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Publication Date

2005-05-18



CSEM WP 144

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May 2005

This paper is part of the Center for the Study of Energy Markets (CSEM) Working Paper Series. CSEM is a program of the University of California Energy Institute, a multi-campus research unit of the University of California located on the Berkeley campus.



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RETAIL POLICIES AND COMPETITION IN THE GASOLINE INDUSTRY

by

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ABSTRACT: We explore issues relating to the vertical structure of ownership and control in gasoline distribution and retailing. Some have argued that refiner control of the retail sector has increased California gasoline prices, prompting proposals for legislation to restrict refiner participation in gasoline retailing. We study the arguments for and against government intervention in gasoline distribution and retailing, and describe the conditions under which such intervention could be justified. In theory, vertical controls in the gasoline industry can produce both positive and negative effects. Many vertical controls can increase efficiency, both operations and in the transactions between refiners and retail outlet. Some controls, however, could also influence the structure or incentives of refiners in a way that increases their market power (reduces competition) and could therefore prove costly to consumers. In general, the positive aspects of vertical controls impact the pricing and operations of retail outlets, and are passed through to consumers in the form of lower retail mark-ups over wholesale prices. The negative consequences primarily impact wholesale prices through the influence of vertical structure on the incentives of refiners to reduce competition at the wholesale level. We conclude that in order to make a case that public intervention could be justified as a basis for reducing consumer prices, one must establish both that intervention could indirectly reduce the wholesale margins of refiners and that these wholesale benefits are not offset by increased costs and market power at the retail level.

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I. Introduction

Gasoline prices are seldom far from the public consciousness of Californians. The fluctuations of gasoline prices command the public's attention like those of no other commodity. This is in part because of the central role of automobiles in California and in part because of the very public display of retail prices. It is by now well known that Californians pay among the highest average retail gas prices in the continental U.S.¹ California has suffered through several episodes where its retail gasoline prices have climbed 30 to 40 cents per gallon above the national average.²

There are many reasons for this. California's wholesale market is relatively isolated because of its unique gasoline formulation. Production capacity has been severely constrained and has not kept up with the growth in demand. Despite being the home to substantial refining capability, California has transitioned from being a net exporter to a net importer of wholesale gasoline in recent years. Retail taxes on gasoline in California are also among the highest in the nation.³ The transition from the oxygenate MTBE to ethanol has caused further strain on the State's gasoline infrastructure. Given the level of California's gasoline prices, it is also natural to be concerned about the competitiveness of the industry.

In a previous report (see Borenstein, Bushnell, & Lewis, 2004), we discussed the potential for competitiveness problems at the wholesale level that could stem from the horizontal concentration of refining. In this report, we explore issues relating to the distribution and retailing of gasoline and the relationship of these activities to the refining of gasoline. We refer to the potential organization of upstream refiners, distributors, and downstream retail outlets as the *vertical structure* of the industry. We refer to all the

¹ According to the Energy Information Administration, in late February 2005 retail gasoline prices in California averaged \$2.15 /gallon in contrast to a U.S. average of \$1.905 /gallon. See http://www.eia.doe.gov/oil_gas/petroleum/data_publications/wrgp/mogas_home_page.html

² In March 2003, average retail prices in California exceeded the national average by 48.9 cents/gallon, the largest differential experienced to date.

³ According to the American Petroleum Institute, total Federal and State gasoline taxes averaged 56.6 cents/gallon in California as of November 2004. This ranked third in the nation behind New York (58) and Hawaii (57.2), and exceeded the U.S. average by 12.6 cents/gallon. See "Nationwide and State-by-State Motor Fuel Taxes as of November 2005" at api-ec.api.org.

various contractual arrangements, terms, conditions, or restrictions that can be reached between upstream refiners and retail distributors and stations as *vertical controls*. As we describe below, vertical controls can take many forms, including *vertical integration* – where a firm owns and operates both refineries and retail outlets – and restrictions by a refiner on where individual retailers can purchase wholesale gasoline.

Given the fact that posted retail prices are the primary source of information about the gasoline market for most Californians, it is natural that significant public policy attention has focused on the retail side of the business. Some have argued that the organization and operation of the retail sector in California has contributed to the state's high prices.⁴ Legislation that regulates the ownership of retail outlets or the pricing interaction between wholesalers and retailers exists in other states and has been proposed for California. In this report, we explore the arguments for and against government intervention in the distribution and retailing of gasoline, and describe the conditions under which such intervention could or could not be justified.

The challenge to formulating policies relating to vertical controls in the gasoline industry stems from the fact that these controls can, in theory, produce both positive and negative effects. Many vertical controls can increase efficiency, both operations and in the transactions between refiners and retail outlet. In this sense vertical controls can be beneficial to consumers. Some controls could also influence the structure or incentives of refiners in a way that increases their market power (reduces competition) and could therefore prove costly to consumers. Policymakers need to be mindful of the fact that intervention to prevent or reduce the negative consequences could also reduce or eliminate the beneficial impacts.

In general, the positive aspects of vertical controls impact the pricing and operations of retail outlets, and are passed through to consumers in the form of lower retail mark-ups over wholesale prices. The negative consequences primarily impact wholesale prices through the influence of vertical structure on the incentives of refiners to reduce competition at the wholesale level. Consistent with this characterization, the available data and the bulk of research to date indicate that government intervention in the retail gasoline sector is very unlikely to improve retail competition and reduce retail margins.⁵ Some policies could in fact increase retail margins. To make a case that public intervention could be justified as a basis for reducing consumer prices, one must establish that intervention could indirectly reduce the *wholesale* margins of refiners and that these wholesale benefits are not offset by increased costs and market power at the retail level.

⁴ For example, a May 2000 report by the California Attorney General listed “free dealers to seek the best price for fuel” among its recommendations for improving California’s gasoline market. See “Report on Gasoline Pricing in California.” Attorney General Bill Lockyer.

