AGRIBUSINESS CONCENTRATION, COMPETITION AND NAFTA

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INTRODUCTION

Two related developments drive current concerns over competition in agribusiness. The first is increasing concentration in many industries that either buy agricultural commodities from farmers or sell inputs to farmers. Second, methods of exchange are changing, as cash markets handle declining shares of commercial transactions between farmers and their buyers or suppliers. Participants in concentrated markets frequently rely on contracts and vertical integration to handle exchange, and in a world of substantially increased concentration, contracts can at times be structured to extend or exploit market power. Competition is currently an important topic in the food sector. I expect that it will continue to attract attention, and that competition and competition policies will affect, and be affected by NAFTA trade issues.

This paper describes some recent trends in agribusiness concentration and in contracting that drive competitive concerns. Increased concentration results from a variety of causes and can have complicated effects. The paper summarizes evidence efficiency gains from increased concentration, as well as evidence on the effects of concentration on competition and market power. Finally, the paper reviews areas where greater applications of competition policy

Table 1: Aggregate Concentration in U.S. Food Processing.

	1967	*1972*	*1982*	*1992*	*1997e*
Share of Value Added Held by 100 Largest Processors	51	53	61	69	75
Share of Grocery Sales Held by 20 Largest Chains	34	34	36	38	48

Sources: Richard Rogers, "Structural Change in U.S. Food Manufacturing, 1958 to 1997," and Phil R. Kaufman, "Structural Change in Food Retailing: Structural Changes and Their Implications for Consumers and Market Participants," papers prepared for ERS conference on The American Consumer and the Changing Structure of the Food System, May, 2000.

to agribusiness can be expected, and identifies the likely connections between those applications and international trade issues.

CONCENTRATION IN AGRIBUSINESS

Leading agribusiness firms grew steadily over the last several decades, with the result that small processors and small agricultural producers became a shrinking part of the landscape. Tables 1 to 3 highlight recent developments. Table 1 shows that aggregate concentration, measured by the share of food processing value added held by the 100 largest processors, grew steadily through time, and by 1997 was more than 20 percent greater than in 1982. Mergers accounted for much of the increase, but the disappearance of small food processors also matters. Table 2 presents data on changes in mean plant for 31 well defined food processing product classes (such as tea, wheat flour milling, or pickles). In order to avoid deflation issues, the table uses Census of Manufactures product classes that report physical output quantities. Mean plant sizes in every class increased between 1972 and 1992, with a median increase of 88 percent (the 1997 Census contains more limited output data, so we can not extend the analysis). Those familiar with Census data know that plant sizes are quite skewed, and that changes in mean plant sizes are driven by the closure of many very small plants.

Table 3 shows changes over time in farm numbers and mean farm size (in acres) as measured by the Census of Agriculture--farm numbers have fallen steadily while mean farm size has grown. Farms have also become more spe-

Table 2: Increasing Mean Plant Sizes in Food Processing, 1972-92.

SIC	Name	1972-92 Percent Change in:		
		Plants (N)	Output (Q)	Q/N
20210	Creamery Butter	-86	4	650
20223	Natural Cheese	-11	212	250
20224	Processed Cheese	-50	195	491
20240	Ice Cream	-35	40	115
20331	Canned Fruits, Juices	-53	-11	89
20332	Canned Vegetables	-49	14	122
20341	Dried Fruits & Vegetables	-12	39	60
20352	Pickles & Pickled Products	-52	62	237
20354	Mayonaisse & Salad Dressings	-16	161	210
20372	Frozen Vegetables	-11	114	141
20411	Wheat Flour Products	-10	59	76
20413	Corn Mill Products	-15	16	36
20440	Milled Rice	-7	64	77
20460	Wet Corn Milling	24	230	164
20470	Dog and Cat Food	29	104	58
20511	Bread: White, Wheat, Rye	-50	-5	90
20521	Crackers, Pretzels, Biscuits	19	55	31
20610	Raw Cane Sugar	-42	53	162
20620	Refined Cane Sugar	-48	-29	37
20630	Beet Sugar	-34	10	67
20648	Chewing Gum	-47	-33	27
20661	Chocolate Coatings	-47	19	125
20792	Margarine	-30	36	94
20830	Malt	-35	33	106
20923	Frozen Fish, exc. Shellfish	159	190	12
20950	Roasted Coffee	-19	-10	11
20980	Macaroni and Spaghetti	3	42	38
20993	Sweetening Syrups & Molasses	-17	17	40
20994	Baking Powder and Yeast	16	29	11
20996	Vinegar & Cider	-28	34	88
2099D	Tea in Consumer Packages	12	93	73
	Medians	-19	39	88

Source: U.S. Census of Manufactures, 1972 and 1992.

cialized; the number engaged in various specific activities--selling hogs or cattle, dairying, or harvesting wheat or cotton--has declined quite sharply, by as much as 85 percent in the 28 years covered.

