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AAI Working Paper No. 07-02 – Competition in U.S. Petroleum Refining and Marketing: Part I – Industry Trends

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Abstract: Perceptions about high U.S. gasoline prices or inexplicable differentials in prices between geographic areas have prompted a range of disparate policy proposals. However, there is a distinct lack of consensus on the cause of undesirable price dynamics. These dynamics are likely to be the product of a complex set of factors. It is thus important that any intervention in domestic markets recognize both the unique characteristics of petroleum products, the more recent changes in the underlying structure of refining and marketing markets, and the behavioral incentives created by those changes. This paper analyzes the three major areas where the most significant changes in U.S. refining and marketing have occurred: (1) merger activity; (2) refining; and (3) gasoline marketing. The analysis indicates substantial consolidation (and concentration), largely involving integrated assets in the downstream refining and marketing segment. The profile of wholesale transactions has also changed in fairly complex ways as the integrated "majors" have restructuring and formerly unintegrated "independents" have expanded their market reach. These changes are important to consider in making intervention decisions and crafting policy approaches.

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Keywords: competition, market power, market definition, merger, enforcement agencies, regulation, economic analysis, concentration

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Competition in U.S. Petroleum Refining and Marketing
Part I -- Industry Trends

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INTRODUCTION

"High" petroleum product prices or inexplicable differentials in prices between geographic areas for gasoline continue to raise public policy concerns in the U.S. Gasoline price dynamics have sparked concern about potential anticompetitive behavior in the downstream (i.e., refining, distribution of refined products to storage terminals, and wholesale and retail marketing) segment of the U.S. petroleum industry. A wave of merger activity over the last two decades has compounded these concerns. The outcome has been a number of disparate initiatives that directly target high prices or attack the underlying structure of the domestic downstream industry that could be driving them.

For example, there have been periodic efforts to authorize the U.S. Department of Justice to enforce the Sherman Act against OPEC.[2] Other initiatives include: (1) state anti-price gouging laws;[3] (2) divorcement statutes to limit integrated ownership; (3)

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[2] See, e.g., *No Oil Producing and Exporting Cartels Act of 2005*, S. 555, 109th Congress. March 8, 2005. Online. Available http://www.govtrack.us/congress/billtext.xpd?bill=s109-555.

[3] See, e.g., Janice E. Rubin, *Price Gouging,' the Antitrust Laws, and Vertical Integration: How They are Related*, CRS Report for Congress, Congressional Research Service, Library of Congress, May 8, 2006; *Anti-Price Gouging Laws and Gasoline Prices*, Wisconsin Legislative Reference Bureau, June 2006. Online. Available http://www.legis.state.wi.us/lrb/pubs/Lb/06Lb11.pdf; and 109th Congress, 2d Session, *To Improve Competition in the Oil and Gas Industry, to Strengthen Antitrust Enforcement With Regard to*

"open supply" regulations that would enable lessee-dealer gasoline retailers to purchase supplies from sources other than the lessor-refiner; (4) unbundling the sale of gasoline at wholesale from the marketing of branded products, thus allowing retailers to "shop" for the commodity;[4] (5) petroleum-specific extensions or amendments to state and federal antitrust statues;[5] and (6) creation of a government owned and operated strategic refinery reserve.[6]

It is important that any intervention in domestic markets--if necessary at all--recognize both the unique characteristics of petroleum products and incentives created by the more recent changes in the underlying structure of refining and marketing markets.[7] For example, energy commodity prices in general reflect the effects of resource depletion, rapidly growing energy demand in countries such as China and India, low demand and income elasticities, high volatility, and global political instability that can

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Industry Mergers, and Other Purposes, S.2557, April 6, 2006. Online. Available http://www.govtrack.us/data/us/bills.text/109/s/s2557.pdf.

[4] See, e.g., Justine S. Hastings, *Prepared Statement before the California State Assembly, Select Committee on Gasoline Competition, Marketing, and Pricing*, April 28, 2004 and Richard J. Gilbert, *Prepared Statement before the California State Assembly, Select Committee on Gasoline Competition, Marketing, and Pricing*, April 28, 2004.

[5] See, e.g., California Senate Bill 1274, which attempted to amend the Cartwright Act to, among other things, more closely parallel the federal antitrust statute. The bill was defeated. California State Senate, *An Act to Add Section 16720.1 To the Business and Professions Code, Relating to Business Practices* (amended), SB 1274, February 9, 2006. Online. Available http://info.sen.ca.gov/cgi-bin/postquery?bill_number=sb_1274&sess=PREV&house=B&site=sen.

[6] See, e.g., H.R. 5365, a bill in the U.S. House that would establish a strategic refinery reserve to enhance U.S. refinery capacity. 109th Congress, *To Provide for the Establishment of a Strategic Refinery Reserve*, H.R. 5365, May 11, 2006. Online. Available http://www.govtrack.us/congress/billtext.xpd?bill=h109-5365.

[7] For a comprehensive analysis of the development of the petroleum industry see, e.g., Daniel Yergin, *The Prize*, New York: Free Press, 1991.

result in adverse supply shocks. Regulatory reforms, technological advances, entry, and consolidation have also changed firms' behavioral incentives.

Part I of this working paper takes stock of major changes in the industry that have most likely affected the competitive landscape of domestic markets. The first section provides a brief overview of gasoline price trends. The second section discusses merger activity over the last 20 years. The third and fourth sections, respectively, address changes in refining capacity and gasoline marketing. The fifth section analyzes major trends in petroleum refining and marketing and offers suggestions for better focusing the policy debate.

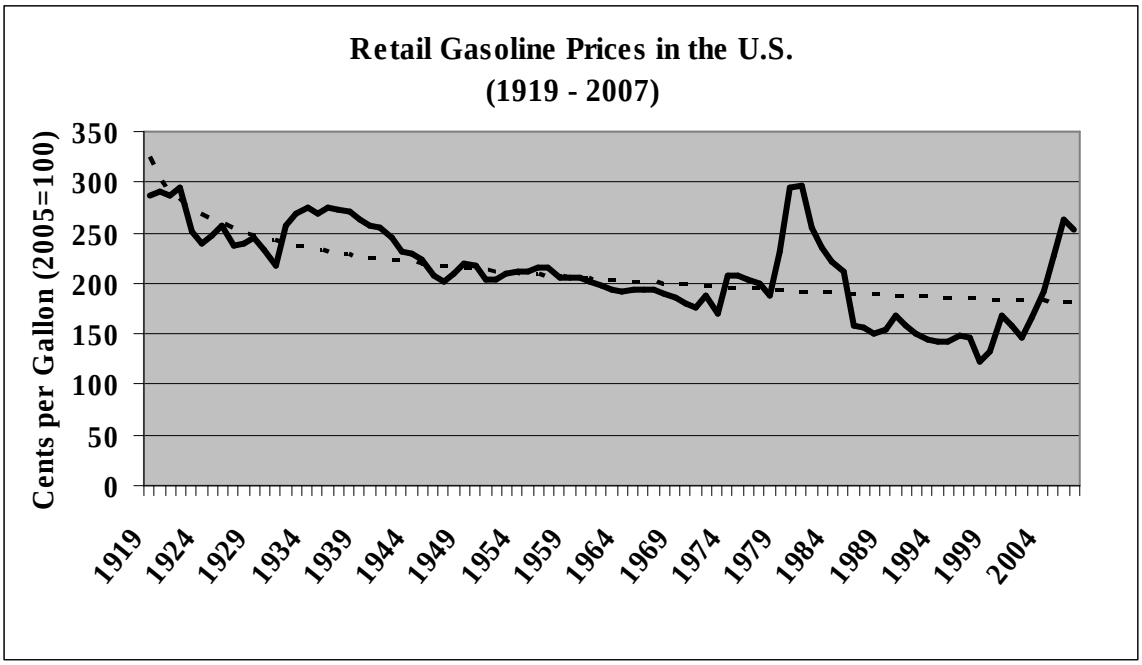
OVERVIEW OF GASOLINE PRICE TRENDS

A number of factors have attracted attention to current gasoline price levels, many of which are reflected in Figure 1. One is that retail prices are approaching 25-year highs. A second factor is the intensity of the most recent price run-up. Prices reached a low of about $1.25 per gallon in 1999 and rose thereafter—a period of escalation that rivals that experienced during the energy crisis of the late 1970s.