⁵ For the purposes of this report, we define the retail margin as the spread between wholesale gasoline prices and retail prices. It includes the costs of distributing and marketing gasoline, the costs of operating a retail outlet, and retail profits. The wholesale margin is the spread between the cost of crude oil and the wholesale price of gasoline. It includes refining costs and operating profits.

II. Vertical Structures in the Gasoline Industry

The petroleum and refined products industry is composed of three main sectors: the exploration for and extraction of crude oil, the refining of oil into petroleum products, and the distribution and retail sales of those products. In the United States there are several large firms (“the Majors”) that are vertically integrated into all three of these functions, and many more, smaller firms involved in only one or two of these sectors. Unlike many other industries, no single vertical structure has evolved to dominate the other possible organizational forms. In this section we describe the vertical segments of the industry and the various combinations of these segments that can be found across the country.

There are several dimensions along which one can differentiate retail structures in the gasoline industry. These include branding, station ownership, management control, and wholesale distribution. The first dimension is the branding of the gasoline. Retailers either market gasoline under a refiner’s brand, which will include a refiner’s proprietary additives, or an “unbranded” product that is not associated with a specific refiner. Unbranded suppliers acquire gasoline from refiners at the wholesale level through some mix of spot purchases and advance contracts, although some refiners do not market at all to unbranded retailers. Historically, unbranded retailers have been either single stations or relatively small chains specializing in gasoline sales, but the emergence of diversified retailers such as Costco and Safeway as players in the gasoline business is an important recent trend.

A second dimension of retail structure is station ownership. There is a mix of both independently (non-refiner) owned and refiner owned stations both in California and across the U.S. Independently owned stations could be branded or unbranded while refiner owned stations obviously market that refiner’s brand. Many of the independently owned stations are owned by jobbers, smaller companies that frequently own many stations, which are not necessarily all under the same brand.

A related and somewhat controversial dimension is the management control of stations. Refiner-owned stations can be directly managed by the refiner or operated by a *leasee-dealer* under a franchising arrangement. In most cases, management control is equivalent to control of pricing at the station level. In a typical franchising arrangement, a leasee signs a long-term contract with a refiner that includes rental costs and could stipulate potentially complex conditions for wholesale purchases of gasoline. These conditions could restrict where the gasoline is purchased from the refiner by the retailer and may include various incentives such as wholesale price discounts or premia based upon sales volumes. The relationship between refiners and their leasee-dealers is frequently contentious. Some tension is to be expected, given the fact that both sides would prefer to keep as much of the retail margin as possible. We could not conclude whether disputes were more or less common in gasoline than in other retail franchising businesses, such as fast food.

Independent retailers often express their concern that the majors will use their size and access to wholesale gasoline to leverage their position at the expense of the retailers. Retailers describe their business conditions as getting steadily worse.⁶ They point to rent increases, declining support, and attempts to shift various costs downstream to retailers by refiners as evidence that refiners are working toward reducing competition. They have also raised concerns about the proliferation of directly company-operated stations, although the data we present below indicate that the percentage of gasoline sold from company-operated stations has remained steady in California since 1997 and the number of company-operated stations has declined.

The California Service Station and Automotive Repair Association (CSSARA) describes a trend in which refiners are putting up their leasee-dealer stations for sale, either to their leasees or to new owners who would operate as branded independents. Table 1 shows the breakdown of retailer operations by brand, ownership and management control for Los Angeles, San Diego, and San Francisco counties respectively. This table suggests that between 1994 and 2002 there was a decline in the share of stations that are branded leasee-dealer, and a rise in independently owned stations. Between 1998 and 2002, there was also apparently a decline in the number of company-operated stations.⁸

Statewide, the picture is somewhat different. Table 2 presents the same breakdown for three urban counties (Los Angeles, San Francisco, and San Diego) and the entire state of California in 2002. Statewide, the majority of stations are independently owned and a much higher share of stations are unbranded than is the case in the three urban counties described in Table 1.

A last important dimension of retail organization concerns the distribution of the gasoline from the wholesaler and the pricing of the wholesale gasoline. In this dimension, the most important distinction is whether the station is *direct supplied* from the refiner or whether it is *self-supplied* or *jobber supplied*. Gasoline supplied to a direct-supplied station is delivered by the refiner and the delivery charges are included in the wholesale price of the gasoline. By contrast, stations that are not direct supplied receive their gasoline at wholesale terminals, or *racks*, and either supply the distribution service (tanker truck) themselves or contract with an independent distributor (or *jobber*) to bring the gasoline to the station.

As we discuss in later sections, the form of distribution has become a controversial issue because it is inexorably linked to the wholesale pricing policies of the refiners.

⁶ See CSSARA, "Why Californians Pay More at the Pump."

⁸ Data for 1994 and 1998 are taken from the Whitney-Leigh census of gasoline stations. Data for 2002 are taken from the Lundberg Survey, Inc. retail gasoline station census provided to us by the CEC. Since the data sources as well as the characterization of retail categories differ somewhat the differences between 1998 and 2002 should be taken with a grain of salt.

Most of the controversy centers around the degree to which refiners can charge different prices to different retailers rather than a uniform price to all retailers whose gasoline comes from a given wholesale rack location. In other words, the degree to which wholesalers can price discriminate among their retail customers. In general, refiners are considered to be better able to price discriminate among direct supplied stations as the delivery charge can be varied down to the individual station level. Retailers have complained that these delivery charges sometimes bear little resemblance to the actual cost of taking the gasoline to the station.

Although direct supply allows refiners more scope for price discrimination, these practices are not limited to retail deliveries alone. Individual stations may have performance related incentives, such as discounts or penalties related to the volume of gasoline sold at the station. Further, even if the gasoline is distributed by a jobber, a refiner can still restrict the ability of the jobber to shop around for wholesale gasoline. Much of the fuel purchased by jobbers is sold under the terms of long-term contracts that could restrict the jobber's purchases to specific racks and could also include volumetric discounts in the marginal price.