Table 3: Consolidation in U.S. Agriculture.

	1964	*1969*	*1978*	*1987*	*1997*
Farms (millions)	3.16	2.73	2.26	2.09	1.91
Mean Farm Size (Acres)	352	389	449	462	487
Number of Farms that:			—thousands—		
Sold hogs, pigs	803	645	423	238	102
Had milk cows	1,134	568	312	202	117
Sold cattle	1,991	1,645	1,320	1,150	1,011
Harvested wheat for grain	740	584	378	352	244
Harvested cotton	324	200	53	43	31

Source: U.S. Census of Agriculture for each year listed.

Table 4: Structural Change in U.S. Meatpacking.

	1980	*1985*	*1990*	*1995*	*1998*
Concentration -CR4-					
Steers and heifers	36	50	72	79	80
Hogs	34	32	40	46	54
Large Plants		-Share of Slaughter in Large Plants-			
Steers and heifers	24	53	66	81	81
Hogs	63	67	79	86	88

Source: USDA/GIPSA

Note: Large steer and heifer plants slaughter at least 500,000 head annually, while large hog plants slaughter at least 1 million head.

Aggregate concentration statistics convey useful summary information about the relative importance of small and large firms in agribusiness, and they send a clear message of consolidation as smaller market participants exit. But such statistics are not directly useful in measuring concentration in particular markets. For that we turn to more specific measures. Table 4 highlights concentration in U.S. meat packing, showing estimates of four firm concentration (CR4) for hogs and for steers and heifers[1]. Steer and heifer CR4 is quite

[1] A four firm concentration ratio (CR4) measures the share of industry output produced by the four largest firms in an industry. They are widely used because the U.S. government has traditionally published such measures for manufacturing industries. Other concentration measures (such as the Herfindahl index, which is the sum of square market shares) are more appropriate in some contexts, but for broad delineation of levels of, and trends in concentration, all commonly used measures are highly correlated with one another. The CR4 measure in Table 3 is based on shares of livestock inputs instead of packer output (meat), and is appropriate for looking at buyer market power.

high, but the dramatic increase, from 36 in 1980 to 72 in 1990 and 80 in 1998, is particularly striking. I know of no other industry with as sharp an increase in any comparable period. CR4 in hog slaughter has increased as well, although not as dramatically, from 34 in 1980 to 54 today. Many of the same firms, including IBP, Cargill, Farmland National, and Conagra, are active in each industry.

The table also summarizes plant sizes: meat packing has shifted sharply toward large plants (at least 1 million hogs or five hundred thousand steers and heifers annually). The shift in steer and heifer slaughter was especially striking; large plants handled less than a quarter of 1980 slaughter, but over 80 percent just fifteen years later. Increasing plant sizes suggests scale economies: they may help to account for increased concentration, and increased concentration may therefore reflect improved efficiency. We return to that suggestion below.

The largest packing plants handle around 5 percent of annual slaughter, so the industry could be unconcentrated if firms each owned only a single plant. Concentration therefore results partly from large plants, but also because firms own many plants. For example, the four largest hog packers own 18 plants, and the four largest steer and heifer packers own 25 plants, according to USDA data. But the number of plants owned by the largest packers changed little after 1980, and indeed, over one hundred years ago, the largest packers of 1890 each owned six plants. Recent CR4 increases were largely driven by increasing plant sizes, not by increases in the number of plants owned by big packers.

