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THE CAUSES OF CONCENTRATION IN THE U.S. BREWING INDUSTRY

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During the last three decades, concentration in the U.S. brewing industry has risen rapidly toward tight-knit oligopoly. The interesting question of what caused this trend has attracted the attention of numerous analysts, but their answers vary. A study of the 1950s and early 1960s by Horowitz and Horowitz (1965) pins the blame on slack demand and a cost-price squeeze. A subsequent analysis of roughly the same period by the present author contends that escalating product differentiation was the chief cause of increasing concentration (Greer 1971). More recently, Elzinga (1973, 1977) and Keithahn (1978) stress the contribution of growing economies of scale in production. Mueller (1978) agrees that "economies of scale played a central role", but only up to 1970; he argues that thereafter the major cause was conglomerate cross-subsidization from Philip-Morris to the Miller Brewing Company, subsidization that financed brand proliferation and enlarging promotional outlays. Finally, Scherer, Beckenstein, Kaufer and Murphy (1975) emphasize economies of scale while reaching an eclectic conclusion that gives credit to "a combination of accumulated image advantages, changes in consumer income levels, (and) the cost implications of a shift toward efficiently decentralized multi-plant operation . . ."

The purpose of the present paper is to reassess, synthesize, and update these prior studies. Among the many current developments motivating this renewed analysis, none rank higher than the sharp decline and impending fall of Schlitz and Schaefer, whose gigantic and efficient plants once served as prominent exhibits in the briefs of those arguing the preeminence of economies of scale. Equally enlightening is Heileman's recent remarkable success in extracting nice profits from a chain of relatively small breweries. The upshot of my analysis is that a mixture of causes has been at work, with proportions in the mix varying over time. As before, I give greater weight to product differentiation than other analysts might think appropriate, but my prior position is substantially modified to make room for important contributions from economies of scale.

CONCENTRATION: HISTORICAL TRENDS AND CURRENT CONDITIONS

The National Market

In the 1940s most beer was supplied by many small firms whose shipments never crossed more than few state boundaries. Now, most beer is supplied by a few giant firms whose shipments span the nation. In the 1940s there were more than 400 companies; today, there are less than 50. When translated into national concentration ratios, the industry's transformation is no less dramatic. Five-firm concentration increased from 16.3% in 1940 to 71.8% in 1979, while ten-firm concentration rose from just under 24% to just over 90%.

Accentuating this drift toward concentration, the gains of the top five have not been evenly distributed. Table 1 shows the national market shares of the present leaders from 1968 to early 1979. Anheuser-Busch and Miller, now ranking first and second, are the only companies enjoying sustained increases in market share over the entire period. Their combined share rose from 20.8% in 1968 to 45.9% in 1979. Pabst's market share has remained fairly stable. Schlitz and Coors experienced substantial gains between 1968 and 1976, but they have suffered considerable losses since 1976, losses which have left them about as well-off in 1979 as they were in 1970. It thus appears from these data that the industry is headed into the hands of a "Big Two" rather than a "Big Five."

Table 1. National Market Shares for the Present Top Five Brewers, 1968-1978, Percent of Tax Paid Withdrawals

Year	Anheuser-Busch	Miller	Schlitz	Pabst	Coors
1968	16.5%	4.3%	10.4%	10.0%	4.8%
1969	16.1	4.5	11.8	8.8	5.5
1970	18.2	4.2	12.4	8.6	6.0
1971	19.1	4.1	13.1	9.3	6.7
1972	20.1	4.1	14.3	9.6	7.4
1973	21.6	5.0	15.4	9.5	7.9
1974	23.4	6.2	15.6	9.8	8.5
1975	23.7	8.7	15.7	10.5	8.0
1976	19.3	12.2	16.1	11.4	9.0
1977	23.3	15.4	14.1	10.2	8.2
1978	25.6	18.8	11.8	9.6	7.4
1979*	25.9	20.0	9.9	8.6	7.4

*First three quarters.

Sources: *Brewers Almanac,* 1978, p. 20; *Advertising Age,* Oct. 9, 1978, p. 122 and Nov. 3, 1975, p. 29; *Beer Marketer's Insights,* Nov. 20, 1978, p. 1 and Nov. 12, 1979, p. 2; *Beverage Industry,* Jan. 5, 1979, p. 1.

State and Regional Concentration

Given the burgeoning strength of two national brewers and the ever more obvious national orientation of the industry, the nationwide definition of the market assumed above is certainly appropriate for analysis. Trends at the state and regional level are of equal interest, however, because the national firms must compete with regional firms of varying robustness and because high transportation costs have always made state and regional markets relevant.

Table 2 presents two- and five-firm concentration ratios for several large state markets over the period 1960-1979. Large states for which data are available were selected because they likely reflect regional trends as well as state trends. In every case concentration has increased, and in all but one instance the increase has been substantial. The one exception is Texas, where five-firm concentration was especially high to begin with, leaving little room for a large increase. The end result in 1979 is a series of two-firm concentration ratios ranging from 46.4% to 67.7% and five-firm concentration ratios nudging the 100% maximum.

The combined shares of Anheuser-Busch and Miller exceeded 50% in only one state in 1973, but by 1978, they exceeded 50% in twenty states. Moreover, the simple average of their combined shares across all states has nearly doubled, from 26% in 1973 to more than 46% in 1978. Rough extrapolation of the trend suggests that by now, Anheuser-Busch and Miller account for more than 50% of sales in more than half of all states and enjoy an average state market share substantially exceeding 50%.

Table 2. Concentration Ratios as Percentages in Five Major States, 1960-1979

State	1960	1965	1970	1975	1979*
California					
Top two	30.6	30.6	45.8	60.2	65.1
Top five	58.5	65.7	73.8	84.3	89.4
Florida					
Top two	60.6	54.0	65.0	74.6	67.7
Top five	79.8	76.9	78.7	93.9	90.4
Michigan					
Top two	37.1	46.4	39.4	52.6	50.9
Top five	66.0	73.4	71.5	83.0	87.0
Texas					
Top two	43.2	39.5	39.6	54.4	46.4
Top five	84.2	77.3	77.0	86.1	91.3
Wisconsin					
Top two	38.4	47.6	52.8	60.7	57.8
Top five	59.3	74.8	80.5	88.4	86.9

*Preliminary (first three quarters)
Source: *Beer Statistics News* and industry sources.