Third, while real gasoline prices have actually declined slightly since the early part of the 1900s, the rate of that decrease has fallen off, compounding fears that the long-predicted effects of depletion on global supply sources are at last being felt. Finally, price effects are magnified by low sensitivity of demand to changes in price and income and a sluggish U.S. consumer response to conservation efforts. For example, declining

sales of the infamously fuel inefficient large-size sport utility vehicles have been observed only recently, several years into the current round of gasoline price escalation.[8]

Figure 1[9]



MERGER ACTIVITY

Perhaps the most important feature of the domestic petroleum industry over the last 20 years has been the significant level of consolidation at the refining and marketing level. In an era characterized by one of the most intense price run-ups in gasoline price history, it is not surprising that merger activity has been a lightening rod for organized opposition to perceived high prices. This pressure most likely accounts for the nine major reports issued by the FTC on the petroleum industry since 1982 (two-thirds of which

[8] See, e.g., Bill Visnic, "Gas Guzzlers Beware," *Ward's Auto World*, October 1, 2006. Online. Available http://wardsautoworld.com/ar/auto_gas_guzzlers_beware/index.html.

[9] Figure 1 data taken from Energy Information Administration, *Real Petroleum Prices*. Online. Available http://www.eia.doe.gov/emeu/steo/pub/fsheets/PetroleumPrices_files/frame.htm.

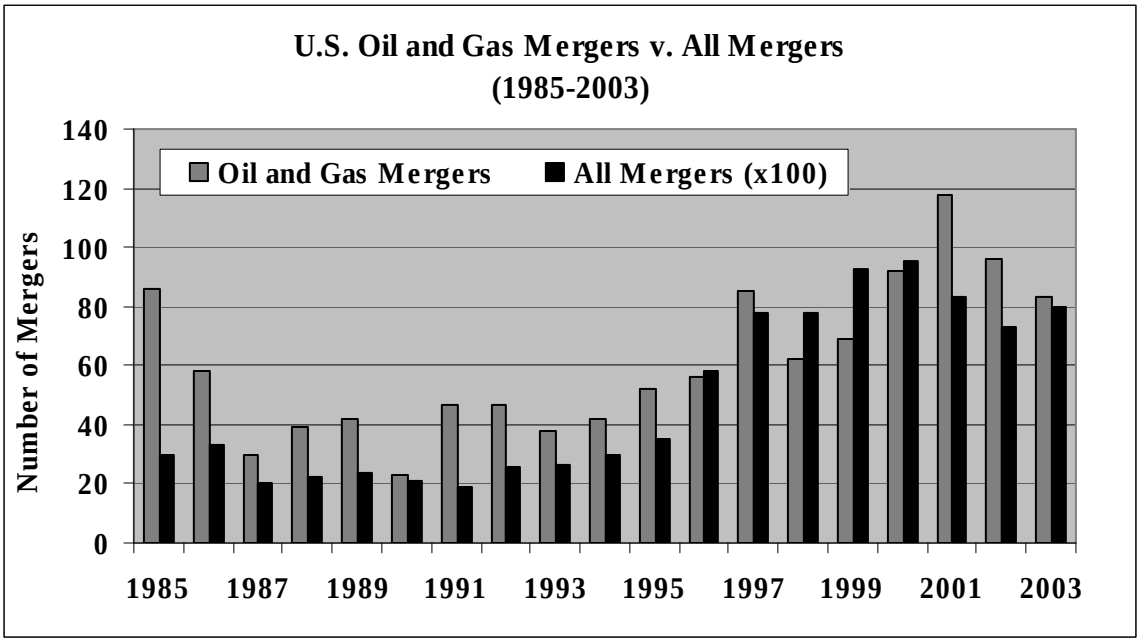
appeared after 2001) and 17 appearances before Congressional committees since 1999. Merger activity is probably best summarized by looking at two groups of statistics: (1) merger trends, including: numbers, value, and size of transactions and (2) selected merger enforcement statistics.

Trends

Figure 2 shows merger activity in the domestic petroleum sector relative to all mergers over the period 1985 to 2003. Petroleum mergers shadow the broader national pattern of consolidation. The Federal Trade Commission (FTC)--which handles the majority of merger and nonmerger enforcement antitrust cases involving petroleum--reports 1,165 mergers in the domestic petroleum industry between 1985 and 2003. The Government Accountability Office (GAO), however, cites a much higher figure over a shorter period of time--2,600 transactions from 1991 to 2000.[10]

[10] Government Accountability Office, *Mergers and Other Factors That Affect the U.S. Refining Industry*, GAO-04-0982T, July 15, 2004, p. 0. The GAO was formerly known as the General Accounting Office. It is not clear exactly why the number of reported mergers differ. One possibility is that the FTC is reporting transactions above a certain asset value threshold for compliance purposes under the Hart-Scott-Rodino Act.

Figure 2[11]



The transactions reflected in Figure 2 are disproportionately allocated over various segments of the industry. For example, GAO estimates that 85 percent of mergers between 1991 and 2000 were in exploration and production (i.e., the upstream segment of the industry).[12] Thirteen percent of transactions involved refining and markets (downstream) and two percent occurred in pipeline transportation (midstream).[13]

The FTC estimates that the total value of transactions of $10 million or more from 1985 to 2001 was about $500 billion dollars. However, billion-dollar mergers accounted

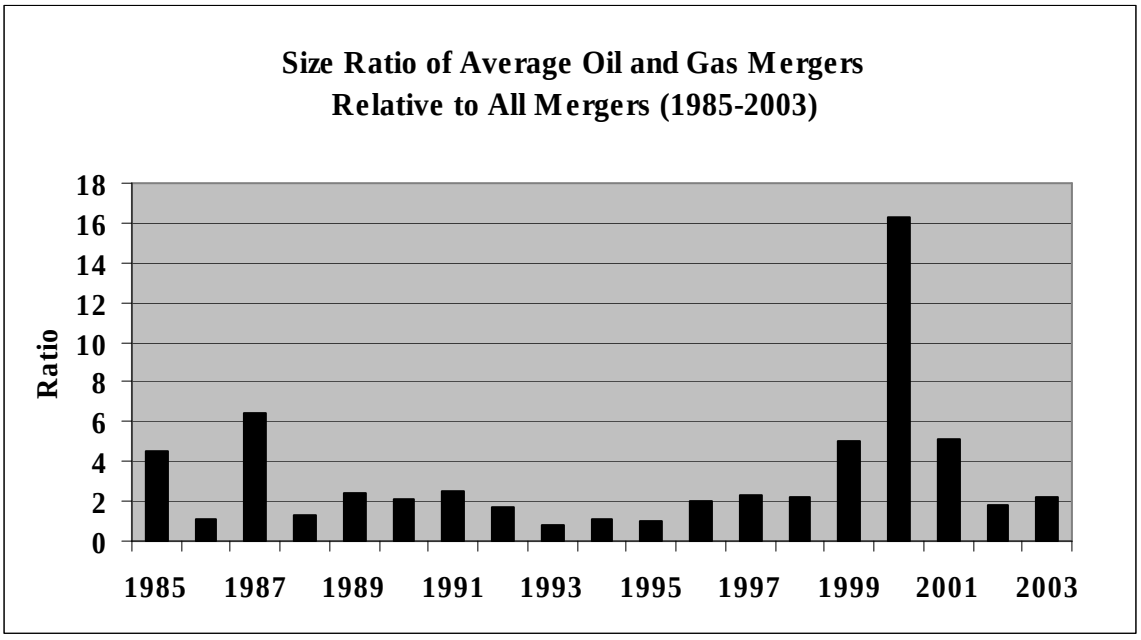
[11] Figure 2 data taken from Federal Trade Commission, *The Petroleum Industry: Mergers, Structural Change, and Antitrust Enforcement*, August 2004, Table 4-14, p. 120.