Meat packing represents the most striking example of agribusiness concentration. Table 5 shows that CR4 is also quite high in U.S. grain and oilseed milling, and has generally grown over time; in particular, CR4 in flour milling and soybean processing grew sharply. Grain producers do not only sell to processing plants, but substantial volumes are exported. Table 6 reports 1998 CR4 ratios for 3 major commodities (corn, wheat, and soybeans) for exports through major port districts[2]. The data again show high levels of concentra-

[2] These data were gathered during the evaluation of the Cargill-Continental Grain merger case and are based on USDA export inspections records. Inspection records were not designed for concentration measurement and may not always accurately capture ownership (for example, if one exporter has a marketing agreement to elevate grain owned by another exporter), and may miss some intra-company shipments.

Table 5: Concentration in U.S. Grain and Oilseed Processing.

Industry	*Leading Firms*	*Four Firm Concentration*			
		1977	*1987*	*1992*	*1997**
Flour Milling	ADM, Conagra, Cargill, Cereal Food	33	44	56	62
Wet CornMilling	ADM, Cargill, Staley, CPC	63	74	73	74
Soybean Milling	ADM, Cargill, Bunge, AGP	54	71	71	83
Cottonseed Milling	Anderson Clayton	45	43	62	n.a.
Malting	Conagra, Cargill, ADM, breweries	59	64	65	n.a.

Sources: 1977-92 concentration data are from Census of Manufactures. 1997 data are from trade sources.

Table 6: CR4 in U.S. Grain Exports, 1998.

Port District	*Share of Exports in Four Largest Firms*		
	Corn	*Wheat*	*Soybeans*
New Orleans	75	72	71
Texas Gulf	80	79	100
Atlantic Coast	100	100	100
Great Lakes	86	81	67
Pacific Northwest	100	86	100
All U.S.	70	47	62

Source: USDA export inspections data, as described in MacDonald (1999).

tion. Moreover, a few firms (such as ADM, Cargill, and Conagra) are widely active across processing industries, grain merchandising, and livestock feeding.

Among input industries, mergers led to sharply increased concentration in seeds[3]. Table 7 shows CR4 measures for four different seed categories (two for each of corn and cotton), indicating substantial levels of concentration. Concentration has increased in other key input industries: Census Bureau data show increased concentration in equipment and in agricultural chemicals.

[3] Biogenetic developments in the 1990s led to the development of seed traits that had strong demand connections to agricultural chemicals, such as herbicides or pesticides. Firms with bases in agricultural chemicals, like Monsanto and DuPont, purchased biogenetic trait developers, seed producers, and seed and chemical distributors in strategies aimed at exploiting complementarities among seed and chemical markets.

Table 7: Four Firm Concentration in Seeds.

Crop	*Largest Companies*	*CR4*
Corn	DuPont/Pioneer, Monsanto, Novartis, Dow	69
Soybeans	Monsanto, Pioneer, Novartis, Dow	47
Wheat	Monsanto, Pioneer, Novartis, Dow	36
Cotton	Delta & Pine Land	87

Source: Unpublished ERS report, by John L. King and Kenneth S. Krupa

Table 8: Scale Economies in Meatpacking.

Plant Size	*Processing Costs Only*	*Full Costs*
1,000 Head per Year	*—Cost Index—*	
Cattle:		
175	130.7	104.3
425	100.0	100.0
825	85.0	97.9
1,350	78.6	97.0
Hogs:		
400	117.5	104.3
1,000	100.0	100.0
2,000	84.6	96.1
4,000	74.5	93.5

Source: Data from U.S. Census Bureau, Longitudinal Research Database; analysis developed in MacDonald and Ollinger (2000). Processing costs exclude animal purchase expenses.

Recent mergers have also reduced the number of independent railroads, important in grain and fertilizer shipments, to two or sometimes three in most parts of the country. Finally, recent and likely future mergers among supermarket chains, which may not greatly alter the number of stores that consumers generally have available to shop at, may still sharply reduce the number of different chains competing to buy produce from agricultural shippers. Table 1 shows that aggregate concentration among grocery chains rose sharply in the 1990s. In short, farmers face important reductions in buyer numbers in a wide range of markets.

SCALE ECONOMIES AND AGRIBUSINESS CONCENTRATION

The dramatic changes in plant size in some concentrating industries suggest that there may be important scale economies. Table 8 reports some evidence for meat packing, drawing on a recent ERS report (MacDonald, et al,

2000). The table lists indexes of average cost for hog and cattle slaughter plants of different sizes. In each case, the largest plants in the table correspond to the largest slaughter plants now operating while the smallest categories match commercial slaughter plants that were common in the 1970s but under increasing pressure in later years. We report separate indexes for processing costs (exclusive of animal purchase expenses) and for full costs in order to highlight some sources of scale economies.

