market, the presence of independents, the extent to which the major oil companies sell through their own stores or through lessee-dealers, and the average income of the local population. Thus, for example, a city like Washington, D.C., in which there is a high concentration of majors and few independents, has higher retail prices than a city like Indianapolis, in which there is a lower concentration of major brands and more independents” (p. 127).

H2: A decrease in market concentration/an increase in the number of retail competitors leads to (a) lower retail gas prices and (b) lower markup over wholesale.
Impact of Industry Structure on Wholesale Prices

Although the literature based on market concentration and power provides ample theoretical support for the negative relationship between the number of gasoline retailers and retail price/markup, less well understood and empirically investigated is whether the hypothesized strengthening of the retail gasoline sector leads to corresponding reduction of wholesale prices. Skidmore, Peltier, and Alm (2005) posited that a stronger retail sector, particularly with regard to independents, lowers wholesale prices through the greater ability of unbranded retailers to select their suppliers. Along these lines the U.S. General Accounting Office (2004, 2005) documented a significant drop in unbranded gasoline at the retail level and a consolidation of the distributor and retail markets. The GAO further commented that unbranded retailers often pay lower wholesale prices in that they traditionally have not been restricted to purchasing from a specific wholesaler and have instead been able to shop around in the wholesale market place. A similar argument was made by Hastings (2004) in explaining her results of why independent retailers lower gasoline prices: “Unlike the branded station at which the retail price of gasoline is directly set (at company-op stations) or indirectly influenced by the branded refiner through lease contract terms and wholesale prices, the independent retailer can shop for the lowest wholesale price from any refiner at any distribution rack and separately determine the retail margin” (p. 317). Lastly, the United States Senate Permanent Subcommittee on Investigations (USSPS): Committee on Governmental Affairs (2002) stated clearly that markets characterized as having a high degree of vertical integration between refiners and marketers have higher wholesale and retail prices. The USSPS noted that “in markets where there are few independent retailers, there are few customers for the gasoline produced by an independent refiner; hence not much gasoline will be bought at a wholesale price lower than the wholesale prices set by the integrated refiners” (p. 128).

H3: A decrease/increase in the number of retail competitors leads to higher/lower wholesale gas prices.

Impact of Number of Retail Establishments on Employment

If SBC/MM laws preserve the number of retail establishments, then employment may also be preserved.

H4: A decrease/increase in the number of retail competitors leads to higher/lower employment in the retail gasoline market.

Impact of Wholesale Price on Retail Price

This last hypothesis in our model is intuitive and is based, in most part, on a cost of supply argument. As an illustration among many, Sen (2003) studied Canadian gas prices from 1991 to 1997 and found strong empirical evidence that an increase in supply costs is highly correlated with retail price.

H5: A decrease/increase in wholesale gasoline price leads to lower/higher retail price.
METHODS AND DATA

The focus in this section of the report is to examine the routes by which SBC/MM laws affect prices and to test our previously discussed hypotheses. However, we first show that SBC/MM laws are negatively correlated with prices. An initial evaluation of the possible effects of SBC/MM laws can be seen in Table 1, which shows a simple comparison of retail prices for all states during the years 1983-2003. (These data are discussed in more detail later.) Table 1 shows that average monthly inflation-adjusted prices net of taxes are more than 2 cents lower in states/years where the law was in effect relative to those states/years in which there was no law. This difference is significant at the 99 percent level of confidence.

Table 1
Comparison of Average End-User Price,
When SBC Law Is in Effect Versus When SBC Law Is Not in Effect

<table>
<thead>
<tr>
<th></th>
<th>Years When Law is in Effect</th>
<th>Years When Law is Not in Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail Price (in cents)</td>
<td>81.73</td>
<td>84.06</td>
</tr>
</tbody>
</table>

Methods

As emphasized earlier, most previous studies of SBC/MM laws have used a case study approach that necessarily focused on a small and limited number of states or cities or have made comparisons across states that had laws versus those that did not. Most studies also were constrained to include only a small number of control variables or to examine only a few dimensions of SBC/MM impact. Importantly, these studies did not examine pricing behavior over a significant period of time during which transitions occurred, so that they could not examine the longer-run impacts of SBC/MM laws or the effects of state passage or repeal of a law. We take a different approach. As shown in Table 2, there are 13 states that adopted (and/or repealed) motor fuel sales-below-cost laws during the 1983-2003 period, with adoptions occurring at different points in time. By collecting time series data on states including these 13 states (and 3 other states that have had an SBC/MM law for many years) and the other 34 states, we can use variation across states in the timing of the adoption (repeal) of these laws to investigate how they affected average prices in states where they have been implemented. We use a within-group estimation technique that exploits the panel nature of our data and controls for fixed state and time effects. We also include a full array of control variables, and we examine multiple dimensions of SBC/MM impact.
Table 2
States with Motor Fuel SBC Statutes, 1983-2003

<table>
<thead>
<tr>
<th>State</th>
<th>Date of Enactment (and Termination)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alabama</td>
<td>May 8, 1984</td>
</tr>
<tr>
<td>Arkansas</td>
<td>August 12, 1993 (ruled unconstitutional March 11, 1996)</td>
</tr>
<tr>
<td>Colorado</td>
<td>July 1, 1993</td>
</tr>
<tr>
<td>Georgia</td>
<td>July 1, 1985 (ruled unconstitutional in 1987)</td>
</tr>
<tr>
<td>Maryland</td>
<td>May 2000</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>1950</td>
</tr>
<tr>
<td>Minnesota</td>
<td>August 2001</td>
</tr>
<tr>
<td>Missouri</td>
<td>August 28, 1993</td>
</tr>
<tr>
<td>Montana</td>
<td>April 19, 1991 (measure terminated January 1, 1999)</td>
</tr>
<tr>
<td>New Jersey</td>
<td>July 1, 1954</td>
</tr>
<tr>
<td>North Carolina</td>
<td>September 1, 1986</td>
</tr>
<tr>
<td>South Carolina</td>
<td>60 Days after June 15, 1993</td>
</tr>
<tr>
<td>Tennessee</td>
<td>July 1, 1988</td>
</tr>
<tr>
<td>Utah</td>
<td>March 16, 1987</td>
</tr>
</tbody>
</table>

Sources: Johnson [21], Perkins, Phillips, and Schwartz [31], and state statutes.