[12] The volume of transactions in exploration and development may indicate significant economies of scale and scope, arguably a motivating factor in consolidation.

[13] Jim Wells, *Factors Contributing to Higher Gasoline Prices*, Testimony of the Director, Natural Resources and Environment, Government Accountability Office, GAO-06-412T, September 21, 2005, p. 2.

for about 86 percent of this total.[14] Relative to non-petroleum mergers, these deals were very large. Figure 3 shows, for example, that the average size of a petroleum merger between 1985 and 2003 was three times larger than the average merger deal.

Figure 3[15]



Despite the frequency of merger activity in the upstream segment of the industry, about two-thirds of billion-dollar petroleum mergers in the U.S. involved downstream, integrated assets. Data on mergers enforced by the FTC confirm this observation. For example, of the 72 relevant markets defined by the agency in 15 petroleum merger enforcement actions between 1981 and 2002, 36 percent were related to refining and 33

[14] Federal Trade Commission, August 2004, op. cit., Tables 4-6 and 4-11.

[15] Figure 3 data taken from FTC, 2004, op. cit., Table 4-14. This figure excludes the BP/Amoco transaction in 1998 which, due to its size, creates an outlier in the data and biases the average size of petroleum transaction upward. The 1998 Exxon acquisition of Mobil was also large.

percent involved marketing.[16] Many of these transactions beginning around 1996 were sizable combinations involving the historically integrated "majors" such as BP-Amoco and Exxon-Mobil. However, there were also several mergers between unintegrated "independents" such as Ultramar Diamond Shamrock-Total.

Merger Enforcement

It is not surprising given the size and complexity of merger transactions discussed above that consolidation of refining and marketing assets generated a relatively higher level of antitrust scrutiny. Figure 4 shows annual data for the percentage of petroleum refining and marketing transactions versus all transactions that were challenged by either the DOJ or FTC. On average, about 13 percent of petroleum and marketing transactions that were cleared for investigation by either FTC or DOJ were challenged, as compared to two percent of all transactions. These challenges include transactions in which one of the agencies filed a compliant, requested injunctive relief, settled the case through consent decree, or in which the transaction was abandoned.

[16] Enforcement actions are those cases in which the FTC required divestiture or other remedial conditions to address competitive concerns. See Federal Trade Commission, "FTC Enforcement Actions in the Petroleum Industry, 1981-2002," (undated). Online. Available http://www.ftc.gov/ftc/oilgas/charts/merger_enforce_actions.htm. The remaining 31 percent of markets defined involved gathering and production (8 percent) and crude transportation (22 percent).

Figure 4[17]

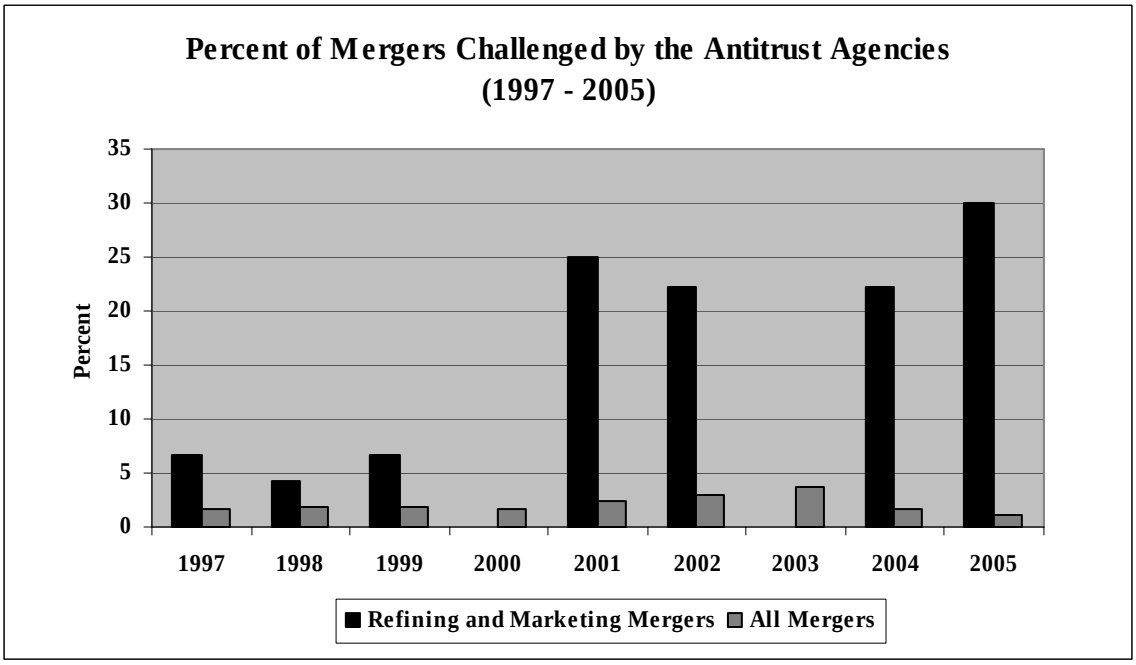


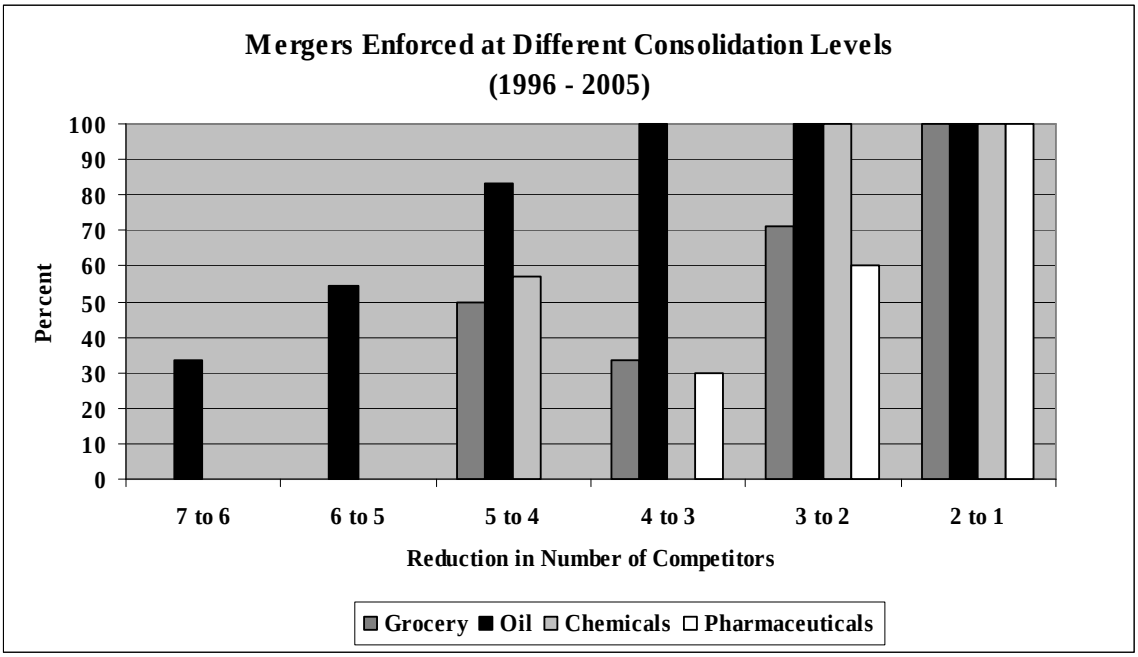
Figure 5 shows the number of mergers enforced based on the reduction in number of competitors for four large industry groups from 1996 to 2005.[18] These groups include grocery stores, chemicals, pharmaceuticals, and oil and gas. Here, merger enforcement in petroleum is the highest of the group of four industries and increases with the level of consolidation. The inter-industry comparisons depicted in Figure 5 should be interpreted with care. Industry structure (e.g., degree of integration, entry, and concentration) is likely to be very different in groceries than in petroleum or in pharmaceuticals.