The table shows large and extensive scale economies in processing costs. Costs per head at the largest hog slaughter plant (4 million head/year) are 12 percent below a plant half its size, and 25-40 percent below small plants. Similarly, processing costs at the largest cattle plant are well below those at smaller competing commercial plants. Processing scale economies arise from opportunities to more intensively use labor and capital in large plants, so that meat output per unit of labor or capital input is larger in big plants. Now review the data on full costs. Animal purchase expenses account for large shares (80-95 percent, depending on animal prices, plant size, and product mix) of full cost, and as a result large scale economies in slaughter cost must translate into small scale economies on a full cost basis. If all plants pay the same livestock prices, the largest plants will be able to deliver meat to wholesale buyers at costs that are 3-5 percent lower than competing plants that are one-third their size.

Packer scale economies became more important in the 1980s. First, technological scale economies became more important as packers built bigger plants and learned how to organize production for more intensive utilization of capital and labor at slaughter plants. Second, consolidation in cattle feeding and hog production provided packers with assured supplies of large volumes of animal. Without assured animal flows, large plants run the risk of sharply rising costs in periods of low slaughter volumes. Third, changes in the labor market eliminated a pecuniary diseconomy of scale faced by large packers, reinforcing the technological scale advantages shown in Table 8.

Table 9 shows average wages in hog slaughter plants, by year, region, and plant size (cattle developments are quite similar). The data source is the U.S. Census Bureau, production worker payroll divided by production worker hours, and wages are not adjusted for inflation. First, note the plant size-wage

Table 9: An Emerging Global Labor Market and Meatpacking Wages.

Hog Plant Characteristics		Predicted Mean Hourly Wages ($)		
Head per year	*Location*	*1972*	*1982*	*1992*
400,000	Western Corn Belt	5.04	12.17	8.08
1,000,000	Western Corn Belt	5.54	13.61	8.22
1,000,000	Southeast	3.64	9.15	7.81
4,000,000	Western Corn Belt	6.40	16.11	8.44

Source: MacDonald and Ollinger (2000).

relation evident for 1972; wages at a 2 million head plant in the Corn Belt are about 10 percent higher than at a 1 million head plant, and wages in the Southeast fall considerably below wages in the Corn Belt. During the 1980s, the industry underwent a series of lockouts, strikes, and renegotiations as labor and management battled over wages and other workplace issues. The table displays several results: wages fell quite sharply; the size-wage premium disappeared, providing large plants with an important cost advantage; and the regional wage differential narrowed sharply.

Scale matters in some other sectors as well. In a recent article, Buccola, Fujii, and Xia (2000) analyzed scale economies and productivity growth in grain processing. While using aggregated industry-level Census data, they found two developments that mirrored those that we found in meat packing. First, scale economies were extensive and important. Second, mean plant sizes changed (grew) over time to take advantage of scale economies. The findings for meat packing and grain processing indicate that we need to be careful in assessing the impacts of increasing concentration. In some cases, concentration changes may reflect the exploitation of scale and may arguably result in lower costs, lower product prices, and expanded output[4].

[4] It is also important to emphasize the unusual nature of the findings in these cases. Extensive scale economies may be more the exception than the rule in U.S. manufacturing industries. Moreover, mergers often are ill-conceived actions that lead to higher costs and lower efficiency (for recent evidence, see Kaplan, 2000). One should not simply assume that mergers or concentration changes are automatically efficiency-enhancing.

CONCENTRATION AND AGRICULTURAL CONTRACTING

The increasing use of contracts as a method of market exchange, while bringing many benefits, may exacerbate some concerns with concentration. Agricultural contracts are arrangements under which farmers agree to deliver products of a specified quality and quantity to a contractor at specified times, under a specific payments agreement (an actual price or fee, or a pricing formula). Contracts generally stipulate who owns the product, who pays for specific inputs, and who bears various risks. USDA 1997 ARMS contract usage data are used in Table 10, focusing on family-owned farms for whom farming is the principal occupation. Farms are classified by size--small (less than $250,000 in annual farm sales), very large (more than $500,000), and large. Nearly one third of all family farm sales were covered by production or marketing contracts in 1997, and coverage is closely related to farm size--nearly two thirds of the very largest farms had contracts, and 44 percent of sales from those farms were covered by contracts (Table 10). In contrast, only 16 percent of small farms had contracts, and contracts in turn covered only 20.9 percent of their production.