CAUSES OF THE CONCENTRATION

Four possible causes of the escalating concentration will be considered: (1) mergers, (2) economies of scale, (3) ruinous or predatory pricing, and (4) product differentiation. Each of these factors has apparently played some part in the process, with varying degrees of importance at various times, but economies of scale and product differentiation apparently played predominant roles.

The Role of Mergers

By definition, merging among brewers reduces their number and increases concentration (at least at the national level if not, as in the case of market extension mergers, at the local level). Brewing mergers have been numerous, but they have not contributed substantially to the soaring concentration because the leaders have not grown appreciably by merger.

Weiss (1966) measured the impact of mergers for the period 1947-1958 and found that less than one-third of the increase in national four-firm concentration during those years could be attributed to mergers. Elzinga (1973) re-applied the Weiss approach for a study of the ensuing 1959-1972 period, finding that only 2.7 percentage points of the 20.4 point increase in four-firm concentration during that period could be pinned on mergers.

Since 1972, none of the industry's leading four firms has grown more than negligibly by horizontal merger.

Vigilant enforcement of Section 7 of the Clayton Act is probably the main reason horizontal mergers have contributed so little to the industry's ballooning concentration. Mergers have thus been no more than symptomatic of other causes.

The Role of Economies of Scale in Production

Since publication of my earlier paper, several studies have appeared giving preponderate weight to economies of scale in production (Elzinga 1973 and 1977, Keithahn 1978, Scherer *et al.* 1975). These studies lack solid estimates of *changes* in economies over time. Moreover, they present widely differing estimates of minimum efficient scale for the one point in time receiving greatest attention, namely, the late 1960s. At plant level those estimates range from 1 million bbl. per year (Kottke 1965, Pratten 1971, and Weiss 1976) to 4.5 million bbl. per year (Scherer *et al.* 1975), and Elzinga (1977) has offered a compromise estimate that has unit cost declining steeply up to 1.25 million bbl. and then declining gently up to 4.5 million bbl. As regards multi-plant economies, Elzinga (1973) finds none, while Scherer *et al.* (1975) and Keithahn (1978) contend that brewers with three or four plants would gain moderate advantages over single-plant brewers.

Despite the gaps and inconsistencies, there can be little doubt that economies of scale at the plant level have increased over the last twenty years and that these changes have forced hundreds of small breweries to close their doors, thereby justifiably augmenting the collective market share of the top 20 or 30 firms. Still, the evidence indicates that production economies and changes therein prevail only up to a point, a point corresponding to sizes and to changes in size of only moderate, not gargantuan, dimensions. Moreover, production economies cannot explain the diverse experiences of the largest firms.

A rough quantitative estimate of the maximum contribution made by production economies may be based on the recent work of Keithahn (1978), who gives greater weight to such economies than any other analyst. Keithahn may be loosely interpreted as demonstrating that the minimum efficient scale of a single plant has risen from about 1 million bbl. per year in 1960 to roughly 2 million bbl. in 1970, and from there to approximately 4 million bbl. in 1978. This interpretation allows for the fact that actual brewery construction or expansion will lag somewhat behind engineering capabilities, as illustrated by the fact that six of Anheuser-Busch's ten breweries had annual capacities below 4 million bbl. in 1977. Moreover, Keithahn asserts that a minimum of four breweries are necessary to exploit multi-plant economies of scale. It follows, then, that a minimum efficient scale firm would have had national capacities of 4, 8, and 16 million bbl. in 1960, 1970, and 1978, respectively.[2] When these capacities are compared to total industry sales in those years (87.6, 121.8, and 165.0 million bbl.), "warranted" concentration ratios for two and five firms may be calculated for the national level as shown in Table 3. Under these assumptions, warranted two-firm concentration increased by 10.3 percentage points and warranted five-firm concentration increased by 25.6 percentage points. These increments are indeed large. However, actual two- and five-firm concentration increased by 28.3 and 41.0 percentage points over the period, as also indicated in Table 3. Thus it appears that only 10.3 points of the 28.3 point two-firm increase (or substantially less than half), and only 25.6 points of the 41.0 point five-firm increase (or slightly over half), can be attributed to increasing economies of scale in production. Generous estimates of scalar effects therefore leave large chunks of the national trend unaccounted for. Notice, too, from Table 3, that actual concentration greatly exceeds warranted concentration in every year. In particular, a minimum efficient firm scale of 16 to 20 million bbl. is not large enough to justify the size of Anheuser-Busch (41.6 million in 1978) or Miller (31.3 million in 1978).

Table 3. Warranted and Actual National Concentration Ratios for Two and Five Firms, 1960, 1970, and 1978.

Year	Two-firm concentration ratios		Five-firm concentration ratios	
	Warranted	Actual	Warranted	Actual
1960	9.1	16.1	22.8	32.6
1970	13.1	30.6	32.8	50.0
1978	19.4	44.4	48.4	73.6

Note: Warranted concentration here assumes minimum efficient scales. If beyond these minimums the LRAC curves are flat, as appears to be the case, then strictly speaking, warranted concentration has no upper bound.

By this kind of arithmetic the assumed quadrupling of minimum efficient plant scale would show a greater contribution to state and regional concentration because actual concentration at this narrower level has not increased as much as national concentration (a disparity that occurs as national brewers supplant regional brewers in local leadership). This greater contribution may be conveniently illustrated by assuming regional markets to be one-fourth the size of the national market, as implied by Keithahn's and Scherer's assumption that four plants are necessary for full efficiency. The warranted concentration figures of Table 3 then apply to individual regional markets as well as the national market. Data for actual regional concentration are not available on this basis, but the 10.3 points of warranted rise for two firms may be compared with the 15.2 percentage point rise derived from averaging the actual experience of the large states mentioned in Table 2. This comparison exaggerates the contribution of scaler changes because states are smaller than regions. Even so, approximately 33 percent of this increase in concentration is then left unexplained by scale economies. And once again, apart from changes, absolute levels of warranted regional concentration appear to be substantially less than those actually prevailing.