[17] Figure 4 data taken from Federal Trade Commission, Annual Reports to Congress Pursuant to the Hart-Scott-Rodino Antitrust Improvements Act of 1976 (Jointly With The Antitrust Division of the United States Department of Justice), 20th through 28th reports, discussion of "Merger Enforcement Activity," and Tables X and XI for 2-digit SIC code #29 or 3-digit NAIC code #324. Online. Available http://www.ftc.gov/bc/anncompreports.htm.

[18] Figure 5 data taken from Federal Trade Commission, *Horizontal Merger Investigation Data, Fiscal Years 1996-2003*, February 2, 2004, Tables 4.2-4.5.

Moreover, competitive issues and efficiencies generated by consolidation will also vary across industries.

Figure 5[19]



REFINING

A second major feature that defines the competitive landscape of the domestic petroleum industry is the structure of refining markets. Refining is arguably a production "bottleneck," or a level through which all inputs produced in complementary markets must flow to ultimately reach the consumer. In this regard, refining is much like electricity transmission networks or natural gas pipelines. The GAO, in particular, has published numerous reports on refining. The agency expressed concern most recently that the "source of potential market power in the wholesale gasoline market is at the refining

[19] Figure 5 data taken from Federal Trade Commission, *Horizontal Merger Investigation Data, Fiscal Years 1996-2005*, January 25, 2007, Tables 4.2-4.5.

level because the refinery market is imperfectly competitive and refiners essentially control gasoline sales at the wholesale level."[20]

Control of bottleneck facilities—particularly with integrated ownership—has long raised concerns over market power and the leverage of that power to complementary levels. Control of bottleneck facilities in markets dominated by a few rivals also introduce the possibility of oligopolistic coordination—either on production or capacity investment decisions.[21] The following sections examine two major underpinnings of these concerns: (1) the dramatic reshaping of the landscape of refinery capacity and operation in the U.S. over the last several decades and (2) the change in refining market structures revealed by higher levels of concentration.

Refinery Numbers, Capacity, and Utilization

Perhaps the most-cited change in domestic refining is that there are fewer refineries now operating in the U.S. than at any time in the past. Moreover, no new refinery has been constructed since 1975. Figure 6, for example, shows a 44 percent decline in the number of operating refineries from 1973 through 2004. This statistic attracts a good deal of attention, but may be somewhat misleading. For example, the phase-out of crude oil price controls that began during the Carter administration in the late 1970s were implemented in 1981. Removal of controls reduced incentives to operate small, inefficient facilities, resulting in a decline in the number of refineries. To some

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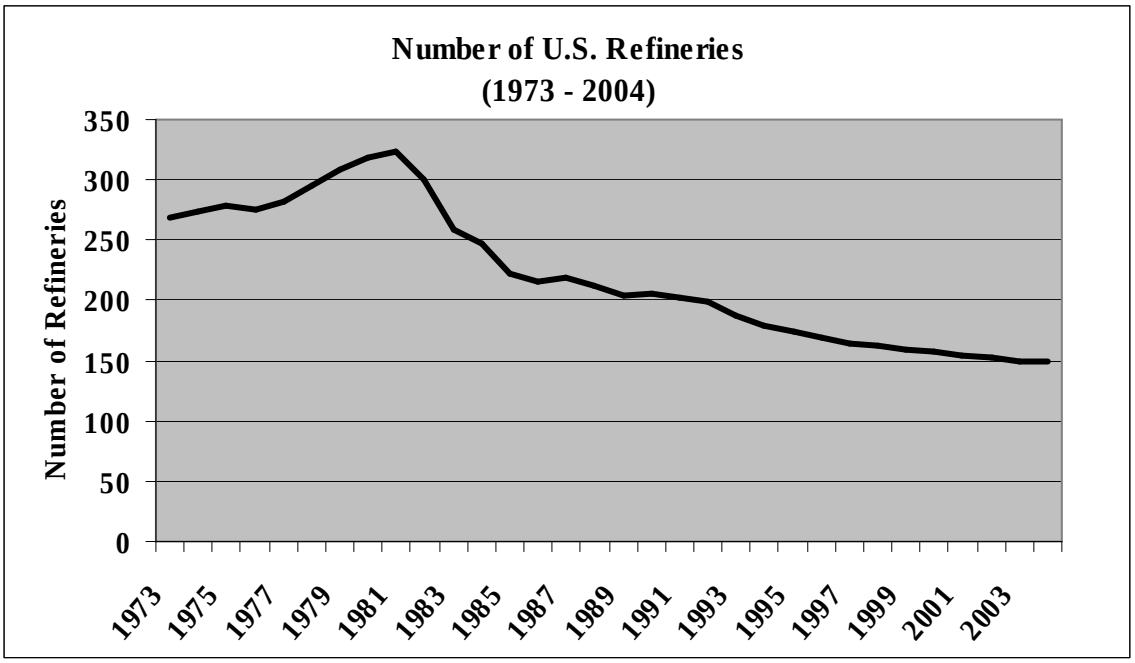
[20] GAO, July 2004, op. cit., p. 3.

[21] For an early discussion of capacity and investment in oligopolies see, e.g., A. Michael Spence, "Entry, Capacity, Investment and Oligopolistic Pricing," *RAND Journal of Economics* 8(2), 1977, pp. 534-544.

extent, therefore, the decline in numbers of facilities may reflect the work-off of obsolete or high-cost capacity.[22]

Figure 6[23]



Since the early 1980s, refiners have developed higher capacity and more technologically advanced facilities. Much of this has been achieved through advances such as increased computerization, employment of advanced catalysts, additional processing units, and other improvements that allow refiners to net greater volumes of more valuable refined products. For example, crude oil distillation capacity has increased over the last 20 years, as shown in Figure 7. Capacity at U.S. refineries increased by 15 percent from 1985 to 2005. Accompanying these changes has also been an increase in

[22] FTC, 2004, op. cit., p. 7.

[23] Figure 6 data taken from FTC, 2004, op. cit., Table 7-1.

refinery utilization rates.[24] These rates (Figure 8) rose from a low of almost 70 percent in 1981 to around 95 percent in the late 1990s and early 2000s. From 1985 to the early 2000s, refinery utilization grew at roughly the same rate as distillation capacity.