The econometric model is as follows. We estimate several equations simultaneously using a seemingly unrelated regression estimation technique. As outlined in our theoretical discussion we seek to understand how SBC laws affect the degree of competition, employment, wholesale prices, and retail prices. The four equations are presented below:

\[
\text{Retail Price}_{it} = D_i \alpha + X_0 \beta + \ln(\text{establishments}_{it}) \alpha + \mu_i + \eta_t + \epsilon_{it}, \quad (1)
\]
\[
\text{Wholesale Price}_{it} = D_i \alpha + X_0 \beta + \ln(\text{establishments}_{it}) \alpha + \mu_i + \eta_t + \epsilon_{it}, \quad (2)
\]
\[
\ln(\text{establishments}_{it}) = D_i \alpha + X_0 \beta + \mu_i + \eta_t + \epsilon_{it}, \quad (3)
\]
\[
\ln(\text{employment}_{it}) = \ln(\text{establishments}_{it}) \alpha + X_0 \beta + \mu_i + \eta_t + \epsilon_{it}, \quad (4)
\]

where \(D_i\) represents the status of the law in state \(i\) at time \(t\); \(X_0\) is a vector of demand-side and supply-side characteristics that may determine retail prices, wholesale prices, the number of firms, and employment; \(\mu_i\) and \(\eta_t\) are fixed state and monthly time effects, respectively; \(\alpha\) and \(\beta\) are coefficient vectors; and \(\epsilon_{it}\) is a random error term. We estimate a similar system of equations except that we replace equations (1) and (2) with a single markup (retail price – wholesale price). In total, we present four system estimation results: (a) the system represented by equations 1-4; (b) a system similar to (a) except that we replace the retail and wholesale equations with a single markup equation; c) system (a) except that we replace equation (3) with two equations—one for “large” establishments and one for “smaller” establishments; and (d) system (b) except that we replace equation (3) with a “larger” establishment equation and a “smaller” establishment equation. Specific definitions of all variables are found in Appendices A and B.

7 One time indicator variable is omitted to avoid perfect multicollinearity.
Before presenting the results, several econometric issues warrant discussion. First, we utilized a two-way fixed-effects procedure in all our models. The fixed-effects model is appropriate for our analysis for three reasons. First, much of the variation in prices and markups is between states rather than within states. Although it would be difficult to specify all the institutional, economic, and demographic characteristics that determine the differences across states in prices, markups, number of establishments, and employment, we can capture permanent differences between states with state fixed-effects. Similarly, there are a variety of factors that may affect prices and markups over time. We capture those differences with monthly (or annual in the case of the establishment and employment equations) time-effects. A second reason for using the fixed-effects model is that adoption of an SBC/MM law may be correlated with high motor fuel prices or markups prior to adoption of the law; that is, states with concerns about non-competitive market structure and high prices may be more likely to adopt SBC/MM laws. Suppose, for example, that states that adopt laws had on average higher prices. Then omitting the state effects would yield biased estimates because the estimates would not clearly illustrate the effect that the SBC/MM law had on prices in that state. Third, the fixed-effects model is a within-group estimator that uses the within-state variation to form the parameter estimates. Therefore, our estimates of the effects of SBC/MM laws measures how the number of establishments, prices and markups change within the states as legal climates change.

Despite the use of the fixed effects framework, there is a lingering concern that the adoption of SBC/MM legislation may be endogenous. Although four states adopted SBC legislation in 1993, a period of unusually low prices, an equal number of states adopted legislation during high price periods, and several states adopted legislation during periods of neither high nor low prices. In recent years, mass retailers such as Wal-Mart have pushed for the repeal of SBC/MM legislation across the states, while organizations such as the Petroleum Marketers Association of America have supported the imposition of new legislation and have fought to protect existing laws. Given that SBC/MM activity does not seem to be spurred by high or low prices, it appears that endogeneity is not a concern.

Given that our panel consists of 50 states for which we have monthly series over 21 years, it is likely that the errors are serially correlated. A Durbin-Watson test indicates autocorrelation to be a concern; therefore, all standard errors are adjusted for autocorrelation using an AR1 procedure. As illustrated in equations 1-4, we have a system of equations to estimate simultaneously. If the error terms in each equation are related, then estimating the series of regressions as a system using a seemingly unrelated regression estimation technique should improve the efficiency of the estimation. In the case of our series of equations it seems likely that shocks that affect retail prices might also affect wholesale prices, the number of retail establishments, and employment. In this context, it is appropriate to estimate the equations as a system. Estimating the equations as a system not only improve efficiency, it also serves to help identify the paths through which SBC/MM laws affect prices.