Contracts can provide a variety of benefits. They may reduce producer price risks, ease acquisition of debt financing, allow processors to improve capacity utilization by providing steady flows of the agricultural commodities through plants, and provide incentives to produce higher and more consistent levels of product quality. But reliance on contracting may also introduce new costs. In particular, in concentrated markets with only a few buyers, buyers may be able to use contracts as a tool of price discrimination, thereby exploiting the potential market power created by concentration. Under some conditions, they may be able to use contracts to deter entry and create market power (Hennessy and Hayes, 2000). Concentrated buyers may be able to manipulate thin cash market prices, which frequently form the basis for contract settlements. In short, contracts may combine with buyer concentration to allow buyers to exploit market power.

Market power concerns are exacerbated, for many farmers, by the close linkages between contract utilization and farm size. Note that over 83 percent of small farms do not have contracts, and but this group alone accounts for over two thirds of all full time family farms (Table 10). For many of these producers, contracting is a tool used by much larger farm enterprises, and is therefore

Table 10: Contracting Among Family Farms, 1997.

Farm Size	Farms	Farms with contracts	Value of Production	Contract Share of Production
	number	*percent*	*($m)*	*percent*
Small	574,908	16.4	55,222	20.9
Large	79,240	47.2	30,231	27.8
Very Large	45,804	62.9	59,583	44.3
All	699,952	22.9	145,036	32.0

Source: 1997 USDA Agricultural Resource Management Survey. Definitions are based on ERS farm typology; table includes only family owned farms for whom farming is principal occupation.

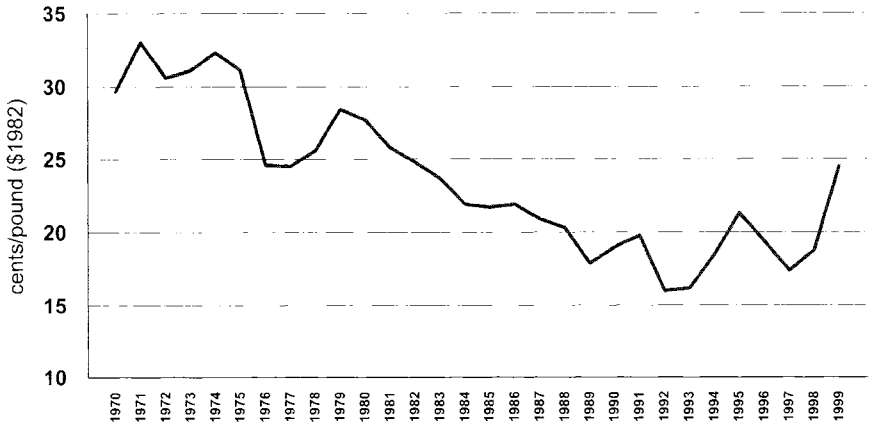
associated with consolidation into larger farms, cost pressures on smaller producers, and with dwindling numbers of farm communities.

DOES CONCENTRATION REDUCE COMPETITION?

High concentration often drives high prices. For example, Crandall and Hausman (2000) found that prices for long distance telephone service (an industry whose concentration levels are now close to those in steer and heifer slaughter) still exceed competitive levels by 150 percent, despite declines in prices through the 1980s and 1990s. MacDonald (1987) found that rail rates rose by about 20 percent as the number of competing railroads fell from 3 to 1, a result confirmed in more recent data by Grimm and Winston (2000). Many studies have found small but statistically and substantively significant effects of airline competition on air fares (with an additional carrier reducing rates by 3-5 percent). And Connor (1997) demonstrates the strong effects of explicit collusion on prices in the case of the lysine price-fixing case, 40-70 percent increases. On the consumer side of the food sector, the results of government attempts to induce competition among the three makers of infant formula are striking. The federal WIC program, which purchases about half of the infant formula consumed in the United States, now pays wholesale prices for formula that are one fifth the wholesale price offered to non-WIC buyers (GAO, 1998). These examples should give pause to anyone who thinks that cartels are inherently unstable or that competition can have only small effects on prices[5].