Figure 7[25]

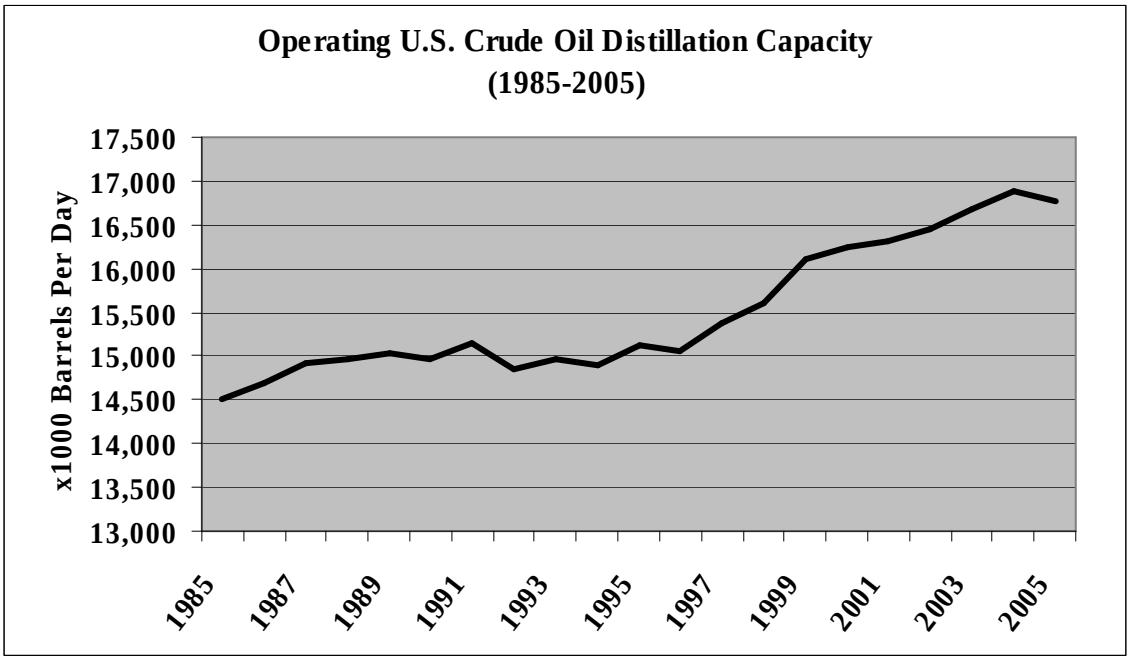
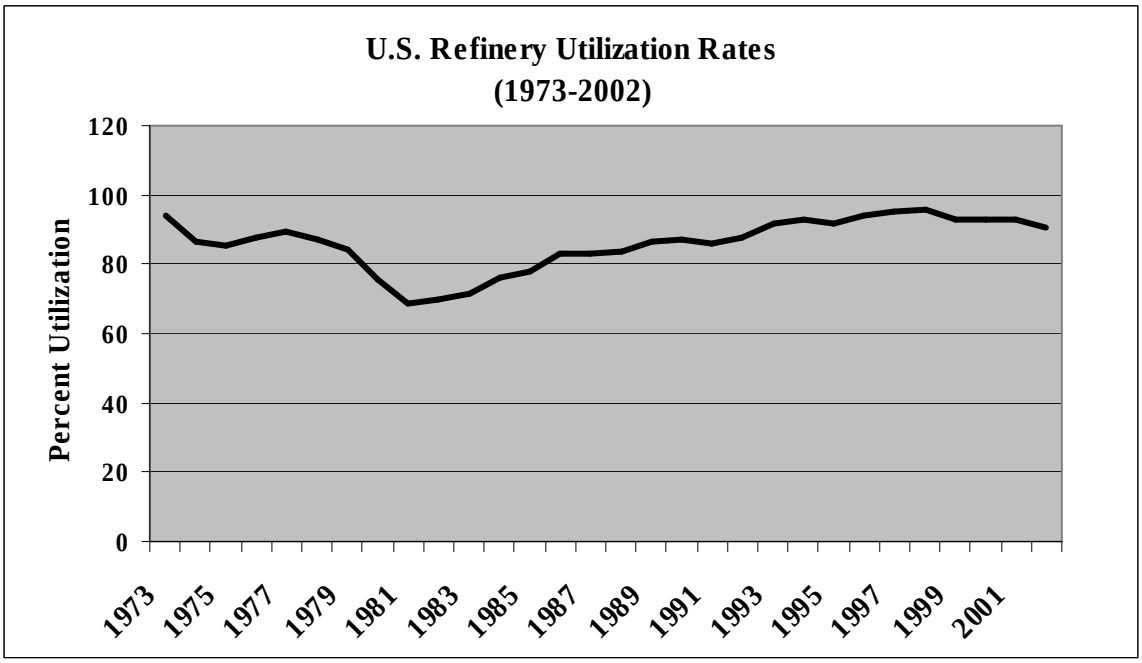


Figure 8[26]

[24] Among other things, higher utilization minimizes the opportunity cost of holding excess capacity. See FTC, 2004, op. cit., p. 7. Since the late 1970s, major oil companies have invested in refinery improvements that allow the use of more sulfurous crude oils as inputs. See Energy Information Administration, "The U.S. Petroleum Refining and Gasoline Marketing Industry," updated August 19, 2004. Online. Available http://www.eia.doe.gov/emeu/finance/usi&to/downstream/index.html. Jeremy I. Bulow, Jeffrey H. Fischer, Jay S. Crewell, Jr., and Christopher T. Taylor, " U.S. Midwest Gasoline Pricing and the Spring 200 Price Spike, " *The Energy Journal*, 24(3), 2003, pp. 121-149.

[25] Figure 7 data taken from http://tonto.eia.doe.gov/dnav/pet/hist/mocggu2A.htm.

[26] Figure 8 data taken from FTC, 2004, op. cit., Table 7-1.



Concentration in Refining Markets

A second major feature of U.S. refining has been an increase in the concentration of regional refining markets over the last 20 years.[27] Figure 9 shows changes in concentration (based on distillation capacity for crude inputs) for the five Petroleum Administration for Defense Districts (PADDs) in the U.S. from 1985 to 2003. PADD I covers the East Coast, PADD II encompasses the upper Midwest, PADD III includes the South and parts of the Southwest, PADD IV includes the upper Rocky Mountain area, and PADD V covers the West Coast and parts of the Southwest (plus Alaska, and Hawaii). These districts vary significantly in their self-sufficiency. PADD I, for example,

[27] How refining capacity is measured raises a number of important issues. Most quoted figures use distillation capacity, but alternative measures include quantities f refined products and sources of crude inputs. The former would provide some insight into the profile of markets for particular types of refined products. The latter measure would give some sense of how refining concentration has been affected by an absolute decline in domestic crude production.

is the largest net imported of finished light refined petroleum products while PADD III is a net exporter.[28]

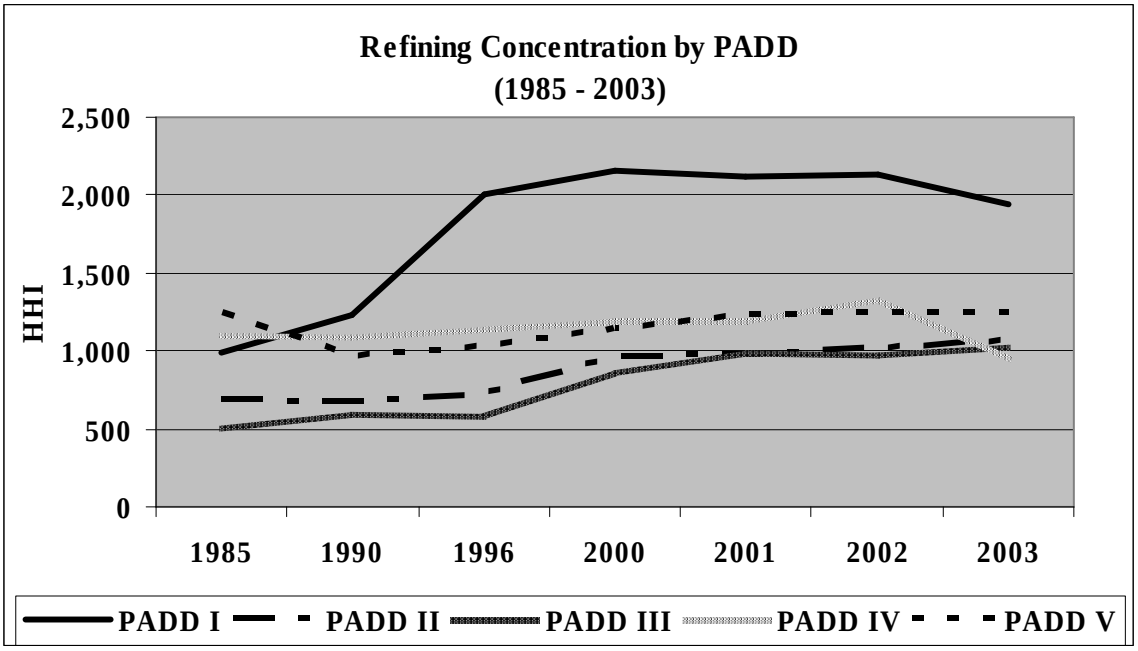
Concentration increased in all PADD districts beginning around the surge in merger activity in 1996. PADDs I, II, and III were the most affected. Over the period, concentration increased by 95 percent in PADD I, by 56 percent in PADD II, and by 104 percent in PADD III. Concentration in PADD IV remained moderate, and was stable in PADD V.[29] These statistics reflect substantial increases in concentration in three PADD regions over a relatively short period of time. By the DOJ/FTC *Horizontal Merger Guidelines* (*Guidelines*) standards, concentration in PADD II, III, IV, and V was moderate by the end of the period. In PADD I, however, concentration was high (around 2,000). [30]