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8 State fixed-effects capture any permanent differences across states (e.g., laws banning self-service, divorce, transportation costs) not otherwise captured by other explanatory variables. Similarly, the time-effects capture any variation in prices and markups over time that affects the whole country (e.g., changes in national environmental standards or crude oil prices).

9 Hsiao (1986) presents an excellent discussion of panel data estimation procedures.

10 We more rigorously examine the endogeneity issue in Skidmore, Peltier, and Alm (2005), and find no evidence of endogeneity.
Data

The key variables in our analysis are the inflation-adjusted average monthly Retail Price of Unleaded Gasoline in state $i$ during period $t$, measured in cents per gallon, the Markup of Unleaded Gasoline calculated as the difference between retail and wholesale prices,\(^{11}\) the Wholesale Price of Unleaded Gasoline, the number of retail gasoline establishments,\(^ {12}\) as well as employment in the retail gasoline sector. The retail price is a key dependent variable, but all measures are important in evaluating the effect of SBC laws. We obtained information on retail and wholesale prices for the years 1983-2003 from The Petroleum Marketing Monthly, a report published by the U.S. Energy Information Administration. Retail and wholesale prices represent inflation-adjusted weighted averages net of all taxes (i.e., net of all federal, state, and local sales and excise taxes) from a scientific sample of more than 3,500 companies and are valid at the 95 percent confidence level.\(^ {13}\)

Our justification for examining the impact of SBC/MM laws on several price measures is straightforward. Because the retail price measures the direct and financial impact on consumers, an evaluation of the retail price (as well as of the markup and of the percent markup) is required to adequately measure the effect of SBC/MM legislation. It is possible that SBC/MM laws have helped to maintain a stronger and larger independent retailing sector, which in turn could reduce the power that integrated refiners have in the marketplace. This loss of power could result in lower wholesale prices (Anderson and Johnson, 1999). As a consequence, if an SBC law has helped lower price at the wholesale level, the final retail price will be lower in the SBC state, even though markups are the same, and the use of retail markup measures alone to assess the effectiveness of SBC legislation might obscure the true nature of SBC/MM laws. Consequently, a thorough examination of all price and markup variables is required to understand fully the effects of SBC/MM laws on gasoline pricing.

Use of these data has two benefits over the use of price data from selected cities over a short period of time. First, since the data are a weighted average of the prices across the entire state, they are a better representation of consumer activity within the state as a whole. Second, analysis using monthly average price data over a number of years is likely to yield a more accurate assessment of the overall, and especially the long-run, impact of the SBC/MM law within each state. Another possible approach to assess SBC/MM laws is to use disaggregated data (i.e., data collected and analyzed at the store level for all states). However, consistent and reliable micro-data over an extended period of time for all states are very difficult to obtain.

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\(^{11}\)The wholesale price is defined as the price that wholesalers pay refiners for gasoline. 

\(^{12}\)From 1983 to 1997 these data are defined as SIC code 554, but from 1998 to 2003 they are defined as NAIC code 447. The mapping between these two industry classifications is not perfect: there is a jump up in the number of establishments in 1998. However, the time indicator variables account for the shift as the government transitioned to the NAIC system. It is important to note that the retail outlet data from County Business Patterns do not include certain types of retailers that happen to sell gasoline. For example, a grocery retailer that also sells gasoline would not be included in our data. Rather, “grocery” establishments are categorized under a different SIC/NAIC code. Similarly, marinas or agricultural cooperatives that sell gasoline would not be included in our data. However, the retailers included in this analysis represent the core gasoline retailers—retailers that sell the most of the gasoline to households (as opposed to boaters or farmers, or businesses) across the states. Moreover, big box retailers like Wal-Mart sell their gasoline through Murphy Oil, which would be included in the data set. 

\(^{13}\)For a more detailed discussion, see http://www.eia.doe.gov/oil_gas/petroleum/data_publications/petroleum_marketing_monthly/pmm.html.
We include a number of independent variables to explain the variation in prices and markups, the number of establishments, and employment across the states and over time. Central to our analysis is a variable that marks the presence and the timing of the adoption of gasoline-specific SBC/MM laws: the natural logarithm of Years After SBC Law. Because newly adopted SBC laws may take some time to alter market structure and prices, we use the natural logarithm of Years After SBC Law, which equals 1 plus the number of months since the state implemented the SBC/MM law. This variable is always equal to zero in those state-years in which there was no law. The natural logarithm specification of this variable accounts for the possibility that, once a new equilibrium market structure emerges, any effects from the law may well diminish.

It should be recognized that three states (Massachusetts, New Jersey and Wisconsin) have had gasoline specific SBC laws for many years, and that in two states (Arkansas, Georgia) the newly imposed laws were challenged in court and were subsequently eliminated. We have estimated separate models in which we include/exclude both sets of states, with no significant impact on our key findings. It should also be recognized that \( \ln(\text{Years After SBC Law}) \) does not capture the differences in the nature of the laws or the degree of enforcement across the states. SBC/MM laws commonly specify that fixed costs (e.g., rent, interest on borrowed capital) be included in the cost calculation in evaluating when a firm is selling below cost. In lieu of actual cost data, a number of states have established minimum markup provisions (typically around 6 percent of the wholesale price). In some estimates reported later, we examine the effects of different types of SBC laws. While SBC laws are fairly uniform in their requirements, differences across states and their enforcement over time can be substantial. Thus, SBC/MM variable reflects the average effect of a SBC/MM law over time and cannot capture the effects in a particular state.