My contention that these several crude numerical estimates probably overstate the role of production economies may be bolstered by two further observations. First, the multi-plant economies claimed by Scherer *et al.* (1975) and endorsed by Keithahn (1978) are not really production economies at all. Rather, they argue that a nationwide scope of operations imparts a premium or high quality *image* which local or regional beers generally lack, and that the nationwide scope is best achieved by multi-plant operations, given the high transportation costs otherwise encountered. This "image" effect is not to be confused with economies of scale in the purchase or production of advertising messages, something which Scherer and Keithahn consider a very minor source of efficiency. Cost efficiencies in advertising procurement would of course favor multi-plant size much the same way that other genuine efficiencies would favor size—the larger firms could cut prices below levels sustainable by smaller, less efficient firms, thereby driving the smaller firms from the market. The premium image effect, on the other hand, works in a distinctly different manner. It enables those possessing favorable images to *raise* their prices without losing, and perhaps even gaining, appreciable sales. Such image effects would therefore probably best be classified as an element of product differentiation.

Second, an economies of scale hypothesis cannot account for the diverse experiences of those firms best positioned to take advantage of production economies. Thus, according to the hypothesis, firms with especially efficient manufacturing capabilities, such as Schlitz, Coors, and Schaefer, should be thriving. In fact, however, these firms are presently suffering declining market shares, substantial excess capacity, and severe financial difficulties, apparently because of managerial and product differentiation deficiencies. More generally, economies of scale in production cannot explain the substantial drop in market share of the sixth through tenth ranked firms between 1967 and 1979.

In short, changes in minimum efficient plant scale have contributed markedly to brewing concentration, perhaps as much as fifty to seventy percent of the trend during the 1960s and early 1970s. But these numbers are rough, high-side approximations. The story is not one of sheer technological determinism. It is, as revealed below, more complicated and less quantifiable.

The Role of Vigorous or Injurious Price Rivalry

Various forms of pricing conduct have purportedly contributed to declining numbers and rising concentration in brewing. The practices alluded to include predatory pricing, ruinous price competition, and price rivalry induced by evolving scale economies. To some unknown degree these allegations are probably true, as a brief rundown of several reliable reports for several periods of time will attest:

The 1950s: Ann and Ira Horowitz (1965) have argued that during the 1950s and early 1960s brewers "found themselves in a position of being in an industry with relatively constant total sales," while increased competition "prevented brewers from raising prices in the face of higher costs . . ." (p. 132).

The 1960s: According to *Business Week,* "In the mid-1960s, the majors began constructing super breweries that were more than double the size of anything built previously and that cut labor costs in half by taking advantage of technological improvements, particularly in packaging. This allowed the majors to cut the price spread between their premium beers and the popular-priced beers of the regionals from 25¢ per six-pack to as little as 10¢. Tough pricing by the majors helps explain why beer prices in the late 1960s and early 1970s rose only 2% a year, half the growth rate of consumer prices overall. It also explains why the brewers' ranks in the last decade were trimmed from 118 to 49".[3]

The Early 1970s: The March 24, 1973 issue of *Business Week* reports the following about Anheuser-Busch: "Along with its more aggressive advertising, the company is chopping its prices as much as 20% in some markets and has become far more competitive in other nondiscount markets . . . Analyst Lawrence Adelman of H.C. Wainwright & Co. claims that Anheuser-Busch has all but eliminated its old 'premium' prices and in most major markets is now selling its beer competitively with other national brands." More generally, Elzinga writes that "in the 2 years between 1971-1973, when the prices of almost all food and beverage products began to escalate, the wholesale price index for malt beverages went from a 1971 average of 110.2 to a 1973 average of only 111.6. Indeed, in 1973, when the industry had permission from the Cost of Living Council to raise prices (because of cost increases), competitive pressures prevented this price adjustment" (Elzinga 1977, p. 240).

Still, these passages illustrate the point that pricing alone, even competitive pricing, cannot create concentration. Prices must somehow fall relative to costs, or rise less rapidly than costs, thereby producing a price-cost squeeze. Moreover, the burden of such a squeeze must fall disproportionately on small firms, pressing them into distress. A disproportionate burden may arise either on the cost side, as in the case of economies of scale, or on the price side, as would be true if the largest firms enjoyed no economies of scale but cut prices only "*partially,*" in limited geographic areas, say, or in exploitation of their premium image. In other words, analysis of the pricing argument (and further scrutiny of the contribution of scale economies) requires analysis of prices, costs, and the causes of any disproportionate burdens.

Table 4 presents a summary view of brewing prices and costs and the distribution of their relationship because it reports brewers' profits before federal income taxes as a percent of stockholder's equity for five different asset size classes from 1947 through 1975 (the latest year available). From this table it may be seen that a severe price-cost squeeze developed during the 1950s and early 1960s, adversely affecting the profit performance of firms in *all* size classes. The largest size class contained two or three firms from 1951 through 1961, and that group's profits fell from 28.8% to 13.9% during that time. The $10 - $50 million asset size class contained 27 to 34 firms during that period (depending on the year), and its profit experience was very similar, falling from 22.9% to 12.4%. The similarity of profit level and downward trend for the largest three dozen firms suggests that economies of scale did not induce price reductions during these years, although to some degree economies of scale may well explain why firms in the smallest size class reported in Table 4 (those ranking roughly 60th to 130th at the time) had by far the lowest profits of all reported groups every year. Beer prices actually rose quite substantially in those years. Rather than appreciable scale economies, the evidence indicates that costs rose more rapidly than prices, catching *all* firms in a cost-price squeeze. This is the hypothesis of Horowitz and Horowitz, as quoted above, and the present author argued previously that a rapid escalation of expenditures for purposes of product differentiation (e.g., advertising and package variation) was the single most important cause of the cost inflation during those years (Greer 1971). Disparate reserves and lines of credit presumably made the large firms more capable of enduring these hard times than small firms, fostering concentration.