[28] FTC, 2004, op. cit., Table 7-6, p. 200.

[29] GAO provides different, but similar, estimates for refining concentration for the five PADDs from 1990 to 2000. Concentration in PADD I increased from 1,136 to 1,819 over that time period, from 699 to 980 in PADD II, from 534 to 704 in PADD III, from 1,079 to 1,124 in PADD IV, and from 937 to 1,267 in PADD V. GAO, July 2004, op. cit., p. 9-13.

[30] Based on categories of concentration outlined in the DOJ/FTC *Horizontal Merger Guidelines*. Markets with an HHI of 1,000 or less are unconcentrated, those with an HHI between 1,000 and 1,800 are moderate concentrated, and those with an HHI above 1,800 are highly concentrated. Online. Available http://www.ftc.gov/bc/docs/horizmer.htm.

Figure 9[31]



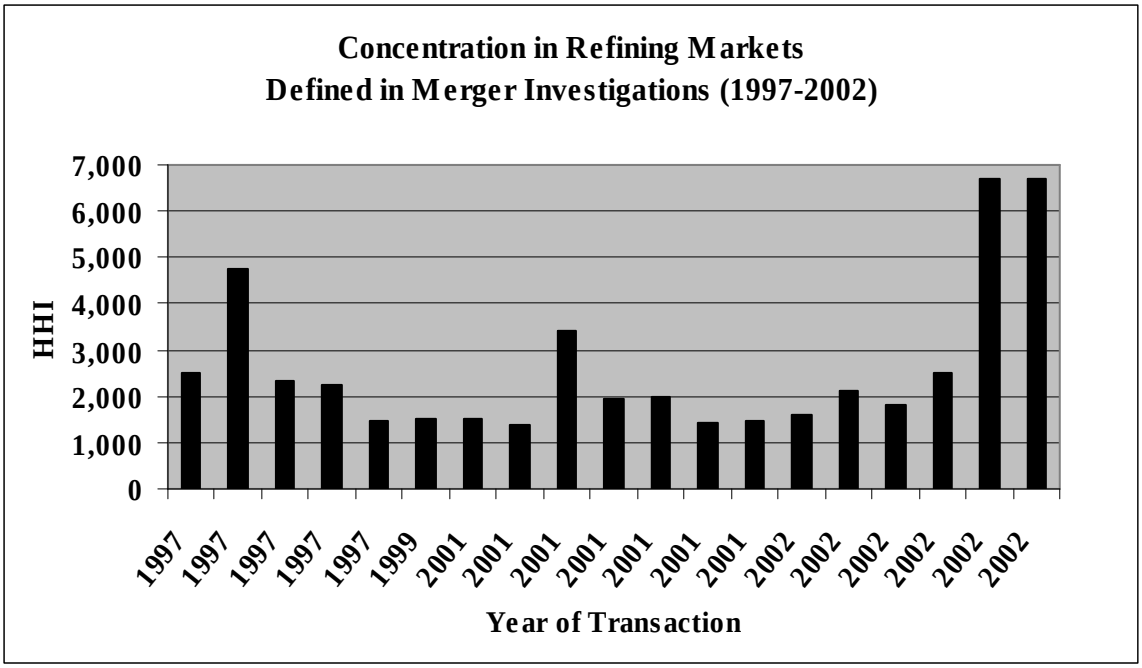
One problem with PADD-based refining concentration statistics is that they do not to reflect the actual geographic dimensions of markets. For example, PADD boundaries are likely to encompass far broader areas than what consumers would consider in searching out alternative sources of supplies. Those areas--determined by pipeline constraints and production cost differentials—are likely to be much smaller and more concentrated than PADD-based markets. While PADD-based concentration statistics may overstate the competitiveness of refining markets, those from merger transactions may give a more realistic picture of refining market structures because they better reflect the market areas in which there are good substitutes.

For example, of the 72 relevant markets identified by the FTC in 15 enforcement actions from 1981 to 2002, concentration statistics are available for about 30 markets,

[31] Figure 9 data taken from FTC, 2004, op. cit., Table 7-7.

about two-thirds of which involve refining and/or bulk supply. Figure 10 shows pre-merger concentration for these markets, which were defined in merger cases between 1997 and 2002. About two-thirds of these markets would be considered highly concentrated, with HHIs ranging from 1,800 to as high as 6,700 (five of which are excess of 2,500 HHI).[32] The remaining one-third of relevant markets are unconcentrated to moderately concentrated.

Figure 10[33]



The comparison of PADD-based and merger-based refining concentration statistics reveals several important points. First, some refining and bulk supply markets

[32] Merger-related increases in concentration in many of these markets are as high as 1,600 HHI points.

[33] Figure 10 data taken from FTC, 2004, op. cit., Table 2-5. Divestitures were required in these cases, which reduced market concentration to pre-merger levels, so pre-merger HHI statistics are a better indicator of market concentration than post-merger statistics.

defined in merger cases do display low to moderate levels of concentration levels--similar to all but the PADD I regions in Figure 9. However, the remaining half of markets defined in merger cases are far more concentrated than PADD-based statistics reveal. Those markets are located largely outside PADD I in PADD II, IV, and V. Overall increases in concentration in refining markets over time is more problematic in light of high market concentration.

GASOLINE MARKETING

A third important change in the domestic petroleum industry is how refined products—particularly gasoline--are marketed. This industry segment encompasses wholesale transactions between refiners, distributors, and gasoline retailers. Given the integrated nature of many refiner/marketers, it is not surprising that changes at the refining level are also reflected at the marketing level. Following a brief overview of the mechanics of gasoline marketing is a discussion of two major changes: (1) increases in wholesale concentration and (2) changes in the relative mix of wholesale transactions.