It is also necessary to control for other possible factors that could individually and/or jointly affect gasoline prices. Following Vita (2000) we include a number of demand-side and supply-side factors that determine gasoline prices. These control variables include: Population, Population Density, Proportion of Population Over Age of 65, Real Per Capita Income, the total number of vehicles per population (Vehicles Per Capita), the total number of licensed drivers in

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14 Although several states have amendments to their laws, this variable does not capture that information. We have also estimated models in which we included some information regarding these amendments. Those results are similar to the results presented here, and so are not reported.
13 To avoid arithmetic error when taking a natural logarithm of zero, we add 1 to each value of Years After SBC Law. We also note that using Years After SBC Law without taking its natural logarithm yields estimates that are qualitatively similar to those presented here.
15 Years After SBC Law is intended to capture the idea that prices and markups are unlikely to change immediately after the law is imposed, but require time for market structure to adjust. However, once the market reaches a new equilibrium, we expect diminishing impacts in later years.
17 In principle, our analysis also evaluates what happens to prices when SBC/MM laws are repealed. However, Arkansas and Georgia eliminated their laws within three years of adoption, and it is unlikely that the laws were in effect and credibly enforced long enough to have an impact in the first place. Montana, on the other hand, enforced its law for more than seven years before its repeal on January 1, 1999. For this reason we treat Arkansas and Georgia as never having the law, and, given the length of time Montana enforced the law, we treat Montana as having a SBC/MM law over the period. Our key results are robust to the treating Arkansas and Georgia as having the law, albeit for a very short period.
18 For example, Wisconsin has amended its SBC law a number of times, most recently in 1998.
19 The empirical approach is similar to Murray, Evans, and Schwab (1998), who evaluate the effects of court-ordered education finance reform on education funding across the states.
the population (Drivers Per Capita), the average annual inflation adjusted retail wage (Average Annual Real Retail Wage), a dummy variable equal to one in those state-years in which a general sales-below-cost law exists and zero otherwise (General SBC Law)\footnote{According to a study by Johnson (1999), Arkansas, California, Colorado, Idaho, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Minnesota, Montana, North Dakota, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Utah, Virginia, Washington, West Virginia, Wisconsin, and Wyoming have or have had general sales-below-cost laws during the period of analysis; only Minnesota and Virginia eliminated the laws during the period of analysis. However, our own search through Commerce Clearing Trade Regulation Reports and the Virginia State Statutes failed to confirm Virginia as ever having the law, and so we do not count Virginia as ever having the law. To our knowledge, no other states experienced a change in the status of this law during our period of analysis.} the heating degree days in the Census region (Average Heating Degree Days), Real Wholesale Price of Unleaded Gasoline, and a dummy variable that is equal to one in those states that have a city in which use of reformulated gasoline is required by federal law (Reformulated Gasoline).\footnote{Although our retail and wholesale prices are in monthly terms, many control variables are only available annually. For these variables, we use the annual observation for each of the 12 months within a given year.} More detailed definitions and sources of these variables are provided in Appendices A and B. Table 3 provides summary statistics for all variables.

Vita (2000) has shown that gasoline demand is influenced by population and population density. An increased population may lead to increased demand for gasoline and thus an increase in prices. The effect of population density is, however, ambiguous. On the one hand, more densely populated areas have other transportation modes available, leading to a reduction in demand. Also, increased population density may result in reduced wholesale transport costs. These two factors suggest that we might observe lower prices in more densely populated areas. On the other hand, more densely populated areas experience greater traffic congestion, and thus more fuel consumption per mile traveled, as well as higher rental values. These factors suggest that prices may very well be higher in more densely populated areas. We also include the percentage of population over the age of sixty-five, the number of vehicles and drivers per capita, and income per capita to control for changes in gasoline demand. We include the real annual retail wage variable to control for changes in wage costs for gasoline retailers. Although a number of states have general SBC laws, only Minnesota experienced a change in general SBC legislation. Our a priori expectation of the effect of this variable is similar to the gasoline specific SBC variable. Following Borenstein, Cameron, and Shepard (1997) and Vita (2000), average heating degree days is included as an exogenous determinant of gasoline production costs.\footnote{Transportation and production costs of gasoline are affected by the demand for jointly produced products such as home heating oil, which has a demand that is weather determined. Gasoline is a by-product of the production of home heating oil so that gasoline and home heating oil are complements in production but substitutes in transportation. The expected sign on this variable is indeterminant.} We include the wholesale gasoline price variable in the retail price regressions to control for changes in the most important input cost for retailers. Beginning January 1, 1994, the Clean Air Act Amendments of 1990 required that cleaner burning (and more expensive) reformulated gasoline be sold in the nine worst “ozone nonattainment” areas, and we include the reformulated gasoline dummy to control for this factor.\footnote{These areas are Baltimore, Chicago, Harford, Houston, Los Angeles, Milwaukee, New York, Philadelphia, and San Diego. Sacramento was added later as well.}
### Table 3
Summary Statistics of Data from All States, 1983-2003