[5] Examples of markets with large effects of concentration on price were selected, to emphasize the potentially serious effects of concentration. On average, prices tend to be higher in concentrated markets, but the more typical effect is small (Weiss, 1989).

Figure 1: Real Farm-Wholesale Price Spreads, Choice Beef, 1970-1999.



Source: ERS choice beef farm-wholesale price spread, deflated for input price changes by author.

But increasing concentration does not necessarily imply sharp increases in market power. Consider trends in the farm to wholesale price spread for choice beef, displayed in Figure 1. The price spread is the difference between what packers pay for animals and what they receive for beef; it includes value of by-products, slaughter costs, transport expenses, and profits. The series in Figure 1 *was* deflated with an index of packer input prices, and the resulting real spread should measure changes in packer profits and input quantities per pound of retail beef. The spreads are represented as annual averages of cents per retail pound, which smooths sharp fluctuations in monthly data.

During the period from 1980-92, when slaughter CR4 increased sharply from 36 to 75, spreads fell quite sharply, as packer cost declines were apparently passed forward as lower beef prices, and backward as higher cattle prices. Spreads fluctuated widely during the 1990s but showed no trend increase through 1998. The data tell a strong story: if large increases in CR4 gave packers extensive new market power, it did not show up as long term increases in farm to wholesale spreads. More sophisticated econometric analyses support the inferences drawn above.

For example, Azzam (1997) formally modeled the forces driving the annual farm-wholesale price spreads shown in Figure 1, by explicitly taking account of the effects of concentration on pricing and on the realization of scale economies. He designed a test for perfect competition in packer purchases of fed cattle, and rejected the hypothesis of perfect competition - - producer prices fell below competitive levels as packer concentration rose suggesting increased market power. However, the divergence was extremely small, and prices were quite close to perfectly competitive levels[6]. Moreover, Azzam found that slaughter costs fell as concentration increased, and the cost decline substantially exceeded the price effects of concentration[7]. Azzam's results indicate that the trend in Figure 1 reflects the net results of two offsetting effects of concentration: increased market power, which had small effects on prices, set against the larger opposing force of reduced slaughter costs. Cattle slaughter is highly concentrated. Yet the price effects of packer concentration appear to be very small. There are three good reasons for this result, and although my arguments here are speculative, they are consistent with the broader literature on the sources of market power:

- entry into the industry is relatively easy;

When compared to the industries cited above there is no specialized technology, no need to develop a cadre of highly skilled workers, and large plants still only account for 5 percent of output, with the result that scale-related entry barriers are modest. Entry only takes money, and there are many investors that can raise the resources for a profitable opportunity.

- the product is homogeneous and opposing players (cattle sellers and wholesale meat buyers) are informed and active, and can induce price competition among packers; and

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[6] Specifically, he found that the divergence between actual and competitive price was about one fifth that predicted on the basis of a Cournot model, which is itself based on independent (noncollusive) buyer behavior and predicts that prices move quickly away from monopsony levels as the number of buyers goes to three and four.

[7] I interpret Azzam's results as showing that increasing concentration in the 1980s, when set against steady overall levels of industry production, allowed leading firms to get larger and realize scale economies and reduced costs.

- the period of consolidation was one in which meat packers moved aggressively to expand plant operations and to attract cattle to fill the plants.

The cast of competitors changed as some firms entered while some long-time participants exited or were acquired. It is not at all uncommon for prices and costs to fall during such periods of sharp change (Peltzman, 1977; Gisser, 1984). During the last two decades, meat packing looked much like one of John Sutton's (1992) industries in which hard competition helped create high concentration by forcing out high cost packers.

EMERGING ISSUES AND CONCLUSIONS

Mergers

I expect more concentration in commodity processing industries, in part because scale economies have not been fully exploited. Concentration in those sectors may increase because large firms build new plants or expand old ones, or because leading firms merge. Mergers among rivals will attract increased scrutiny because the law provides a policy lever, i.e., antitrust agencies are directed to oppose those mergers likely to reduce competition. Increased concentration makes it more likely that a merger will reduce competition, and the political furor over concentrated agribusiness will provide further impetus for a closer review of particular cases.