Still, as we discuss below, price discrimination cannot be sustained in the presence of a liquid secondary market for the product. If jobbers are free to supply a wide number of stations and even trade branded gasoline freely with each other, the ability of refiners to price discriminate will almost certainly be reduced. The impact of such a result on retail *prices* paid by consumers is much less clear.

Using data from the Energy Information Administration (EIA) we can examine the trends in distribution methods in California and across the U.S. The EIA reports volumetric sales and prices by various distribution methods.⁹ Table 3 reports the gasoline volume marketed directly by refiners, the volume sold bulk at wholesale (such as to fleets), the volume directly delivered by refiners and sold to retailers at *dealer tank-wagon* (DTW) prices, and the volume sold at racks for the U.S. and for California.¹⁰

Several facts stand out from these tables. First, across the U.S. rack sales are the dominant marketing channel for refiners, accounting for just over half of sales volume. This share has also been increasing over the last decade. Dealer tank wagon sales by contrast, comprise a declining fraction of overall refiner sales. The story in California is quite different. Rack sales account for around one-fifth of refiner sales in California, while DTW sales comprise about half of all sales. The share of sales by major company-operated stations has increased somewhat over the last decade in California (specifically in 1997) while there is no noticeable change in company operated sales nationwide. Company operated stations, while comprising only 10 percent of the number of stations in California account for about 20 percent of sales volume. The stations that are owned and operated by refiners are the higher volume stations.

⁹ Data are taken from the EIA's Petroleum Marketing Monthly.

¹⁰ Dealer Tank Wagon prices are bundled prices of both gasoline and delivery charges.

Note also that, although from Table 1 there appears to be a trend away from leasee-dealer stations toward branded independently-owned stations in California, there is no analogous trend from DTW to jobber distribution. Thus, the new branded independents appear to be getting their gasoline directly from refiners. There are at least two explanations for this. First, the refiners may offer a better deal than do jobbers. Second, as indicated by the CSSARA, the sale of formerly-leased stations to new owners may be tied to long-term contracts for wholesale gasoline to be direct-supplied by the refiner.

Thus, from the aggregate census and volume data, it is clear that California's retail structure is different from the rest of the United States. It is also true that California's wholesale margins are among the largest in the country, although its retail margins are actually somewhat smaller. It is also important to note that, while California's wholesale distribution structure differs from the rest of the U.S., it has been relatively stable in terms of sales volume since 1997. The increase in California wholesale margins does not coincide with this last change in the distribution structure. To demonstrate a link between wholesale margins and retail structure, this disconnect in the timing would have to be explained.

Since the wholesale prices paid by individual retail stations are usually not reported, retail margins must be estimated from aggregated or more generic measures of wholesale prices. In table 4, we summarize the annual average LA pipeline spot price of reformulated regular gasoline, the average California retail price of that gasoline, and the portion of the retail price that can be attributed to federal and state taxes.¹¹ The difference between the retail price, taxes, and wholesale prices can be interpreted as comprising distribution and retail costs and margins. For brevity, we will refer to this as retail margin. Since the LA spot price is for generic (unbranded) gasoline, this measure of the retail margin also includes any brand-specific values and costs.

Retail margins measured in this way have been around 20 cents/gallon since 1998, although there was a notable decline in 2000 (12 cents) and a notable increase (28 cents) during 2003. Figure 1 illustrates the weekly time series of the same data. From this figure, the asymmetry between wholesale spot prices and retail prices stands out. The large margins in 2003, for example, appear to be impacted by the two large wholesale price shocks that arose during that year.

¹¹ Wholesale and Retail reformulated gasoline prices are taken from the EIA at http://www.eia.doe.gov/oil_gas/petroleum/info_glance/gasoline.html. Taxes are calculated by applying the relevant tax rates to the above prices. Taxes include CA State Excise Tax (\$0.18/gallon), Federal Reformulated Excise Tax (\$0.184/gallon prior to 2004, \$0.154/gallon after 2003), and an Underground Storage Facility fee (\$0.009/gallon in 1996, \$0.012/gallon after 1996). Sales and Use Tax was assumed to be 8.00 percent although actual values vary somewhat by County.

III. The Economics of Vertical Controls and Pricing

Over the last few decades, economists have studied the vertical structure of industries in great depth. The motivating questions behind most of this research have been “Why do some firms choose vertical integration or various forms of vertical restrictions and others don’t?” and “Does vertical integration or restrictions benefit consumers?”

Early in this debate, advocates of one view of competition policy (known as the “Chicago” view) argued that vertical integration and controls (such as exclusive dealing, territorial exclusivity, and vertical price controls) imposed by a producer could not harm consumers. In straightforward models, they demonstrated that a firm with no market power could not create market power through these actions, and that a firm with market power could not enhance that market power and harm consumers through vertical integration or restrictions. Many of the same researchers showed that these vertical practices could be explained as attempts to deal with inefficient incentives that can arise between upstream and downstream firms.

This initial view that vertical controls could not possibly harm customers has been modified over the years. Within the community of economics and antitrust practitioners, it is fair to say that the view that vertical controls could *never* harm consumers is not widely held, but that there is fairly strong skepticism about claims that vertical integration or restrictions are likely to have anticompetitive effects.

In this section, we discuss vertical practices in the gasoline retailing industry, in terms of both theories of efficiency enhancement and theories of market power enhancement.

Vertical Integration and Control

One of the fundamental shifts in gasoline retailing over the last 50 years is the introduction of company-operated stations. “Company ops” grew rapidly in the 1980s and then leveled off around their current 20 percent share (nationwide) on a gasoline volume basis. They are a substantially smaller share of stations; company op stations tend to sell much greater volume than others.