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real Retail Price of Unleaded Gasoline (in cents)</td>
<td>83.50</td>
<td>17.21</td>
</tr>
<tr>
<td>Markup of Unleaded Gasoline (in cents)</td>
<td>11.63</td>
<td>4.401</td>
</tr>
<tr>
<td>Months After SBC Law</td>
<td>3.250</td>
<td>10.21</td>
</tr>
<tr>
<td>Population (in thousands)</td>
<td>5,213</td>
<td>5644</td>
</tr>
<tr>
<td>Population Density</td>
<td>170.3</td>
<td>234.4</td>
</tr>
<tr>
<td>Proportion of Population Over Age 65</td>
<td>0.701</td>
<td>0.023</td>
</tr>
<tr>
<td>Real Per Capita Income (in dollars)</td>
<td>22,588</td>
<td>4,361</td>
</tr>
<tr>
<td>Vehicles Per Capita</td>
<td>0.799</td>
<td>0.120</td>
</tr>
<tr>
<td>Drivers Per Capita</td>
<td>0.685</td>
<td>0.052</td>
</tr>
<tr>
<td>Average Annual Real Retail Wage (in dollars)</td>
<td>13,989</td>
<td>1747</td>
</tr>
<tr>
<td>General SBC Law</td>
<td>0.432</td>
<td>0.495</td>
</tr>
<tr>
<td>Average Heating Degree Days</td>
<td>4,701</td>
<td>1,668</td>
</tr>
<tr>
<td>Real Wholesale Price of Unleaded Gasoline (in cents)</td>
<td>71.86</td>
<td>16.67</td>
</tr>
<tr>
<td>Reformulated Gasoline</td>
<td>0.069</td>
<td>0.254</td>
</tr>
<tr>
<td>Total Number of Gasoline Retail Establishments (SIC code 554 and NAIC code 447)</td>
<td>2,182</td>
<td>1936</td>
</tr>
<tr>
<td>Number of Gasoline Retail Establishments with 1 to 4 Employees (SIC code 554 and NAIC code 447)</td>
<td>958.8</td>
<td>915.0</td>
</tr>
<tr>
<td>Number of Gasoline Retail Establishments with 5 or More Employees (SIC code 554 and NAIC code 447)</td>
<td>1,223</td>
<td>1936</td>
</tr>
<tr>
<td>Employment in Retail Gasoline Sector (SIC code 554 and NAIC code 447)</td>
<td>14,876</td>
<td>13,112</td>
</tr>
</tbody>
</table>

See Appendices A and B for sources and details.
FINDINGS

We begin by presenting a retail price model in which we include a number of explanatory variables, but not the market structure variable(s). The purpose here is to estimate the total effect on prices. Then, in our simultaneous equation model, we will attempt to identify the sources of the price effect. This price regression is shown in Table 4. The complete regression is presented in Appendix Table A. The results show that retail prices for gasoline decrease as years after the adoption of a SBC/MM law increase. The coefficient on ln(Years After SBC Law) is negative and highly significant. According to these results, prices would fall by about 1 cent per gallon five years after the law is imposed.

Table 4
Regression Results for Initial Retail Price Model
(t-statistics in parentheses)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Ln(Years After SBC Law)</th>
<th>Adj. R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retail Price of Unleaded Gasoline</td>
<td>-0.488***</td>
<td>0.878</td>
</tr>
<tr>
<td></td>
<td>(-3.235)</td>
<td></td>
</tr>
</tbody>
</table>

Note: All models include state and monthly indicator variables and the following control variables: population, population density, percentage of the population over the age of 65, per capita inflation adjusted income, the total number of vehicles per population, total number of licensed drivers in the population, a dummy variable equal to 1 in those state-years in which a general sales-below-cost law exists and zero otherwise, heating degree days in the Census region, average annual inflation adjusted retail wage, and a dummy variable that is equal to one if a state has a city in which there is a reformulated gasoline requirement and zero otherwise.24

n = 12,431

*** Indicates significance at the 99% confidence level for a two-tailed test.

This analysis demonstrates that there is a strong negative correlation between prices and SBC/MM laws. The objective of the next section is to identify the routes by which prices are affected by estimating a system of equations designed to identify the paths by which SBC/MM laws lower prices.

Identifying the Routes by Which SBC Laws Affect Prices

In order to evaluate these linkages between SBC/MM laws, market structure and prices we employ a multivariate regression technique. Our system contains four equations: a retail price equation, wholesale price equation, an equation for the number of establishments, and an equation of the number of employees. The systems method generates more efficient estimates

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24 All of the remaining regressions included the same set of indicator and control variables; the remaining tables will exclude this information.
because it takes into account any cross-equation correlation of disturbances. As with the retail price regression presented earlier, we include time and state fixed effects and correct for serial correlation of errors for each equation in the system. The estimates generated from the analysis are then used to determine the routes by which SBC/MM laws affect prices. As outlined in the previous discussion, we hypothesize that in the long-run prices are affected via a more competitive market that was induced by the SBC/MM law. The multi-equation system that we estimate allows us to examine the linkages and determine the direct and indirect effects of SBC/MM laws on gasoline prices.

From Table 4, the single equation estimate shows that after five years the total effect on retail prices is about 1 cent per gallon (the downward effect on price equals 0.488x(ln(1 + Years After SBC Law)). The Seemingly Unrelated Regression results suggest that prices are indeed affected via market structure. We report the findings of four estimations in Tables 5, 6, 7 and 8.

In Table 5 we present estimates of the retail price, wholesale price, total number of establishments, and employment equations. Table 6 is similar to 5 except that instead it includes a markup (retail price/wholesale price) equation in lieu of the retail and wholesale price equations. Tables 7 and 8 are similar to 5 and 6 except that the total establishment variable is separated into smaller establishments (1 to 4 employees) and medium to large establishments (5 or more employees).

Consider first the results presented in Table 5. First, the presence of an SBC law leads to more establishments: After five years the number of retail establishments increases by about 3.2%. This in turn leads to an increase in employment of about 2.4%. SBC/MM laws are not directly correlated with wholesale prices, but in this model after controlling for the number of establishments, SBC/MM still have a significant negative direct effect on prices (about 0.5 cents per gallon). If we total the direct effect on prices along with the indirect effects via lower wholesale prices and retail prices generated from having more retail establishments, the total downward effect on retail prices is nearly 1 cent per gallon after five years. Even with this broad measure of market structure, we have evidence that a route by which SBC/MM laws lower prices is through the number of establishments.