The geographic extent of the market plays a crucial role in evaluating the competitive effects of agribusiness mergers. For example, in its review of the proposed Cargill acquisition of Continental Grain's North American grain operations, the Justice Department quickly decided that Cargill and Continental competed with many other firms in the business of selling grain around the world, and a combination of the two was not likely to lead to any increase in grain prices to buyers. Hence, the relevant product market for grain sales from those facilities was global, and world trade and efficient transportation systems would limit product market power. But the market on the procurement side was smaller. There, the Justice Department believed that relevant markets were local and regional--transport costs, among other things, limited grain produc-

ers' options- -and a merger would reduce the number of relevant buyers in some markets that already had only two or three (MacDonald, 1999).

Geographic issues will arise in a similar fashion in future cases. For example, should Smithfield acquire IBP, the key antitrust issue will not focus on national and international product markets for pork, but on local and regional procurement markets for hogs. Similarly, evaluation of future mergers among grain or oilseed processors will likely focus on local procurement markets and the effects on prices paid to farmers, on the grounds that product markets for processed products are of greater geographic scope and less competitive concern, often because of international competition.

Mergers among agricultural input providers will also attract greater scrutiny following recent increases in concentration in seed, chemical, and equipment markets. Moreover, those markets are beset by great uncertainty over future prospects and over the best organizational structures for firms, leading to many mergers, divestitures, joint ventures and reorganizations. Consider the creation of the Swiss-based company Syngenta AG, formed by combining the seed and agricultural chemical business of Novartis with the agricultural chemical business of AstraZeneca. The new firms' stock was issued to stockholders in the parent firms, but management is independent. The U.S. Federal Trade Commission (FTC) filed a civil complaint against the merger, alleging that it would reduce competition in two markets: (1) pre-emergent herbicides for the control of grassy weeds in corn, and (2) foliar fungicides for the treatment of diseases in cereal, citrus, cotton, peanuts, potatoes, rice, vegetables, and turf crops[8].

Novartis was the leading seller of corn herbicides for pre-emergent control of grasses, with half of the U.S. market, while AstraZeneca held about 15 percent. Fungicides are crop-specific, and there are typically only two or three significant sellers for any crop type. Moreover, Novartis and AstraZeneca

[8] Two federal agencies, the Federal Trade Commission and the Antitrust Division of the Justice Department, share most antitrust authority in the United States (although other agencies also have roles; for example, Congress assigned antitrust authority for railroad mergers to the Department of Transportation). The two agencies generally agree to assign merger investigations to one or the other depending on available expertise.

were two of the three firms with strobilurin fungicides registered for sale in the United States (BASF was the third). Strobilurins are a new class of fungicides that are effective against a broader spectrum of diseases and are more environmentally friendly than other fungicides. The FTC ultimately cleared the merger under the conditions that Novartis divest its worldwide foliar fungicide business (to be sold to Bayer) and that AstraZeneca divest its worldwide corn herbicide business (to be sold to Dow Agro-Sciences).

Contrast the issues arising in commodity processing mergers with those involving seed/chemical suppliers. First, the relevant market scope differs, although each involves multinational firms with worldwide operations. Competitive issues in processing mergers typically come down to local and regional procurement markets, whereas the relevant agricultural chemical markets are considered to be national or global markets for narrowly defined products. Second, barriers to entry in chemical businesses are high, because of the risk and unrecoverable expense of the R&D investments needed to enter the industry. Even though many processing markets are highly concentrated, it is harder (though not impossible) to demonstrate substantial barriers to entry. Third, note an important similarity: the Cargill-Continental Grain and Novartis- AstraZeneca cases were each settled with the participants agreeing to divest some parts of the business as a condition of merger. Such outcomes have become far more common results of merger investigations in the last two decades, and have made merger policy into more of a regulatory instrument, subject to negotiation between antitrust authorities and the firms.

Contracts

I expect to see increased scrutiny paid to marketing and production contracts between processors and producers, as well as closer attention paid to contracts between producers and input suppliers that govern seed and chemical purchases. Antitrust issues will focus on contracts that appear to tie sales of one product to another, and to contracts that may serve primarily to limit entry by potential rivals into a market, while other regulatory issues (associated with USDA/GIPSA) will revolve around issues of price discrimination.