As described in the previous section, company ops are one end of a spectrum of vertical structures in gasoline retailing. At the opposite end are independent stations that sell unbranded gasoline. At the company op station, the refiner has complete control over the environment in which its product is sold to the end user: price, facilities, personnel, etc. At the independent, unbranded station, the refiner has no control at all. The economic study of vertical practices can be organized according to when vertical control increases or decreases the profits generated in the full vertical chain and when the practice benefits or harms final customers.

Efficiency-Enhancing Vertical Controls

In an ideal market environment, where there is no market power at either the wholesale or retail level, prices will be set at the incremental costs of supply. In an economic sense, this is the efficient price level because customers will continue to consume as long as their value (*i.e.* willingness to pay) for gasoline exceeds the actual costs of supplying it. When market power is introduced, prices rise above incremental costs of supply. This creates an inefficiency in consumption as consumers whose value of gasoline is less than the price will not purchase it, even though some of those customers value the gasoline more than the incremental cost of supplying it. The resulting lost gains from trade, from the under-consumption caused by high prices, is known as *deadweight loss*.

Thus market power can lead to inefficient prices. If there is market power in both the refining and retailing of gasoline, these inefficiencies can be multiplied. One of the best known and understood problems in the study of vertical organization is known as “double marginalization.” If the wholesale and retail firms are separately controlled, then the wholesaler may mark up the product in order to make a profit and the retailer would then take that wholesale price and mark it up again. This double markup leads to lower total profits for the two sellers than if they coordinated with one another. In effect, the multiple levels of market power are causing prices to be marked-up too much, relative to the optimal market for a vertically integrated firm.

The reason is that, holding constant the markup at one level of the distribution chain, an increase in the markup at the other level raises retail price, reduces total sales and harms the profits of the other firm in the chain. For example, an increased mark-up by a refiner will harm consumers *and* the retailer, who will be unable to pass on all of the price increase. Because the companies are independent, each ignores the effect of its action on the other company in the chain. In doing so, the companies generate lower profits *and* charge a higher retail price than if they coordinated their behavior. Vertical integration aligns the incentives of the two companies in the chain. In this simple setting, vertical integration raises profits and lowers price to final customers.

There is some empirical evidence that double marginalization is a real concern in gasoline. For example, studies of states with laws that limit the ownership or deployment of company-operated stations, known as *divorcement* laws, find that retail prices are higher in states with divorcement laws.¹² However, it is not obvious what specific vertical structures are necessary to eliminate double marginalization. Company-operated stations should have no double marginalization since pricing decisions are made at the corporate level. But leasee-dealer and even open-dealer arrangements do not necessarily have to produce double marginalization either if the terms of the wholesale transaction are sufficiently flexible. For example, an upstream firm could price its gasoline so that the retailer sees a marginal price equivalent to the refiner’s marginal

¹² Barron and Umbeck (1984) study a time series of station prices in Maryland over the time horizon in which divorcement legislation took effect there. Vita (2000) studies a cross section of several states with such legislation.

cost and the refiner covers its costs and profit through fixed charges, rental fees, or delivery charges. Similarly volume discounts can effectively lower the *marginal* price seen by the retailer while still producing a transfer of rents to the wholesaler. The refiner could charge high prices to the retailer for the first few units of gasoline, but marginal cost for volumes in the range close to the expected amount the retailer is going to sell.

Intuitively, it is thought that the double marginalization problem will be not be a concern at company-operated stations, and potentially most severe at independently-owned open dealer stations. The more vertically separated are the wholesaler and retailer, the more the wholesaler must rely upon creative non-linear prices, contract terms, or other methods to provide the right incentives to the retailer. In a study of Boston area stations, Shepard (1993) found that company-operated stations charged significantly lower prices than independent dealers for premium gasoline, but not for regular gasoline. More recently, Barron, Taylor, and Umbeck (2003), in a study of L.A. area stations, find that prices at stations served directly by refiners at DTW prices were lower than those for the same brand taking delivery from a jobber who had purchased its gasoline at the rack. Both of these studies reinforce the intuition that double marginalization exists, but has been mitigated by non-linear pricing by refiners.

The potential for double marginalization implies that tighter vertical controls would be most efficient if the setting of retail prices is the main activity of retailers. However, the opposite effect occurs if the *effort* that the retailer puts into selling the gasoline, or complimentary products, has a significant effect on total sales. For instance, retailers that also do automobile repair make an important local investment in reputation by running an honest and reliable repair shop. This sort of effort might be difficult for the refiner to monitor closely, and it could be difficult for the refiner to motivate its own employee running the station to put in the extra effort to make the repair shop reliable and honest. But, if the station operator is the beneficiary of the returns from a good reputation, then s/he will have a much stronger incentive to supply high-quality service. In this case, vertical disintegration can improve efficiency, raise total profits in the chain and benefit customers. Indeed, Shepard (1993) finds that Boston area stations were much more likely to be operated by a leasee or open dealer if they offered repair services.

The value of reputation may extend beyond one retailer. A good experience at one Chevron station might make a customer more likely to patronize another Chevron station in another town. If such spillovers exist, then the refiner is more likely to want to either own the outlets or monitor them closely in order to keep one outlet from free riding on the reputation of others under the same brand. This vertical control is likely to benefit customers as well as the refiner.

These examples make clear that without any anticompetitive intent, a refiner might still view some degree of vertical integration or control as a benefit for the company, and may also benefit consumers. They also highlight the fact that efficient vertical organization may differ over time and across areas. As auto repair becomes a less

common feature of service stations over time, the incentive to have independent stations may decline. More generally, as personal interaction at gas stations declines – to the point that a single individual can operate a 16-pump or larger station and only interact personally with the small share of the customers who don't pay at the pump with a credit card – the refiner may find less need for high-powered incentives at the station level and may be more inclined to own its outlets. Likewise, a refiner might decide that the optimal ownership structure for rural areas, where stations are more spread out and more costly to monitor, is vertical separation to instill strong retailer incentives, while at the same time maintaining a closer vertical relationship in urban areas.