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25 See Greene(1993) for an excellent discussion of seemingly unrelated regression analysis.
Table 5
Results from System Estimation (1983-2003)
(t-statistics in parentheses)

<table>
<thead>
<tr>
<th>Equation</th>
<th>Explanatory Variable</th>
<th>Total Establishments</th>
<th>Employment</th>
<th>Wholesale Prices</th>
<th>Retail Prices</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wholesale Prices</td>
<td></td>
<td></td>
<td></td>
<td>0.791***</td>
</tr>
<tr>
<td></td>
<td>Ln(Total Establishments)</td>
<td>0.767*** (84.71)</td>
<td>-6.075*** (-5.188)</td>
<td>-4.250*** (-6.236)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ln(Months after Minimum Markup Law)</td>
<td>0.018*** (5.880)</td>
<td>0.019 (0.092)</td>
<td>-0.294* (1.895)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>n = 12,354</td>
</tr>
</tbody>
</table>

*** Indicates significance at the 99% confidence level for a two-tailed test.
** Indicates significance at the 95% confidence level for a two-tailed test.
* Indicates significance at the 90% confidence level for a two-tailed test.

The results in Table 6 show that the markup is affected in virtually the same way as retail prices: SBC/MM laws lead to more establishments and more establishments reduce the markup. Again, the direct effect of SBC/MM laws in the prices equation is significant. In Tables 7 and 8 we disaggregate our data on the number of establishments to further examine our market structure hypothesis.

Table 6
Results from System Estimation (1983-2003)
(t-statistics in parentheses)

<table>
<thead>
<tr>
<th>Equation</th>
<th>Independent Variable</th>
<th>Total Establishments</th>
<th>Employment</th>
<th>Markup (Retail Price-Wholesale Price)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ln(Total Establishments)</td>
<td></td>
<td></td>
<td>-2.788*** (-4.286)</td>
</tr>
<tr>
<td></td>
<td>Ln(Months after Minimum Markup Law)</td>
<td>0.018*** (5.967)</td>
<td>0.767*** (84.70)</td>
<td>-0.300** (2.050)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>n = 12,354</td>
</tr>
</tbody>
</table>

*** Indicates significance at the 99% confidence level for a two-tailed test.
** Indicates significance at the 95% confidence level for a two-tailed test.
* Indicates significance at the 90% confidence level for a two-tailed test.

In Tables 7 and 8 we estimate a system of equations similar to those in Tables 5 and 6 except that we separate total establishments into smaller (1 to 4 employees) and medium to large (5 or more employees) establishments in an effort to capture more of the market structure effect. Breaking out establishments by size incorporates more information about market structure and thus may shed more light on the paths by which SBC/MM laws affect prices. Table 7 shows that
SBC/MM laws increase the number of both types of establishments (4.1% for medium to large establishments and 2.9% for small establishments) and, in turn, the increased number of establishments\(^{26}\) leads to greater employment. Increases in medium to large establishments leads to both lower wholesale and retail prices. In this system estimation, although the coefficient on the SBC/MM variable in the price equation is negative its magnitude is smaller and it is not statistically significant. This result provides compelling evidence that the route by which SBC/MM laws affect prices is by enhancing the number of firms in the marketplace. In these estimates, the indirect effect of SBC/MM laws via number of firms is more than half of the total price effect.

### Table 7

**Results from System Estimation (1983-2003)**

(t-statistics in parentheses)

<table>
<thead>
<tr>
<th>Equation</th>
<th>Medium to Large Establishments</th>
<th>Small Establishments</th>
<th>Employment</th>
<th>Wholesale Prices</th>
<th>Retail Prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholesale Prices</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.789***</td>
</tr>
<tr>
<td>Ln(Medium to Large Establishments)</td>
<td>0.676*** (126.66)</td>
<td>-5.990*** (-6.958)</td>
<td>-4.523*** (-8.939)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ln(Small Establishments)</td>
<td>0.082*** (20.34)</td>
<td>-1.131 (-1.529)</td>
<td>0.243 (0.542)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ln(Months after Minimum Markup Law)</td>
<td>0.022*** (5.047)</td>
<td>0.016*** (2.785)</td>
<td>0.1399 (0.496)</td>
<td>-0.200 (-1.286)</td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>12,354</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*** Indicates significance at the 99% confidence level for a two-tailed test.
** Indicates significance at the 95% confidence level for a two-tailed test.
* Indicates significance at the 90% confidence level for a two-tailed test.

\(^{26}\) Skidmore, Peltier, and Alm (2005) found that SBC laws increased the number of medium to large establishments but not small establishments. Two possible reasons for the difference in results are that: 1) in the present study we estimate establishments in log form and 2) we have extended the analysis from 1997 to 2003.
In Table 8 we repeat the systems estimation in Table 7 except that we again focus on the markup. These findings corroborate those found in Table 7; the direct effect of SBC/MM laws in the markup equation is insignificant, but SBC/MM laws lead to more firms, which has the effect of lowering the markup.