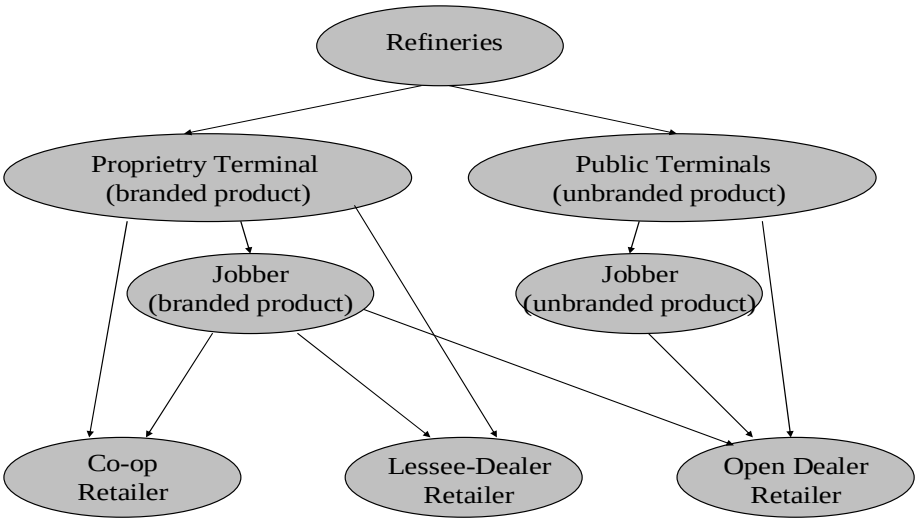
Mechanics of Gasoline Marketing

There are three types of retailers, including those: (1) owned and operated by the refiner-marketer (“co-op”), (2) owned by the refiner-marketer but operated by independent dealers (“lessee-dealers”), and (3) owned and operated by independent dealers (“open dealers”). As shown in Figure 11, retailers can obtain their wholesale gasoline supplies directly or indirectly, but all deliveries are made via tanker trucks. Under direct distribution, the refiner sells branded product (i.e., marketed under the refiner’s trademark) to co-op or lessee-dealer stations. They may also sell unbranded

gasoline to open dealers. Under indirect distribution, refiners sell branded or unbranded gasoline to independent distributors known as "jobbers" that operate their own retail stations or that resell product to other retailers.[34]

Figure 11

Schematic of U.S. Gasoline Marketing



Wholesale prices paid by retailers depend on the type of transaction. For example, a refiner can sell a single cargo of product to any buyer at a spot price that varies daily. Jobbers and open dealers also can purchase at the refinery "gate" or the refiner's terminal at the "rack" price.[35] Rack prices include refining, feedstock, and some storage costs.[36]

[34] *Canadian Agricultural Energy Prices (Part 3 of 4)*, Section 7.A – Retailing Arrangements, Agriculture and Agri-Food Canada. Online. Available http://www.agr.gc.ca/pol/index_e.php?s1=pub&s2=energ&page=expl. All gasoline leaving a refinery is "generic." Branded gasoline acquires its name at the rack when the refiner injects its particular additives into the tanker truck.

[35] Terminals are either proprietary if owned by the refiner-marketer, or public if owned by an unintegrated, independent refiner.

Finally, retailers owned by a refiner (e.g., co-op or lessee-dealer) or by jobbers can purchase at the "dealer tank wagon" (DTW) price.[37] DTW prices include transportation costs to the station and other costs such as promotions and dealer incentives. Rack and DTW prices are influenced by competitors' prices, spot prices, and futures market prices.

Changes in Wholesale Concentration

Much like refining, the structure of wholesale refined product markets in the U.S. has changed significantly. For example the number of terminals in the U.S. decreased by almost 50 percent from 1982 to 1997.[38] One implication of this decline is that jobbers and other distributors that purchase at the rack have fewer alternatives available to them in the event of a price increase at one location. Higher levels of vertical integration between refining and marketing would also tend to exacerbate this problem.

Wholesale concentration statistics are shown in Figure 12 for the five PADDs for the period 1994-2004. Concentration in PADD I region increased over the period by 32 percent, in PADD II by 48 percent, in PADD III by 45 percent, in PADD IV by 10 percent, and in PADD IV by 19 percent. By the end of the period, one of these regions was highly concentrated (PADD V) by *Guidelines* standards and the remainder were moderately concentrated. It is interesting to note that relative to the PADD refining statistics presented in Figure 8, the highest levels of wholesale concentration are in

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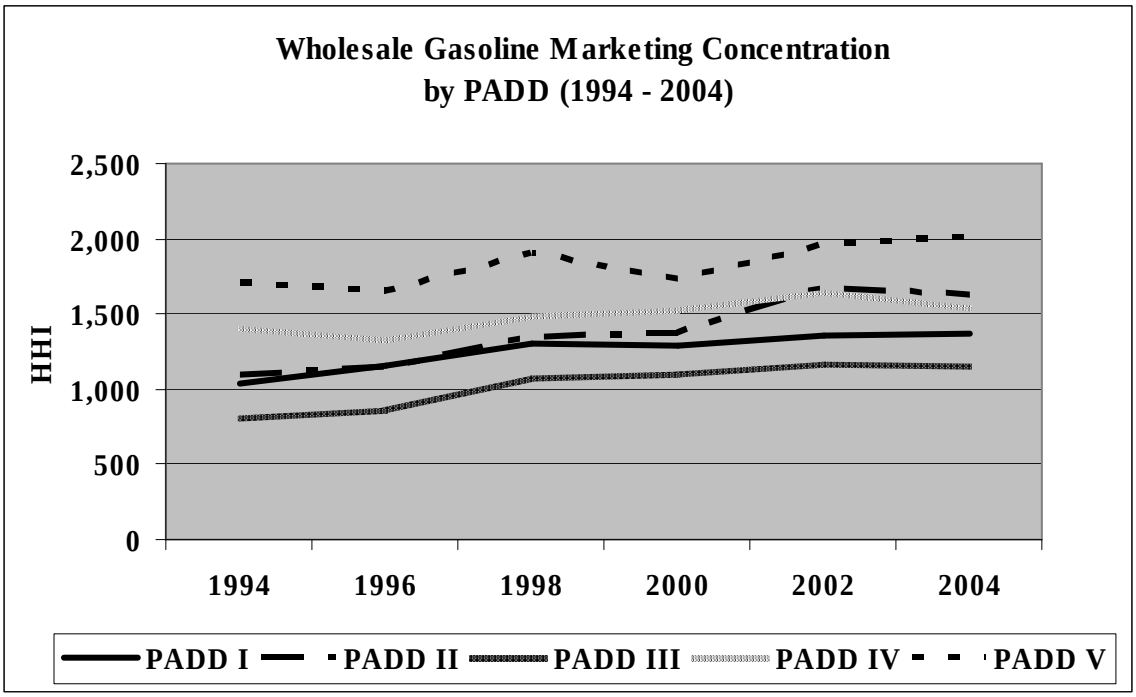
[36] *Canadian Agricultural Energy Prices (Part 3 of 4).*

[37] Energy Information Administration, "Gasoline Classes of Trade." Online. Available http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/oil_market_basics/price_gasoline_classes_of_trade.htm.

[38] FTC, 2004, op. cit., Table 9-1.

PADD V (California and the Pacific Northwest). Similar to refining, however, PADDs I, II and III displayed the most growth in concentration.

Figure 12[39]