Table 4. Profits Before Federal Income Taxes as a Percent of Stockholders' Equity by Asset Size Classes, 1947-1975

Year	$100 million and above	$50-$100 million	$10-$50 million	$5-$10 million	$1-$5 million
1947	—	47.1%	32.2%	33.0%	28.6%
1948	—	48.3	27.2	27.7	19.8
1949	—	40.8	28.1	26.4	18.0
1950	47.2%*	29.2	28.4	20.1	11.9
1951	28.8	26.0*	22.9	18.0	8.6
1953	28.3	13.8*	20.6	16.0	7.0
1954	22.8	3.1*	17.0	16.2	6.6
1955	22.3	15.1	18.7	16.3	6.6
1956	19.0	13.0	18.5	14.9	4.9
1957	18.1	10.0	17.8	10.7	4.4
1958	13.6	14.4	17.1	14.7	4.4
1959	14.2	20.6	16.7	7.8	5.5
1960	14.0	19.1	15.1	5.7	4.0
1961	13.9	21.0	12.4	12.3	0.2
1963	17.1	18.0	14.3	13.7	4.4
1964	16.8	17.7	15.7	9.4	6.9
1965	19.3	10.7	13.2	13.7	8.5
1966	20.8	14.5	13.7	(6.8)	(4.6)
1967	20.1	17.6	13.6	21.9*	3.1
1968	26.7	16.4	14.8	103.7*	17.7
1969	24.8	14.1	15.3	58.5	7.8
1970	21.7	6.2	11.2	8.7	16.4
1971	22.6	2.7	10.5	—	21.6
1973	21.8	1.3	1.1	13.6	4.8
1974	16.3	(7.4)	4.4	—	14.1
1975	18.1	2.4	10.1	—	(19.0)

*Observation from only one firm.

Source: Internal Revenue Service, *Source Book of Statistics of Income,* as reproduced in *Brewers Almanac,* various issues.

For the period 1963-1973 the data in Table 4 indicate a price-cost squeeze afflicting all but the largest four or five firms. Profits for the biggest firms rise from 17.1 to 21.8 percent of equity, while profits for the smaller firms are erratic, declining, and occasionally even negative (as signified by parentheses). According to *Business Week* and other observers, it was during these years that the majors constructed super breweries, cut costs and prices, and thereby pinched the small operators. It is here, then, that the economies of scale thesis, when coupled with price competition, gets its greatest support, for economies would create such disparities by size on the cost side.

Still, a substantial influence from product differentiation cannot be ignored. Several points beyond those already qualifying the economies of scale hypothesis can be made defending the notion that the demise and diminution of firms below the top 4 or 5 depended on much more than the top brewers' ability to produce 4 million barrels of beer per year efficiently and price it with a competitive markup.

First, the majors never eliminated their price premium vis-á-vis "popular" priced brands (except for Pabst in 1962, and the popular priced brands introduced by the majors, like Schlitz's Old Milwaukee). This would not be relevant if there were genuine differences in quality between the premium brands and popular priced brands justifying a price differential, but many taste tests have shown that most "blinded" beer drinkers cannot taste notable differences between most U.S. brands and they cannot distinguish their "favorite" or "regular" brand without the aid of brand labels.[4] Carling's President Henry E. Russell once admitted as much when he said that "Most American beers fall pretty close together in the beer taste spectrum."[5] Correspondingly, the costs of producing premium and nonpremium beer are essentially the same.[6]

Second, the beer industry insiders who supplied Scherer *et al.* (1975) with their estimates of economies of scale also agreed by an overwhelming majority "that marketing was a much more important dimension of business strategy than production" (p. 258). That is to say, if promotional and product image efforts go astray, "efficient production would not be sufficient to save the day." Conversely, a favorable image can prop one's price and thereby completely compensate for costly inefficiencies. In other words, product differentiation explains why many firms big enough to exploit economies of scale in production nevertheless fail, and why many firms of suboptimum size survive prosperously. Thus, in 1963, Ballantine, Hamm's, Carling, and Falstaff were each selling 3.8 to 5.7 million barrels per year, well above most estimates of minimum efficient scale for the time. Yet each lost substantial volume thereafter. In the early 1960s, Lucky Lager and Pearl ranked number one in California and Texas, respectively, and each exceeded 1 million barrels output. Yet they have subsequently diminished to the point of near disappearance. Tiny but successful Blitz-Weinhard of Oregon (prior to its acquisition by Pabst) and Leinenkugel's of Wisconsin illustrate the possiblities at the opposite pole.

This is not to question whether price competition existed in brewing prior to 1973. It did exist, in conventional ways among popular priced brands and in the unconventional sense of premium discounting. This analysis merely qualifies the significance of conventional price competition to concentration (or this competition plus economies).[7]

Whatever one concludes about the contribution of vigorous pricing practices in the past, data for the last few years indicate rather solidly that Anheuser-Busch (A-B) and Miller have been outdistancing the rest of the industry without discounting their brew. Since 1976 their average prices (or revenues) per barrel have substantially exceeded all other major firms, national as well as regional. It is worth noting in this connection that Miller's recent success is due in large part to its new "Lite" brand, which includes less raw materials, less alcohol, and less of everything except water, thereby costing less to produce than regular beer. From the very start, however, Miller chose to price Lite as a premium beer rather than as a popularly priced beer (or a discounted popularly priced beer). Estimates of industry insiders peg the cost of "light" beers between $2 and $3 a barrel less to produce than regular beers and yet, following Miller's lead, most sell for about $2.75 a barrel more.[8]

Moreover, A-B and Miller have been making their spectacular gains while sales are shifting away from popular-priced beer toward premium and super-premium priced beers. The share of popular-priced beer fell from 59.9% in 1972 to 43.3% in 1977 and is projected to fall below 35% in 1979 (despite the blind taste tests).[9] As one analyst puts it, "the price sensitivity of beer consumers has demonstrably lessened in recent years."[10]