It is also likely that there are economies of scale and scope in the distribution of gasoline. This means that a firm serving a larger number of stations, and is also involved in other aspects of distribution will have lower costs. What is not clear is how pervasive these economies are, or at what level they become significant. It is also true that these economies could also in theory be captured by separate firms reaching specialized contractual arrangements as well as by vertically integrated or large firms. The uncertainty over the efficient organization of the industry, as well as its dynamic, increases the risks of regulating or even banning specific organizational forms.

Market Power Enhancing Vertical Controls

Vertical control is not necessarily always in consumers' interests. From research of the last 20 years, it has become increasingly clear that vertical integration or close control can be used in some circumstances to raise barriers to entry and reduce competition. In the best known examples, which are also widely accepted in antitrust analysis, vertical control can be used to deprive a competitor of access to some critical input. If entry into gasoline retailing is difficult, for instance, a refiner might integrate downstream in order to reduce the number of outlets that competing refiners (or importers) might have through which they could sell their product. Concern has indeed been expressed by some in the California gasoline market that the low number of unbranded stations, makes entry of new gasoline suppliers (through imports from other regions) more difficult.

There are also many theories of the interaction between vertical integration and collusion among producers, most suggesting that integration increases the stability of collusion. For instance, if two refiners wish to collude on price, but cannot easily monitor one another's wholesale prices, vertical integration in some situations can allow monitoring of retail prices (at much lower cost) to substitute for wholesale price monitoring. Clearly, these incentives for vertical integration or control may benefit firms, but harm consumers.

Price Discrimination

A practice that does not lie clearly in either the efficiency-enhancement or market power-enhancement area is *wholesale price discrimination*, which is defined as a refiner selling to different retail outlets at price differences that do not reflect cost differences. For example, two service stations may be equally distant from a wholesale terminal and, even though the costs of delivering gasoline to those stations may be identical, they could be charged significantly different DTW prices by the same refiner. It is first worth noting that such discrimination is feasible only if the refiner has some degree of market power, because otherwise its price would reflect marginal cost in all cases. Similarly, the producer can maintain discriminatory prices only if resale among downstream firms is prevented. Thus, such wholesale price discrimination usually involves some degree of vertical control. It can be as little as an agreement of the retailer to buy its gas through a specified channel and not to resell or as much as a refiner charging a station-specific wholesale price to every station it sells to.

The bulk of empirical research on price discrimination in gasoline markets has focused on *retail price discrimination*, or the ability of stations to price discriminate amongst customers. For example, Borenstein (1991) demonstrated that price differentials between leaded and unleaded gasoline arose from the fact that buyers of leaded gasoline were much more likely to shop around for the lowest price rather than the cost differences in producing the gasoline. Shepard (1993) detected the same phenomenon at work in the pricing of full-service gasoline relative to self-serve.

Though the terminology differs, there seems to be widespread agreement that refiners engage in price discrimination across retail outlets and that they exercise vertical control in part to be able to maintain this discrimination. Refiners often argue that this is necessary in order to give them the ability to respond to locational competitive differences. In any case, refiners enforce contracts that require retailers to purchase gas from them through different delivery channels and from different locations. The wholesale price differences between locations and delivery channels do not necessarily reflect cost differences.

While refiners clearly believe that this improves their profitability, it is unclear whether it benefits or harms consumers. It is well understood that while price discrimination almost always harms some customers while benefiting others, the net effect is ambiguous. The analysis is even more complex in the case of price discrimination at the wholesale level in gasoline. The discriminatory wholesale prices are part of complex vertical relationships that often include property lease payments, volume discounts (or rebates), and contractual performance obligations on both sides.

It is important to recognize that price discrimination can hurt some parties, but still prove beneficial to others. The natural tension between the upstream provider and retailers over dividing up the profits provided by a specific retail location play a role here. Thus, zone pricing and other practices may be harmful to station owners, but not necessarily

to consumers. A general intuition is that price discrimination is more likely to be beneficial over all as it leads to larger increases in total output. In other words, even though *some* customers are paying higher prices, more product is being provided in total, suggesting a reduction in the deadweight loss caused by a firm exercising market power. To the extent that such practices in the distribution of wholesale gasoline reduce double-marginalization and lower consumer prices, they are beneficial. To the extent that such arrangements provide wholesalers an incentive to reduce output and raise wholesale prices, for example by reducing the population of unbranded stations, they can be detrimental.

Competition Versus Breach-of-Contract Issues

In this analysis, we have alluded a number of times to the tension between refiner and retailer. While both entities would like to maximize the profits in the vertical chain, if they are separately owned, then each side would also like to maximize its share of those profits. As we have described, each side might take actions that reduce the total profit in the vertical chain in order to increase its own profit.

From an antitrust and competition policy viewpoint, these actions are of no interest unless they raise retail prices or otherwise harm consumers. Sometimes the actions taken by one side might violate the spirit or letter of an agreement between them, which might then be grounds for legal action based on a breach of contract or other unfair business practice. Nonetheless, it is very important to recognize that while these may be valid legal disputes between private parties, they may still have no impact on final consumers.

For example, leasee and independent branded dealers frequently complain about low prices charged by company-operated stations. They argue that these low prices harm the other dealers of the same brand and may cause them to go out of business. While such actions might violate a contract between refiner and its leasee, that is a private legal matter.

Such action would become a competition policy issue if the low pricing by company-operated stations eventually led to reduced competition, at either the wholesale or retail level, and to higher retail prices. The disappearance of certain types of stations, or even a reduction in the total number of stations, could harm consumers, but it could instead be part of a change to a more efficient distribution system that benefits consumers.

Surprisingly, despite a scarcity of evidence that changes in retail distribution over the last 20 years have harmed consumers, a number of states have intervened in the vertical organization of gasoline retailing. The focus of divorcement and minimum retail markup legislation seems to have been protection of certain types of retailers, not necessarily the protection of consumers.