### Table 8
**Results from System Estimation (1983-2003)**
* (t-statistics in parentheses)

<table>
<thead>
<tr>
<th>Equation</th>
<th>Medium to Large Establishments</th>
<th>Small Establishments</th>
<th>Employment</th>
<th>Markup (Retail Price-Wholesale Price)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ln(Medium to Large Establishments)</td>
<td>0.679*** (127.48)</td>
<td>-3.091*** (5.840)</td>
<td>0.082*** (20.42)</td>
<td>0.510 (1.086)</td>
</tr>
<tr>
<td>Ln(Small Establishments)</td>
<td>0.016*** (2.730)</td>
<td>0.0227*** (5.191)</td>
<td>0.0227*** (5.191)</td>
<td>-0.227 (1.389)</td>
</tr>
<tr>
<td>Ln(Months after Minimum Markup Law)</td>
<td>0.016*** (2.730)</td>
<td>0.0227*** (5.191)</td>
<td>0.0227*** (5.191)</td>
<td>-0.227 (1.389)</td>
</tr>
</tbody>
</table>

n = 12,354

*** Indicates significance at the 99% confidence level for a two-tailed test.
** Indicates significance at the 95% confidence level for a two-tailed test.
* Indicates significance at the 90% confidence level for a two-tailed test.

These findings demonstrate that SBC/MM laws lower prices by about 1 cent per gallon after 5 years, but that the route by which SBC/MM laws affect prices and markups is through increasing the number of establishments, particularly the medium and large establishments. Our systems estimation also links more establishments with higher employment in the retail gasoline sector. Figure 2 summarizes our findings:

---

**Figure 2**

*** Indicates statistically significant at the 99% level of confidence for a two-tailed test.
**Summary of Hypotheses**

H1a: Supported. SBC laws result in a more competitive market as defined in terms of the number of retailer establishments.

H1b: Not Supported. SBC laws appear to protect small firms, though not to the detriment of consumers.

H2a: Supported. A more competitive market leads to lower retail prices.

H2b: Supported. A more competitive market leads to lower markups.

H3: Supported. A more competitive market leads to lower wholesale prices.

H4: Supported: More retail establishments lead to greater employment.

H5: Supported. Lower wholesale prices lead to lower retail prices.

**CONCLUSIONS**

Using data over the years 1983-2003, this study was conducted to address four major areas of interest regarding minimum markup and sales-below-cost laws:

- Do minimum markup and sales-below-cost laws affect market structure, specifically in terms of market concentration (i.e., number and types of competing firms)?
- Does market structure/industry concentration affect the wholesale and retail prices of gasoline?
- Does market structure/industry concentration affect the markup consumers pay for gasoline?
- Do minimum markup and sales-below-cost laws affect employment levels in the retail gasoline sector?

Building on Peltier, Skidmore, and colleagues and Skidmore, Peltier, and Alm (2005), we utilized a simultaneous equations and systems approach to testing the direct and indirect impact of fair marketing laws on wholesale price, retail price and markup, the number and size of competitors, and employment. We further tested whether the number and size of gasoline retail competitors affects wholesale price, retail markup/price, and employment. Lastly, completing the systems analysis we examined the relationship between wholesale price and retail price and markup. The data and analytical approach we utilized are considerably more extensive than those used in previous studies and help to more clearly understand how fair marketing laws eventually benefit competition, consumers and employment. Below we make some final conclusions.

- **Fair Marketing Laws Preserve Competition:** One of the most important theoretical justifications behind fair marketing laws is to preserve competition, which in turn is expected to result in a more price competitive environment. The twenty years of data utilized in this study support the market preservation benefit of fair marketing laws. Specifically, five years after the enactment of a fair marketing law there is a 3.2% increase in retail establishments over states that didn’t have a fair marketing law.

  *Conclusion: fair marketing laws lead to a greater number of retail competitors.*

Committee on Governmental Affairs (2002) all posited that a stronger retail sector, particularly with regard to independents, lowers wholesale prices through the greater ability of unbranded retailers to select their suppliers. Our findings support this perspective by showing that fair marketing laws lower prices by about 1 cent per gallon after 5 years by increasing the number of establishments, particularly the medium and large establishments.

Conclusion: More retail competitors leads to a more competitive wholesale sector. In turn, lower wholesale prices benefit consumers via lower retail prices and margins.

- **A More Competitive Retail Environment Increases Employment:** Mostly ignored in the literature and in legislative discussions is the employment benefit that fair marketing laws might provide in terms of jobs and tax revenues. Our results show that fair marketing laws preserve competition in terms of the number of retail outlets, which in turn leads to an increase in employment of about 2.4%.

  Conclusion: Fair marketing laws benefit residents vis-à-vis the creation of additional employment opportunities.

- **A More Competitive Retail Environment Lowers Retail Price/Margins:** Greater competitive intensity at the retail level, as a result of preserving the number of competitors, is the driving theoretical force behind the posited benefits that fair marketing laws have on the price and markup consumers pay. Of all the significant relationships in the systems model, this link had the highest t-value.

  Conclusion: Fair marketing laws preserve competition, and it is this preservation of the number of competitors that has the greatest impact on lower retail prices and markups.