Still more specifically, the industry's two ascendant stars, A-B and Miller, cannot be accused of buying their burgeoning market shares with aggressive price cutting the last five years or so. For quite some time A-B has claimed it maintains a "statesmanlike pricing position", which generally means holding prices up except to "meet competition" so as to avoid being "priced out of any market."[11] By some accounts this "statesmanlike" behavior makes A-B the industry's price leader. But over the last three years Miller's demonstrated eagerness to raise prices portends Miller's replacement of A-B in that position. Strong demand for Miller's brands has made price discounting unnecessary for Miller, and Miller appears to have led all major price advances from 1977 to the time of this writing.[12]

It may seem perverse to classical economics, but Miller's favorable image helps it raise prices, and its high prices in turn boost its favorable image. Conversely, industry insiders claim that Schlitz hurt its image and its sales when in the early 1970s it continued to discount its beer long after the prices of other premiums had recovered from a period of price shading. For another example, Pabst, in response to its recent problems, is now trying to "reposition" its Blue Ribbon as a premium beer in many areas where for years it has sold at popular prices.

To summarize, price competition of at least moderate intensity seems to have prevailed in the past, and such competition has probably contributed to the exodus of many small brewers and some increase in concentration. Still, price competition alone cannot be blamed for these effects. There must be some additional element that causes relatively small firms to suffer disproportionately. Aside from a portion of the 1960s when economies of scale in production had their greatest impact, product differentiation, or attractive image, which has permitted short-term, strategic, premium discounting seems most often to have been detrimental to small firms. Of late, as brand images have grown more important than in the past, and as concentration has increased a pace, price competition has diminished. Those firms now enjoying greatest gains apparently convey the flashiest images.

The Role of Product Differentiation

There are essentially four more or less distinct ways in which product differentiation may foster concentration: (1) the development of a premium image that gives leverage in price combat; (2) a competitive escalation of advertising and other differentiation expense to the point of creating an injurious cost-price squeeze, survived only by those who are financially most viable, which generally means deep-pocketed large companies; (3) a predatory escalation of promotional outlays by one or a few firms bent on domination of the industry and often funded by outside sources; and (4) the presence of significantly increasing returns to advertising outlays or some other form of economies of scale in differentiation effort. The first of these has been discussed already, so it may now be set aside. The remaining three possiblities deserve elaboration. For this purpose, the recent history of the industry is best divided into two periods: 1947-1967 and 1967-1978.

The 1947-1967 Period

Product differentiation during this period was analyzed in my earlier paper, so only the barest outline need be given here. Table 5 shows brewing industry profits as a percent of stockholders' equity, profits as a percent of sales, and advertising expense as a percent of sales from 1947 through 1975. The substantial decline in profits between 1947 and 1960 can be attributed to, among other things, a sharp escalation of advertising and packaging variation (Greer 1971, see also Faundorf 1975).

Detailed study of the expenditures of individual companies and classes of companies over the 1950s and early 1960s discloses no single company greatly outspending the others and no consistent evidence of economies of scale to advertising. Hence the dramatic rise in advertising and other differentiation expense seems attributable to vigorous but nonpredatory competitive rivalry.

Table 5 also shows that for seven years after 1961 profits moved upward, a recovery undoubtedly assisted by a declining intensity of advertising outlay, from a high of 7.0% in 1964 to 5.46% in 1968 and still less later. As long as advertising expenses are high they produce cost pressures that may, as in this case, induce even higher concentration. But as concentration proceeds it is logical to expect that advertising outlays relative to sales will eventually fall. If moderately concentrated and imperfectly collusive oligopolies spend more on advertising than is in the profit interests of the industry as a whole, then levels of concentration above the point of most intensive rivalry should lead to collusive or quasi-collusive curtailment of that costly rivalry. This reasoning led me to predict a decline in beer advertising intensity before the decline became evident (Greer 1971, p. 218). Confirming the contention that the industry's advertising was excessive during the 1960s, Grabowski (1977-78) estimates that, on average, expenditures relative to sales were two times higher than the profit maximizing level.

The 1967-1978 Period

It is difficult to specify exactly what level of advertising outlays is excessively burdensome and injurious to profits because it varies from time to time and from firm to firm. But Grabowski's estimates indicate that for most brewing firms advertising expenditures above 3 percent of sales revenues are financially damaging, and intensive advertising may therefore have provided some impetus to rising concentration up through 1972. Even so, increasing concentration during 1972-1974 was probably more a cause of declining advertising than was advertising a cause of concentration. The climbing concentration of those years seems to have been primarily the result of two forces—momentum and slumping profits. Profits fell sharply during those years because of radically increased prices for materials—grains and containers in particular (see Table 5).[13]

Table 5. Profits after Taxes as a Percent of Stockholders' Equity and as a Percent of Sales, Cost of Materials as a Percent of Sales, and Advertising Cost as a Percent of Sales, 1947-1975

Year	Profits as Percent of Equity	Profits as Percent of Sales	Cost of Materials as Percent of Sales	Advertising as Percent of Sales
1947	19.1%	6.5%	38.7%	3.25%
1949	15.9	6.4	38.4	4.29
1950	12.0	5.1	39.5	4.80
1951	8.7	3.6	42.0	5.17
1953	7.8	3.1	40.9	5.65
1954	7.0	2.8	40.9	6.77
1955	7.9	3.2	39.8	6.73
1956	6.1	2.4	40.3	6.70
1957	6.3	2.6	40.9	6.87
1958	6.5	2.6	43.9	6.84
1959	6.6	2.6	42.7	6.52
1960	6.2	2.5	43.0	6.90
1961	6.4	2.4	43.4	6.84
1963	7.7	2.8	44.5	6.86
1964	8.9	3.2	44.8	7.05
1965	9.2	3.3	45.6	6.90
1966	9.9	3.4	47.7	6.50
1967	9.3	3.2	47.2	5.96
1968	11.5	3.7	48.1	5.46
1969	10.2	3.6	47.7	5.33
1970	8.7	3.2	47.0	4.77
1971	9.3	3.3	47.5	4.27
1972	6.9	2.2	51.0	4.06
1973	7.0	2.4	55.1	3.34
1974	4.0	1.3	62.7	2.62
1975	7.1	2.1	64.7	2.66

Sources: Internal Revenue Service, *Source Book of Statistics of Income,* individual years; Bureau of the Census, *Annual Survey of Manufacturers,* various issues.