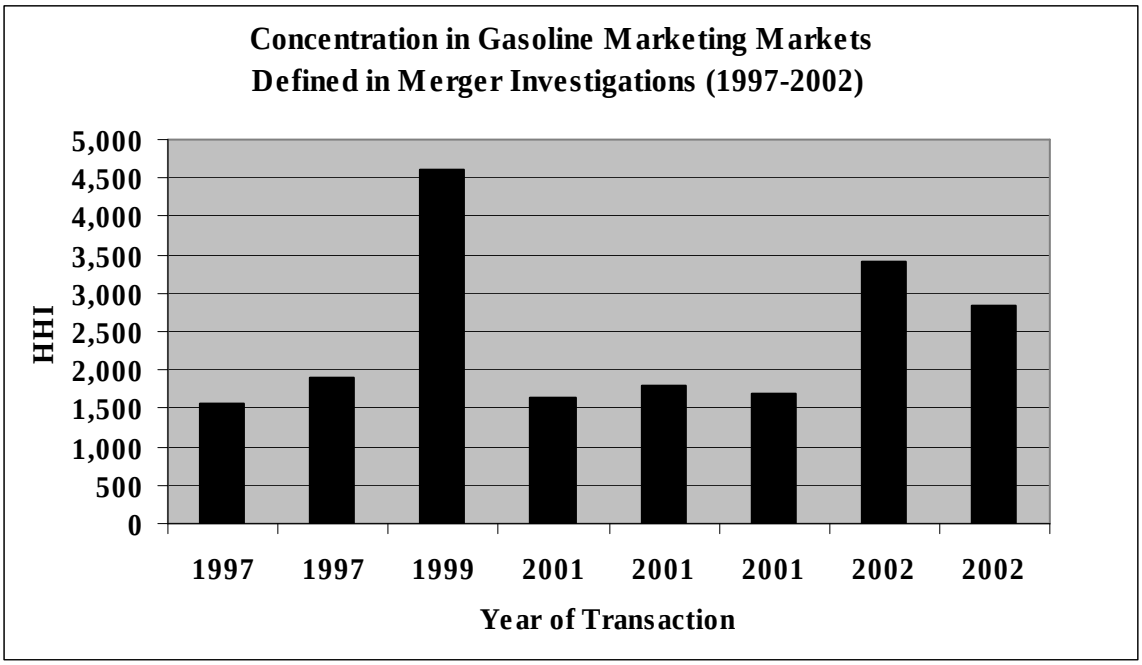


Much like refining, broad regional concentration statistics may not accurately reflect wholesale market structures. Terminal networks are likely to be defined around smaller, metropolitan areas which encompass a consumer's universe of economic alternatives. We turn again to merger data to sharpen the picture. For example, of the 30 relevant markets identified by the FTC in the 15 enforcement actions discussed earlier, about one-quarter involve terminalling and marketing. Figure 13 shows pre-merger concentration for these eight markets, over one-half of which are highly concentrated (1,565 to 4,600 HHI). The remaining markets are moderately concentrated. These

[39] Figure 12 data taken from FTC, 2004, op. cit., Table 9-11.

numbers are also significantly higher than the regional PADD-based statistics shown in Figure 12 since they reflect smaller regional markets.

Figure 13[40]



Relative Mix of Wholesale Marketing Transactions

The relative mix of wholesale gasoline marketing transactions has also changed over time, reflecting the restructuring of both the major and independent refiner/marketers. Between 1994 and 2004, for example, co-op sales increased by about 7 percent, DTW transactions decreased by about 26 percent, and rack sales were up almost 11 percent.[41] The foregoing statistics likely reflect an increase in sales of wholesale

[40] Figure 13 data taken from FTC, 2004, op. cit., Table 2-5. Divestitures were required in these cases, which reduced market concentration to pre-merger levels, so they are a better indicator of market concentration than post-merger statistics.

[41] See FTC, 2004, op. cit., Table 9-2.

product directly to branded co-op stations and sales to independent jobbers that supply both branded and unbranded retail stations.

The decline in sales by refiners or jobbers via DTW could be explained by the significant 63 percent decrease in number of branded retail outlets owned by the majors over part of this period. [42] This decrease outstripped an overall 16 percent decrease in retail outlets over roughly the same period.[43] One result of this activity has been to increase brand concentration in retail markets. The GAO observes, for example, that one of the major changes in gasoline marketing has been a decrease in sales of unbranded (generic) gasoline relative to branded gasoline. In fact, brand concentration increased by 25 percent and 36 percent in PADD III and PADD IV, respectively, from 1990 to 2002 while increases in PADD I and PADD III were 8 percent and 10 percent, respectively.[44]

Some of the decrease in numbers of retail output is likely due to the increasing capital intensity of gasoline marketing. Growth of the convenience store/gasoline distribution channel reflects the rise of higher-volume outlets owned by independent such as Sheetz and RaceTrac. Hypermarkets such as Costco, Walmart, and club warehouses are also accounting for an increasing percentage of retail outlet share.[45] As of 2002, for example, hypermarket retail outlets had about a 9 percent market share in PADDS III and

[42] See EIA, August 19, 2004.

[43] FTC, 2004, op. cit., Table 9-3.

[44] FTC, 2004, op. cit., Table 9-7. Brand concentration in PADD V remained the same.

[45] FTC, op. cit., p. 11. The GAO reports that refiners deal more with large distributors and retailers than in the past GAO, July 2004, op. cit.., p. 0.

V. In PADD II and IV, that share was about 4 to 5 percent, and about 3 percent in PADD I.[46]

ANALYSIS OF INDUSTRY TRENDS

The industry trends discussed above sketch out a picture of an industry that has undergone significant change in the last decade. A number of observations are worth making. First, there has been a significant amount of M&A over the last decade. In terms of asset value, the bulk of this activity has been in very large transactions that involve integrated refining and marketing assets. This has occurred against the backdrop of technological change in refining and development of new distribution scales and channels in increasingly concentrated markets.

Enforcement statistics over the last decade appear to support to the notion that the FTC has looked carefully at petroleum mergers. However, there continues to be pressure on the agency to justify its enforcement record and to monitor gasoline price movements.[47] It is no surprise (as Part II of this working paper series notes), then, that much of the empirical economic work devoted to evaluating competitive issues in petroleum focuses on the price effects of mergers.

In many ways, the profile of changes in refining and marketing is similar to that in the U.S. electricity industry. A large wave of mergers in the mid 1990s to early 2000s, together with a redefinition of market participants fundamentally changed the landscape

[46] FTC, op. cit., Table 9-9.

[47] Online. Available http://www.ftc.gov/ftc/oilgas/testimony.htm. The GAO has published eight major reports since 1979, with a particular focus on refining capacity.

of regional wholesale markets. As in electricity, however, merger policy in petroleum must stay attuned to the potential adverse effects on competition and consumers of large-scale consolidation.

Second, it is fairly clear that while the majors have to some extent deintegrated over time, the independents are now more integrated. For example, the share of refining capacity owned by the majors fell by 18 percent from 72 percent in 1990 to 54 percent in 1998.[48] At the same time, however, the independents tripled their share of capacity from eight to 23 percent, about two-thirds of which was acquired from the majors by firms such as Citgo/PDV America, Ultramar Diamond Shamrock, and Valero Energy.[49] If firms' behavioral incentives are a function of market structure, then the net effects of these shifts in market shares on the degree of vertical integration (particularly in light of increasing concentration at the individual refining and marketing levels) will be important to monitor.

Third, the transformation of U.S. refining emphasizes the increasingly bottlenecked nature of the segment, particularly when merger activity has reduced options for procuring refined products at wholesale. High sunk costs, environmental regulations, and the declining availability of domestic crude inputs collectively act to discourage new entry that could inject additional competition into refining.

[48] It is interesting to note that the majors—who extolled the compelling advantages of integration in the 1970s—have pursed the opposite strategy over much of the last decade.

[49] EIA, August 19, 2004. All other domestic refiners maintained stable market shares from 1990 to 1998. Other independents include: Clark Refining and Marketing, Koch Industries, Tesoro Petroleum, and Tosco Corporation.

Moreover, technological change and the phase-out of price controls have driven the movement to fewer, higher-capacity refineries that operate at high utilization rates. In 2004, for example, around 80 percent of operating distillation capacity resided in facilities with capacities greater than 100,000 barrels per day. Collectively, these facilities account for about 40 percent of U.S. capacity.[50] And while refining efficiency has likely increased, it is also the case that operation at high utilization levels can creates unique opportunities for the exercise of market power.

The foregoing characteristics highlight the possibility of adverse effects on refining investment, prices, and output, either from unilateral action, or oligopolistic coordination. Part II of this working paper series discusses coordination in more detail as a possible explanation for observed price asymmetry. Mergers and joint ventures should be carefully scrutinized in light of these concerns.

Finally, increasing brand concentration, the attendant reduction in generic gasoline, and the rise of hypermarkets have signaled the decline of the independent (open dealer) service station.[51] Elimination of this competition at the retail level with little or no change in the degree of vertical integration among refiner/marketers presents potential challenges for consumers in obtaining competitively priced gasoline.

[50] FTC, 2004, op. cit., Table 7-4, p. 198.

[51] The effect of hypermarkets on retail prices has yet to be empirically examined.

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