- **Fair Marketing Laws a Good for States That Adopted Them:** In combination, on average, those states that have adopted a fair marketing law have a more competitive retail structure in terms of the number of competitors, greater employment in those outlets, lower wholesale prices brought on by the enhanced competitive structure, and lower retail prices and markups vis-à-vis the increased number of competitors vying for market share.
### Variable Definitions and Sources

<table>
<thead>
<tr>
<th>Variable</th>
<th>Details</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Annual Inflation</td>
<td>SIC 5541: Gasoline Service Station, Average Annual Inflation Adjusted Wage Per Service Station Employee in the State</td>
<td></td>
</tr>
<tr>
<td>Adjusted Wage Per Service Station Employee</td>
<td></td>
<td><a href="Http://stats.bls.gov/sahome.html">Http://stats.bls.gov/sahome.html</a></td>
</tr>
<tr>
<td>Drivers Per Capita</td>
<td>Total Number of Driver Licenses Divided by State Population</td>
<td>Federal Highway Administration, Highway Statistics, 1980-1999</td>
</tr>
<tr>
<td>GDP Deflator</td>
<td>Gross Domestic Implicit Price Deflator</td>
<td><a href="Http://www.bea.doc.gov/bea/dn/nipaweb/AllTables.asp">Http://www.bea.doc.gov/bea/dn/nipaweb/AllTables.asp</a></td>
</tr>
<tr>
<td>Heating Degree Days</td>
<td>Heating Degree Days by Census Division (where “Heating Degree-Days” are deviations from the mean daily temperature below 65°F)</td>
<td><a href="Http://www.eia.doe.gov/emeu/acer/overview.html">Http://www.eia.doe.gov/emeu/acer/overview.html</a></td>
</tr>
<tr>
<td>SBC Law</td>
<td>Indicator Variable (equal to 1 if a state has a SBC Law and 0 otherwise)</td>
<td>Anderson and Johnson (1999), Perkins, Phillips, and Schwartz (1999), and State Statutes</td>
</tr>
<tr>
<td>Per Capita Income</td>
<td>Inflation Adjusted Per Capita Income</td>
<td><a href="Http://www.bea.doc.gov/bea/regional/data.htm">Http://www.bea.doc.gov/bea/regional/data.htm</a></td>
</tr>
<tr>
<td>Proportion of Drivers Between the Ages of 20 and 44</td>
<td>Number of Drivers Between Ages of 20 and 44 Divided by Total Number of Drivers in the State</td>
<td>Federal Highway Administration, Highway Statistics, 1980-1999</td>
</tr>
<tr>
<td>Proportion of Population Over the Age of 65</td>
<td>Proportion of Population Over 65 Within the State</td>
<td><a href="Http://www.census.gov/population/www/estimates/statepop.html">Http://www.census.gov/population/www/estimates/statepop.html</a></td>
</tr>
<tr>
<td>Reformulated Gas Requirement Indicator Variable</td>
<td>Indicator Variable Equal to 1 if a State Has a City in Which the Clean Air Act Amendment Required Use of Cleaner Burning Reformulated Gasoline</td>
<td>Vita (1999)</td>
</tr>
<tr>
<td>Retail Price of Unleaded Gasoline</td>
<td>Average Monthly Inflation Adjusted Price of Unleaded Gasoline Sales to End-Users Net of All Taxes (where “Sales to End-users” are sales made directly to the ultimate consumer, including bulk customers such as agriculture, industry, and utilities, as well as residential and commercial customers)</td>
<td>Energy Information Administration, Petroleum Marketing Annual, 1984-1999</td>
</tr>
<tr>
<td>General SBC Law</td>
<td>Indicator Variable (equal to 1 if a state has a General Sales-Below-Cost Law and 0 otherwise)</td>
<td>Anderson and Johnson (1999)</td>
</tr>
<tr>
<td>Wholesale Price of Unleaded Gasoline</td>
<td>Average Monthly Inflation Adjusted Price of Unleaded Gasoline Sales for Resale Net of All Taxes (where “Sales for Resale” are those made to purchasers who are other than ultimate consumers)</td>
<td>Energy Information Administration, Petroleum Marketing Annual, 1984-1999</td>
</tr>
<tr>
<td>Months After SBC Law</td>
<td>Cumulative Index of the Number of Months After the Implementation of the SBC Law</td>
<td></td>
</tr>
<tr>
<td>Total Number of Gasoline Retail Establishments (SIC)</td>
<td>Data based on an Annual Survey Completed By the Bureau of the Census</td>
<td>County Business Patterns for years 1983-1997 and 1998-2003</td>
</tr>
<tr>
<td>Description</td>
<td>Source</td>
<td>Years Covered</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Number of Gasoline Retail Establishments with 1 to 4 Employees (SIC code 554 and NAIC code 447)</td>
<td>Data Based on an Annual Survey Completed by the Bureau of the Census</td>
<td>County Business Patterns for years 1983-1997 and 1998-2003.</td>
</tr>
<tr>
<td>Number of Gasoline Retail Establishments with 5 or More Employees (SIC code 554 and NAIC code 447)</td>
<td>Data on an Annual Survey Completed by the Bureau of the Census</td>
<td>County Business Patterns for years 1983-1997 and 1998-2003.</td>
</tr>
</tbody>
</table>
## APPENDIX B

Statutes, Names, and Adoption (Repeal) Dates of Motor Fuel Specific SBC Legislation

<table>
<thead>
<tr>
<th>STATE</th>
<th>CITATION</th>
<th>AKA</th>
<th>EFFECTIVE</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massachusetts</td>
<td>Mass. Ch. 94 §§ 295A-W et seq.</td>
<td></td>
<td>1950</td>
<td></td>
</tr>
<tr>
<td>South Carolina</td>
<td>S.C. Code Ann. § 39-5-325 et seq.</td>
<td>SC Unfair Trade Practices Act (part of)</td>
<td>60 days after June 15, 1993</td>
<td>This is part of a larger act.</td>
</tr>
</tbody>
</table>

Sources: Perkins, Phillips, and Schwartz (1999) and a review of state statutes. We thank the Wisconsin Attorney General’s Office for assistance.
REFERENCES