Note: The profit figures could be adjusted for the fact that advertising is an investment that by accounting convention is expensed. In the case of brewing, however, advertising depreciation is very high, 90% annually (Grabowski 1977-78), so such adjustment would produce only minor change.

Also, sales include excise taxes. Scherer, et al. (1975) reports advertising as a percent of sales 50% higher because of the exclusion of excise taxes (p. 246).

The decline in advertising outlays between 1967 and 1974 is also shown in Table 6, which reports data on measured media advertising expenditures per barrel for the industry's leading firms. (The data for Table 5 are from tax records and they therefore have the advantage of including advertising expenditures for things other than measured media, but they have the disadvantage of including non-beer advertising to the extent that companies included in the IRS industry classification engaged in business activities outside brewing.) Measured media outlays per barrel in 1974 for the top 10 *other* than Miller were almost half of what they were in 1967 despite increases in the costs of producing and disseminating advertising messages and despite higher prices for beer. A-B, Schlitz, and Pabst show especially marked reductions, as if these leaders were attempting to lead a de-escalation from the peaks of the early 1960s (when their measured media outlays were in the $1.39 to $2.22 range).

Table 6 reveals quite different behavior from Miller, however. In 1967 Miller's relative outlays were far greater than any other leading firm and they grew still greater until 1971. In 1971, Miller's measured media outlays were more than two and a half times the average outlay per barrel of the other firms in the top 10 that year. These relatively massive Miller outlays had little effect on Miller's national market share up through 1971, its share being only a bit bigger than 4 percent at the time and slipping slightly. It is probably for this reason that Miller's unique bahavior stimulated no notable response from its rivals at the time.

Table 6. Advertising Expenditure (in Dollars) Per Barrel of Sales for Nine Leading Firms, 1967-1978

Year	A-B	Miller	Schlitz	Pabst	Coors	Olympia	Heileman	Stroh	Schaefer
				Measured Media					
1967	1.09	1.92	1.59	.84	.26	1.19	.94	1.57	.91
1968	.79	1.83	1.51	.78	.15	1.13	.52	1.44	.95
1969	.86	1.83	1.20	.51	.16	.96	1.24	.84	.87
1970	.84	2.12	1.10	.61	.24	1.30	1.18	1.19	1.20
1971	.98	2.59	1.03	.56	.22	1.40	1.32	1.20	1.08
1972	.94	2.07	1.09	.49	.19	1.03	1.40	1.07	.88
1973	.69	1.58	.92	.55	.13	.90	.76	.96	.78
1974	.52	1.50	.92	.59	.13	.90	.62	1.00	.89
1975	.78	1.65	1.14	.61	.10	1.04	.62	.77	.45
1976	.98	1.58	1.41	.57	.15	.89	.72	.87	.47
1977	1.60	1.78	1.98	.68	.33	1.29	.75	1.19	.92
				Total expenditures (for limited years)					
1977	2.16	2.10	2.49	1.57	1.97	2.28	1.63	1.19	1.99
1978	2.80	2.60	2.97	2.59	2.66	2.27	1.82	1.42	2.01

Source: ***Advertising Age,*** **November 3, 1975, p. 29; October 9, 1978, p. 122; September 24, 1979, p. 18.**

Thereafter the situation changed enormously. Miller's especially heavy promotional effort began to pay off with a doubling of its national market share over the 1972-1975 period and then a redoubling over the next two years 1975-1977. Table 6 shows the retaliatory response of those threatened. The per barrel outlays of A-B, Coors, and Schaefer more than doubled over 1975-1977, and those of the other firms jumped substantially.

Miller's responsibility in this renewed escalation of advertising outlays may also be measured by changes in absolute dollar outlays. Miller's measured media expenditure rose 387% between 1971 and 1978, whereas the laggardly comparable figures for A-B, Schlitz, and Pabst are 236%, 160% and 175%, respectively. It thus appears that the industry is headed for another period of excessively burdensome promotion. As William Coors recently exclaimed, the major brewers have "gone berserk with advertising expenditures."[14] If sales were booming, this might be normal. But they are not.

This explosion will alter the nonlinear pattern traced above, wherein advertising as a percentage of sales rises as concentration rises from low to moderate levels and then falls as concentration proceeds to especially high levels. As tax bureau data after 1975 become available, they will reflect this immense inflation of promotional outlay, thereby confirming that concentration is already high. It is quite common to see established leading oligopolists in consumer goods lash out at successful new entrants with rapid escalations in their advertising efforts, and to the extent Miller is regarded as an intruder into the top ranks of brewing these events coincide with that industrial experience. Still, genuine instances of successful entry usually reduce concentration in conjunction with the escalating promotion, and that is decidedly not the case in brewing. The soaring costs of promotion here will probably fuel further concentration faster than would otherwise occur. The process therefore generates support for Mann's (1974) thesis that advertising as a percentage of sales and concentration are positively related throughout the possible range of concentration. Even so, it is my view that once concentration reaches the point where the leading brewers are solidly in command and satisfied with their positions, advertising intensity may be expected to decrease once again to levels more closely approximating the industry-wide or monopoly optimum (assuming that in the future Pabst or some other runner-up is not bought by a giant conglomerate acquirer with designs on wresting the number-one spot from A-B or Miller).

The Miller-Philip Morris Connection: The amount of money Miller has invested to vault so high so quickly is rather remarkable in light of its formerly modest position in an industry generally facing financial doldrums. Apart from Miller's advertising expenses, which probably exceed $260 million when totaled over the period 1971-1978, the company invested an estimated $731 million in plant and equipment over 1971-1978. The general consensus among financial analysts and Miller's rivals is that this enormous expansion would not have been possible without the tremendous financial backing of Philip Morris, which acquired Miller in 1969-1970 and which covered Miller's operating losses for a number of years. According to Willard Mueller this is a classic case of conglomerate cross-subsidization with predatory overtones.[15]

Defenders of Miller-Philip Morris dismiss the significance of the company's big spending and stress the innovative spirit Philip Morris injected into Miller.[16] In particular, Miller's resounding success is credited by Miller's supporters to a number of special achievements in the realm of marketing and product differentiation, nearly all of which can be categorized under three broad headings—market segmentation, brand reposition, and package variation. Each has its counterpart in cigarette marketing.