In theory, the elimination of leasee or independent branded dealers could reduce competition and harm consumers. For instance, as explained earlier, independent

branded dealers, along with unbranded dealers, may make it easier for new firms to enter at the wholesale level, because these dealers can fairly easily switch to buying gas from the entrant. Even absent the exit of other stations, vertical integration into retail by a refiner might give it an incentive to raise the wholesale price that refiner charges to rivals of its retail outlets and thereby raise wholesale margins.

In sum, the theoretical study of vertical organization in gasoline retailing makes it clear that it is possible for integration or vertical restrictions to harm consumers, but there are many credible explanations for these practices that would not harm and could very well benefit consumers. The fact that certain companies in the vertical chain, such as certain types of retailers, are harmed by changes in the vertical structure is not a good guide to whether the changes are likely to harm customers. The number of retail outlets during the 1980s, for instance, declined steadily while retail margins also declined, benefiting consumers.¹³ Actions intended to regulate vertical relationships in gasoline should be based on clear *empirical* evidence that such practices have raised retail prices or otherwise harmed consumers.

¹³ See Borenstein (1991).

IV. Evaluation of Proposals for Regulating Vertical Controls

The set of policies relating to the relationship between wholesale refiners and retail stations is known as vertical controls. These include direct ownership (integration) as well as contractual restrictions and other pricing policies. As described in section 3, there can be both positive and negative impacts from vertical controls. Controls can help eliminate inefficiencies such as double marginalization, but can also provide an additional incentive for wholesalers to restrict output. In general, the positive impacts of controls are felt at the retail level, while the negative impacts are felt at the wholesale level. Thus a demonstration that vertical restrictions reduce retail margins, (or increase wholesale margins) does not by itself demonstrate the net impact of such restrictions.

As gasoline prices have fluctuated over the years, there have been periodic proposals for various interventions into the retail structure of gasoline markets. Several states have adopted statutes that regulate structure or pricing in one form or another. The details of such proposals vary, but a generic characterization of these proposals follows.

Divorcement

Divorcement laws make the ownership of retail stations by refiners illegal. A weaker form would outlaw company-operated stations but preserve the company owned – leasee operated framework. Milder forms of divorcement, which only forbid refiners from acquiring additional stations, are often proposed.

Regulation of Retail Margins

Another common proposal would focus on the potential that company-operated stations would try to drive their competitors out of business by working low or even negative retail margins into their retail price. Several states have statutes focused specifically on outlawing predatory pricing by company-operated stations. Some go even further and specify a required minimum retail margin that must be charged by all stations. Such regulations, although originally intended to impact company-operated stations, also pose problems for big-box retailers that may want to use gasoline as a loss-leader for other purchases.

Branded Open Supply

More recently, legislative proposals have focused more on the distribution of gasoline, rather than the ownership structure. Increasingly focused pricing zones, upon which DTW prices are based, have given rise to calls to eliminate the practice of pricing zones. One way to accomplish this would be to require refiners to allow their leasees the option to take delivery from a jobber rather than directly from the refiner. Concerns

have also been raised about restrictions that have been placed on the jobbers, however, so proposals for more “open” distribution usually call for a relaxation or end to such restrictions also.

These proposals have been called *branded open supply*. The strongest form would require that both leasee-dealer and independently-owned branded stations have the option to be supplied by a jobber, and that jobbers would be allowed to distribute gasoline to any branded station in any area.

Full Open Supply

An even stronger form of open pricing regulation would require that all gasoline be marketed as unbranded, and that additives, which are added at the rack and constitute the effective difference between brands, be marketed separately. The fate of leasee-dealers under such a scheme is unclear. The goal of such a regulation would be to stimulate the presence of independent unbranded stations by loosening the ties between brand and gasoline availability.

Contract Length Limitations

Another way to increase the presence of unbranded stations, and potentially reduce the ability of refiners to price discriminate amongst retailers would be to facilitate the switching of brands by independently-owned stations. One possibility for reducing the barriers to switching would be to restrict the length of contractual arrangements between refiners and station-owners.

Empirical Analysis of Vertical Policies

Previous research has produced several insights about vertical relationships which are relevant to discussions about potential policy interventions. Hastings (2004) studies the purchase of the Thrifty independent retail chain by ARCO in 1997. All of these stations became property of ARCO although some were operated directly by ARCO and others by leasee-dealers. Hastings finds that the management control of these stations did not have a significant impact on the prices at competing stations. Hastings finds that the most important factor in tempering retail prices is the presence of independently owned unbranded stations, which were reduced by the ARCO purchase. Since there was no change in jobber-supplied branded stations with the Thrifty purchase, this study does not address the question of the impact of *distribution* to branded stations.

Barron, Taylor, and Umbeck (2003) also study retail prices in Southern California during the mid 1990's. Unlike Hastings, and Hastings and Gilbert (2003), their focus is on the distribution method, rather than ownership. Specifically they look at the impact of direct supply by a refiner at a DTW price as opposed to delivery by a jobber. They do not distinguish between independently-owned and company-owned branded stations. They

find that the group of direct-supplied stations had lower prices, even after controlling for many of the obvious station characteristics for which data were available. They argue that branded open supply, which would presumably reduce if not eliminate direct supply, should not be expected to lower retail prices. It may in fact do the opposite.

Barron, Taylor, and Umbeck essentially argue that retail costs and margins would not decrease from branded open supply. Because of their focus on retail prices, their study does not address the question of branded open supply on wholesale margins. In fact, studies of the pricing effects of vertical relationships are rare. Most research on vertical relationships have focused on organizational questions such as why a refiner would want to directly operate some stations but not others.