The antitrust treatment of vertical contracts is a complex and unsettled area of the law, and the competitive effect of vertical contractual relationships

is a complex and unsettled area in economics. Nevertheless, actions that might be unremarkable in unconcentrated and competitive markets may generate further legal and economic concerns in markets that are already concentrated (Kwoka and White, 1999).

One example of expanded antitrust scrutiny of agribusiness contracts occurred in September of 2000, when the Justice Department filed a civil suit against LSL Plant Science, a joint venture of Seminis Vegetable Seeds and LSL Biotechnologies. LSL, headquartered in Tucson, and Seminis (a subsidiary of the Mexican conglomerate Savia) together are the dominant sellers of seeds used to grow fresh-market tomatoes in North America during the winter. Hazera, an Israeli firm, is a major developer of seeds used in Europe and Asia. Beginning in the 1980s, Hazera and LSL signed a series of contracts to work together to develop tomatoes with a longer shelf life for the American market. Those contracts expired in December of 1995, except for a provision that forever bars Hazera from competing in North America against LSL and Seminis. The Justice Department sued to overturn that provision on the grounds that Hazera is the most likely entrant into a highly concentrated market and that the contract hence unreasonably reduces competition.

Note some important features of the case. First, the original agreement among the seed developers was primarily focused on investments in support of seed development, while only part of the contract related to competition. Second, non-compete provisions frequently appear in international technology transfer/development contracts (Scherer, 1994). Third, the offending agreement would have caused less concern if the seed market was unconcentrated, with many competing developers. In that case, the exclusion of one would probably not have a substantive effect on competition. But in a highly concentrated market, contracts that effectively exclude one of the few actual or potential competitors are much more problematic.

International Dimensions

Increased concentration will lead to greater antitrust scrutiny of agribusiness mergers and contracts because of competitive concerns. But expanded international trade may allay those concerns, and might thereby limit the need for expanded antitrust. The usual argument along these lines is that trade, aris-

ing from reduced transport and communications costs or from reduced government barriers, expands the geographic reach and commercial volume of markets (Scherer, 1994). Increased market sizes allow firms to expand to realize available scale economies, thereby lowering costs. At the same time, by combining previously separate markets, expanded market size brings local dominant firms into new competition with one another in the larger market, thereby driving prices closer to costs.

The combined effect can lead to sharply reduced prices for products where scale economies are large relative to the size of the market. That is more likely in Mexican and Canadian markets than in the United States where the large national market means that trade agreements will generally have only incremental effects on market sizes and competition. Nevertheless, expanded trade, by increasing the reach of some markets, will play a role in merger evaluations.

Expanded trade agreements will affect antitrust policy on contracts in more complicated ways. Consider the LSL-Seminis-Hazera contract case described above. The case itself illustrates a longstanding tension in competition policy between two goals: providing protection for intellectual property in the hopes that protection will lead to greater investment in innovation, and limiting such protection in the hopes that competition will allow the benefits of innovation to be widely diffused. Intellectual opinion and policy in the United States have oscillated between the two goals, at times leaning in the direction of greater protection for intellectual property (thereby foregoing a civil complaint against that type of contract) and at times leaning in favor of competition. Recent developments have intensified the issues, with more litigation and debate over intellectual property in agricultural biogenetics and with greater international trade bringing more firms and more countries into the issue.

Expanded North American markets will likely lead to conflicts as national competition authorities aim to apply their rules to larger markets. For example, U.S. laws against price fixing proscribe behavior that is not illegal in other countries, but is treated as a criminal violation, with substantial fines and possible jail sentences, in the United States. Foreign governments often resist U.S. efforts to gather evidence and subpoena witnesses from foreign based com-

panies that are the targets of U.S. price-fixing investigations. Recent successful U.S. prosecutions of international price-fixing cartels for agricultural inputs may lead to more extensive investigations and increased international legal conflicts.

Finally, expanded trade has created some losers among U.S. domestic producers, as well as some producers who see expanded trade and competition as the source of their difficulties. For example, the 1990s have seen sharply increased cross-border flows of fed cattle into the United States from Canada and Mexico. During periods of low cattle prices, U.S. producers frequently blame packers for low prices, and often also see freer trade as a problem (despite net exports). Many of those producers have in recent years called for changes in antitrust laws to explicitly provide protection for U.S. farmers and farm communities. As trade agreements expand markets and bring new participants into conflict, we are likely to see more attempts to use competition policies as protective devices.

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