> *Market segmentation:* Different products can be made for different groups of people; or different groups of people can be persuaded to buy allegedly or genuinely different products. Thus, among Miller's brands, Lite is a low-calorie beer suitable for he-men; Players is a low-calorie beer fitting for women as well as men; High Life is best suited to

the tastes of blue collar workers; and Lowenbrau is aimed at the upper-middle class.

Brand repositioning: When Philip Morris acquired Miller its High Life brand had a "champagne of beers" image, attractive to upper-class folks who generally are not heavy beer drinkers. To attract the 30% who drink 80% of all beer, Miller "repositioned" its image. The strategy was "To take Miller High Life out of the champagne bucket and put it into the lunch bucket without spilling a drop."[17] Similarly, when Lite was the property of Meister Brau, it was targeted at diet-conscious consumers. After Miller's acquisition of the brand, it was repositioned to appeal to "real" beer drinkers.

Packaging variation: Miller's 1972 introduction of a 7-ounce "pony" bottle is said to be a "major factor in the Miller resurgence."[18] The bottle apparently appealed to Miller's original nonheavy drinkers and also to its newly repositioned customers who thought 12 ounces got too warm before the last drop went down.

What is interesting about these ploys is that they are not really new to the beer industry. There has always been a price-image segmentation, with Budweiser and Brown Derby aimed at different drinkers, plus the super-premium, high-class imports. Coors introduced "pony" containers in 1959 (not to mention the industry's several dozen other packaging innovations), and Rheingold brought out a low-calorie beer called Gablinger's in 1968. Gablinger's flopped, apparently because its low-calorie virtues were touted by fashion models and beauty queens instead of ex-athletes and because of taste problems. Meister Brau Lite was a second entry, a brand which Miller acquired. Miller has been notably successful at "repositioning" Lite and its other brands, but this too is obviously not new to the industry.

Thus, apart from the money, it is difficult to pin down what accounts for Millers' success. Perhaps it is Miller's extensive segmentation within one company, or its particular blending of these marketing strategies, or its great stress on marketing research, or its particular choice of advertising themes, or some combination of these plus the vast expenditures. It cannot be the money alone because Miller's sales were not responding to its heavy outlays prior to 1972. In any event, the rest of the industry is emulating Miller in more ways than just escalating money outlays. For example, A-B is offering Natural Light, Busch Light, Michelob Light, and Busch Premium to complement its Budweiser, Busch, and Michelob brands. Anheuser-Busch is also preparing a super-premium import to rival Miller's Lowenbrau.[19] An ironic instance of segmentation is supplied by Heilemen's, which claims to have engaged in more market segmentation than any other brewer, and yet Heilemen's is essentially just a large collection of acquired, formerly independent regional beers. Indeed, given the industry's past variety, owing to a variety of *firms,* it is doubtful that a mere handful of firms could gain domination without simultaneously devising a variety of *brands* under their control. It is also doubtful, given these observations and developments, that Miller's share will continue to surge at the remarkable rate of the 1970s.

Economies of Scale in Promotion: How do the above details relate to the main theme of this paper? Aside from the cost-price squeeze that the renewed flurry of promotion will probably create and contribute to concentration, economies of scale in promotion are likely to emerge as a further contributory factor, and this development will also heighten barriers to entry.

Economies of scale to advertising would imply that, compared to lesser firms, the largest firms could spend less on advertising relative to their sales and yet still gain market share. During the late 1960s, and especially during the 1970s (to the extent data are available), the industry's top five or so were able to gain appreciable increments in shares while spending relatively less than the rest of the industry on advertising.

Now, and in the future, economies of scale in promotion are likely to arise from the brand proliferation that is generated by market segmentation. This forecast is based on evidence that promotional economies arise primarily in consumer goods industries experiencing frequent style changes (autos and cosmetics), or new titles and editions (books and records), or rapid brand multiplication (breakfast cereals and cigarettes) (Greer 1973). Simply stated, brand proliferation may induce scale economies because heavy "fixed" expenses are incurred with each new introduction, expenses largely independent of eventual sales levels. Given high fixed expenses for promotion in an industry, the largest firms will have the lowest advertising costs *per unit of sales* because they can spread these costs over larger volumes of sales than smaller firms can. A related theory of how brand proliferation and market segmentation may impair competition by raising entry barriers has been devised by Schmalensee (1978) and applied to breakfast cereals, an industry that brewing increasingly resembles. It thus appears that the advent of vigorous brand proliferation by the leading brewers portends a future of even greater market power than is suggested by the advertising explosion alone.

To summarize, product differentiation has been and probably will be a major determinant of concentration in the brewing industry. If during the late 1960s and early 1970s it was not the most important factor, it certainly seems so now. As in the 1950s, marketing strategies are now growing ever more expensive, an escalation sparked by cross-subsidization between Philip Morris and Miller. Of course the story is not simply one of money. For years Coors grew briskly with very little advertising, thriving instead on its "mystique", and Miller languished for awhile despite relatively intense outlays. Likewise, the phenomenon is not quantifiable. But that is perhaps as it should be, given the nebulous and often fleeting nature of "images" in this industry.

CONCLUSION

The following conclusions emerge: (1) The trend toward super-concentration in United States brewing will not crumble of its own accord. It is ingrained in the past and its present causes will persist into the future. (2) Some credit for past developments may be given to mergers and vigorous price combat, premium discounting especially. However, the main contributions come from economies of scale (particularly during the 1960s and early 1970s) and product differentiation (particularly during the 1950s and late 1970s). Complexities prevent accurate quantification of the separate contributions. (3) Ever higher concentration will probably lead to higher prices and profits. A-B and Miller have gained their present position with "premium" priced brands, and they have begun to exercise price leadership such as is commonly found among ponderous oligopolists.[20] (4) Eventually, ever higher concentration will probably produce another de-escalation in differentiation outlays.