Hastings and Gilbert (2003) examine the effect of vertical structure on wholesale margins. They find a positive correlation between vertical integration and wholesale margins. In other words, regions where refiners own more stations tend to have higher margins. From such correlations one cannot infer causality however. Margins may be larger because the markets are more vertically integrated. Or the markets may be more vertically integrated because wholesale margins are bigger. Or some factor favoring integration may also favor larger margins. They also study the 1997 Tosco purchase of Unocal's West Coast refining and market assets. This purchase changed Tosco's vertical position, and they argue that the ensuing price phenomenon can be construed as caused by this change. They find that Tosco's price for wholesale unbranded gasoline increased more at racks where purchases were made by competitors to their new retail stations than at racks where there was no change in their downstream position.¹⁴

In sum, previous work has demonstrated the importance of independently owned stations that are not marketed under one of the major brands. The presence of unbranded stations lowers retail margins and likely lowers wholesale margins also. The impact of independent *branded* owners is much less clear, as is the impact of the distribution method. Yet it is this latter effect that is most likely to be impacted by a branded-open supply proposal. Thus, while there is some indication that vertical policies may have an impact on market power at the wholesale level, there is no evidence, one-way or the other, on the combined wholesale and retail net impact of such policies. To date, there is much more empirical evidence of the efficiency enhancing aspects of vertical controls at the retail level. But it should be noted that because of data and other factors, it is much more difficult to estimate the impact of such policies on wholesale competition than it is on the retail prices at specific stations.

¹⁴ This aspect of the paper has been criticized for not adequately accounting for the impact of California's gasoline reformulation standards, which took effect at about the same time, and for the choice of Phoenix, which is served via pipeline from Los Angeles, as a control city (see Meyer and Fischer, 2004).

V. Summary

The gasoline industry features a wide variety of vertical structures and contractual arrangements that span many dimensions; including ownership, distribution, and managerial control. California falls at one end of the national spectrum in terms of these arrangements, with an especially high percentage of its gasoline distributed directly by refiners to retail outlets. Independent distributors, or jobbers, have a smaller role in California than almost anywhere else in the continental U.S.

California also has some of the highest wholesale margins and overall gasoline prices in the country, leading to a natural interest into the possible linkage between vertical structure and retail prices. From a policy perspective, it is far from obvious what kind of structure is desirable, as vertical structures and arrangements can have a multifaceted impact on markets. Some of these impacts will be positive, efficiency-enhancing effects while others will be negative effects that reduce competition. There is both theoretical and empirical evidence that both types of impacts play a role in the industry, but no clear indication that vertical controls have driven up overall retail prices.

Legislative and regulatory initiatives aimed at vertical policies need to be mindful of several points. First, both positive and negative impacts from specific vertical policies can coexist. Second, vertical policies play an important role in the *distribution* of profits between wholesalers and retailers and are therefore a natural source of tension between these two groups. However a policy that is harmful to firms at one level of the vertical supply chain does not necessarily have to be harmful to consumers. Lastly, proposals to regulate vertical policies could likely produce unexpected side-effects. The banning of specific pricing practices or contractual arrangements, for example, could spur a move toward greater direct vertical integration or spawn a new set of contractual arrangements that prove more damaging than the practices they are replacing.

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Table 1 - California Gasoline Stations

| | | Major Company Operated | | Major Leasee-Dealer | | Branded Independent Owned | | Branded Ownership not reported | | Un-branded Independent Owned | | Totals |
|-----------|------|------------------------|-------|---------------------|-------|---------------------------|-------|--------------------------------|-------|------------------------------|-------|--------|
| | | Number | Share | Number | Share | Number | Share | Number | Share | Number | Share | |
| LA County | 1994 | 152 | 6% | 1349 | 54% | 552 | 22% | 61 | 2% | 380 | 15% | 2494 |
| | 1998 | 220 | 10% | 1261 | 55% | 446 | 20% | 89 | 4% | 267 | 12% | 2283 |
| | 2002 | 137 | 7% | 955 | 50% | 517 | 27% | | 0% | 309 | 16% | 1918 |
| SD County | 1994 | 84 | 12% | 305 | 45% | 89 | 13% | 20 | 3% | 178 | 26% | 676 |
| | 1998 | 83 | 12% | 304 | 44% | 82 | 12% | 17 | 2% | 209 | 30% | 695 |
| | 2002 | 123 | 18% | 231 | 33% | 191 | 27% | | 0% | 155 | 22% | 700 |
| SF County | 1994 | 4 | 3% | 77 | 67% | 19 | 17% | 2 | 2% | 13 | 11% | 115 |
| | 1998 | 3 | 3% | 82 | 73% | 14 | 12% | 1 | 1% | 13 | 12% | 113 |
| | 2002 | 7 | 5% | 88 | 68% | 8 | 6% | | 0% | 27 | 21% | 130 |
| Totals | 1994 | 240 | 7% | 1731 | 53% | 660 | 20% | 83 | 3% | 571 | 17% | 3285 |
| | 1998 | 306 | 10% | 1647 | 53% | 542 | 18% | 107 | 3% | 489 | 16% | 3091 |
| | 2002 | 267 | 10% | 1274 | 46% | 716 | 26% | 0 | 0% | 491 | 18% | 2748 |

Table 2 - 2002 California Gasoline Stations

| | Major Company Operated | | Major Leasee-Dealer | | Branded Independent Owned | | Un-branded Independent Owned | | Totals |
|-------------|------------------------|-------|---------------------|-------|---------------------------|-------|------------------------------|-------|--------|
| | Number | Share | Number | Share | Number | Share | Number | Share | |
| LA Co. | 137 | 7% | 955 | 50% | 517 | 27% | 309 | 16% | 1918 |
| SD Co. | 123 | 18% | 231 | 33% | 191 | 27% | 155 | 22% | 700 |
| SF Co. | 7 | 5% | 88 | 68% | 8 | 6% | 27 | 21% | 130 |
| Rest of CA. | 638 | 10% | 1625 | 24% | 2051 | 31% | 2376 | 36% | 6690 |
| Total CA | 905 | 10% | 2899 | 31% | 2767 | 29% | 2867 | 30% | 9438 |

Table 3 - Gasoline Sales Volume by Distribution Method
(Thousands of Gallons per Day)

| All of United States | | | | | | | | | |
|----------------------|---------------|-------|------------|-------|------------|-------|------------|-------|--------------|
| Year | Direct Retail | | Bulk Sales | | DTW | | Rack | | Total Volume |
| | Daily Vol. | Share | Daily Vol. | Share | Daily Vol. | Share | Daily Vol. | Share | |
| 1994 | 55031 | 17% | 27695 | 8% | 83107 | 25% | 165821 | 50% | 331654 |
| 1995 | 55916 | 16% | 35998 | 10% | 77944 | 23% | 174782 | 51% | 344640 |
| 1996 | 57526 | 16% | 39269 | 11% | 77541 | 22% | 176755 | 50% | 351091 |
| 1997 | 61093 | 17% | 37970 | 11% | 75155 | 21% | 179524 | 51% | 353741 |
| 1998 | 63311 | 17% | 41410 | 11% | 72941 | 20% | 185976 | 51% | 363638 |
| 1999 | 61959 | 17% | 40217 | 11% | 72150 | 20% | 194488 | 53% | 368814 |
| 2000 | 60895 | 17% | 37080 | 10% | 69411 | 19% | 197893 | 54% | 365278 |
| 2001 | 62012 | 17% | 36652 | 10% | 67380 | 18% | 201017 | 55% | 367062 |
| 2002 | 63641 | 17% | 43253 | 12% | 66866 | 18% | 201575 | 54% | 375335 |
| 2003 | 63750 | 17% | 44143 | 12% | 59981 | 16% | 207100 | 55% | 374973 |

| California | | | | | | | | | |
|------------|---------------|-------|------------|-------|------------|-------|------------|-------|--------------|
| Year | Direct Retail | | Bulk Sales | | DTW | | Rack | | Total Volume |
| | Daily Vol. | Share | Daily Vol. | Share | Daily Vol. | Share | Daily Vol. | Share | |
| 1994 | 6639 | 17% | 3177 | 8% | 21286 | 54% | 8304 | 21% | 39406 |
| 1995 | 6935 | 18% | 4129 | 11% | 20556 | 52% | 7644 | 19% | 39265 |
| 1996 | 7136 | 17% | 5361 | 13% | 21513 | 53% | 6829 | 17% | 40839 |
| 1997 | 7648 | 20% | 4963 | 13% | 20535 | 53% | 5757 | 15% | 38904 |
| 1998 | 8051 | 20% | 4724 | 12% | 21323 | 53% | 6030 | 15% | 40128 |
| 1999 | 8343 | 21% | 3943 | 10% | 21379 | 53% | 6950 | 17% | 40615 |
| 2000 | 8274 | 20% | 3919 | 10% | 21897 | 53% | 6850 | 17% | 40939 |
| 2001 | 8331 | 20% | 3980 | 9% | 22261 | 53% | 7402 | 18% | 41975 |
| 2002 | 8712 | 21% | 3522 | 8% | 22252 | 53% | 7625 | 18% | 42112 |
| 2003 | 8524 | 20% | 4409 | 10% | 20975 | 49% | 8633 | 20% | 42541 |

| All of non-CA United States | | | | | | | | | |
|-----------------------------|---------------|-------|------------|-------|------------|-------|------------|-------|--------------|
| Year | Direct Retail | | Bulk Sales | | DTW | | Rack | | Total Volume |
| | Daily Vol. | Share | Daily Vol. | Share | Daily Vol. | Share | Daily Vol. | Share | |
| 1994 | 48392 | 17% | 24518 | 8% | 61822 | 21% | 157516 | 54% | 292248 |
| 1995 | 48980 | 16% | 31869 | 10% | 57388 | 19% | 167138 | 55% | 305375 |
| 1996 | 50390 | 16% | 33908 | 11% | 56028 | 18% | 169926 | 55% | 310252 |
| 1997 | 53445 | 17% | 33007 | 10% | 54620 | 17% | 173766 | 55% | 314838 |
| 1998 | 55260 | 17% | 36686 | 11% | 51618 | 16% | 179946 | 56% | 323511 |
| 1999 | 53616 | 16% | 36274 | 11% | 50771 | 15% | 187537 | 57% | 328198 |
| 2000 | 52621 | 16% | 33161 | 10% | 47514 | 15% | 191043 | 59% | 324339 |
| 2001 | 53681 | 17% | 32672 | 10% | 45118 | 14% | 193615 | 60% | 325087 |
| 2002 | 54929 | 16% | 39730 | 12% | 44614 | 13% | 193950 | 58% | 333222 |
| 2003 | 55225 | 17% | 39734 | 12% | 39006 | 12% | 198467 | 60% | 332432 |

Table 4 - Gasoline Price Components

| Year | Retail Price | Taxes | LA Spot Price | Retail Costs and Margin |
|------|--------------|---------|---------------|-------------------------|
| 1996 | \$ 1.31 | \$ 0.47 | \$ 0.72 | \$ 0.13 |
| 1997 | \$ 1.34 | \$ 0.48 | \$ 0.70 | \$ 0.17 |
| 1998 | \$ 1.17 | \$ 0.46 | \$ 0.52 | \$ 0.19 |
| 1999 | \$ 1.37 | \$ 0.48 | \$ 0.69 | \$ 0.21 |
| 2000 | \$ 1.67 | \$ 0.50 | \$ 1.04 | \$ 0.13 |
| 2001 | \$ 1.64 | \$ 0.50 | \$ 0.95 | \$ 0.19 |
| 2002 | \$ 1.51 | \$ 0.49 | \$ 0.83 | \$ 0.20 |
| 2003 | \$ 1.83 | \$ 0.51 | \$ 1.04 | \$ 0.28 |
| 2004 | \$ 2.12 | \$ 0.50 | \$ 1.40 | \$ 0.22 |

**Figure 1: Weekly Average Wholesale and Retail Prices:
California Reformulated Regular Unleaded**