FOOTNOTES

[1] I am indebted to an anonymous referee for helpful comments. This paper initially appeared in the Winter 1981 issue of the *Quarterly Review of Economics and Business.*

[2] This estimate assumes no change in the number of plants required for multiplant economies. None of the analysts believing in the existence of multiplant economies has presented argument or evidence that such economies have grown over time.

[3] *Business Week,* November 8, 1976, p. 62.

[4] See e.g., Allison and Uhl (1964), and Rewoldt, Scott, and Warshaw (1973 pp. 177-90). For an interesting twist on the same topic see McConnell (1968). It has been shown that when tested brands are known to be significantly different in taste, "blind" subjects can tell differences. But even in this context brand image significantly influences taste perception. Jacoby, Olsen, and Haddock (1971) find that the addition of a brand label to the "ultra premium" beer raised its mean quality rating from 64.6 to 79.8, and brand identification of the "regional inexpensive" brand *lowered* its mean rating from 48.2 to 33.5.

[5] *Business Week,* September 13, 1969, p. 139. Many companies, such as Coors, make claims of special quality water, but in fact all brewers distill their water. It was thus interesting to hear William Coors admit recently that "you could make Coors from swamp water and it would be exactly the same." . . . San Francisco *Chronicle,* January 27, 1979.

[6] *Fortune,* November 1972, p. 106; *Wall Street Journal,* November 17, 1977, p. 1. Stroh recently has converted to premium merely by marketing; *Business Week,* December 3, 1979, p. 91.

[7] Thus I further question Keithahn's (1978) analysis. He reports evidence that the average revenues per barrel of A-B and Schlitz have fallen over time relative to the average revenues of the rest of the industry and he concludes therefore "that the premium-popular price differential appears to have declined" (p. 95). However, average revenues per barrel exaggerate any true decline in absolute price differentials because changes in the composition of sales bias average revenues in the observed direction: (1) A-B and Schlitz introduced popular priced brands, Busch and Old Milwaukee; (2) premium beers like Miller and Coors account for a growing portion of rest-of-industry sales; and (3) the decline in draft sales as a portion of total sales has probably caused some of the decline in relative revenues per barrel, given that, compared to A-B and Schlitz, other brewers were disproportionately dependent on draft sales.

[8] *Wall Street Journal,* March 8, 1978, p. 40. Much the same has been said about Miller's Lowenbrau; see, e.g., *Beer Marketer's Insights,* April 17, 1978, p. 3.

[9] *Beer Marketer's Insights,* January 30, 1978, p. 3; August 28, 1978, p. 3; and E.F. Hutton Research Review, *The Brewing Industry* (Dec. 19, 1978), p. 3.

[10] *Beer Marketer's Insights,* August 14, 1978, p. 3.

[11] *Business Week,* March 24, 1973, pp. 45-46.

[12] See, e.g., *Beer Marketer's Insights,* May, 1978, p. 1; *Forbes,* August 7, 1978, p. 38.

[13] *Business Week,* August 18, 1975, pp. 28-29.

[14] *Beer Marketer's Insights,* October 16, 1978, p. 2.

[15] Mueller (1978) first quotes John Murphy, President of Miller and former Philip Morris executive, as saying that Miller's intent is to become "number one" in the industry. Mueller then estimates that Philip Morris absorbed $120 million in losses on its investment in Miller during 1971-1975.

[16] Indeed, John Murphy, President of Miller, was selected "Adman of the Year" by *Advertising Age;* see January 9, 1978 issue. See also William Flanagan, "The Charge of the Lite Brigade," *Esquire,* July 18, 1978, pp. 73-81.

[17] *Advertising Age,* January 9, 1978, p. 86.

[18] *Ibid.*

[19] For details on A-B's response to Miller see "August Busch Brews Up a New Spirit in St. Louis", *Fortune,* January 15, 1979, pp. 92-102.

[20] Indeed, financial analysts have begun to predict as much: "Brewing is an industry in the final stages of a transition to a far more highly concentrated and profitable business." *Wall Street Journal,* August 28, 1979, p. 33.

REFERENCES

Allison, R.I. and K.P. Uhl, "Influence of Beer Brand Identification on Taste Perception," *Journal of Marketing Research* (August 1964), pp. 36-39.

Elzinga, Kenneth, "The Beer Industry" in *The Structure of American Industry* edited by W. Adams (New York, Macmillan 1977), pp. 221-49.

Elzinga, Kenneth, "The Restructuring of the U.S. Brewing Industry," *Industrial Organization Review* (Vol. 1, No. 2, 1973), pp. 101-114.

Fraundorf, Kenneth, "The Social Costs of Packaging Competition in the Beer and Soft Drink Industries," *Antitrust Bulletin* (Winter 1975), pp. 803-31

Grabowski, Henry G., "The Effects of Advertising on Intraindustry Shifts in Demand," *NBER Explorations in Economic Research* (Winter-Spring 1977-78), pp. 675-701.

Greer, D.F., "Product Differentiation and Concentration in the Brewing Industry," *Journal of Industrial Economics* (July 1971), pp. 201-19.

Greer, D.F., "Some Case History Evidence on the Advertising-Concentration Relationship," *Antitrust Bulletin* (Summer 1973), pp. 307-32.

Horowitz, I. and A.R. Horowitz, "Firms in a Declining Market: The Brewing Case," *Journal of Industrial Economics* (March 1965), pp. 129-53.

Jacoby, J., J.C. Olsen, and R.A. Haddock, "Price, Brand Name, and Product Composition Characteristics as Determinants of Perceived Quality," *Journal of Applied Psychology* (Dec. 1971), pp. 570-79.

Keithahn, Charles F., *The Brewing Industry,* Staff Report of the Bureau of Economics, Federal Trade Commission (December 1978).

Kottke, Frank, Testimony, *Economic Concentration,* Part 2, Subcommittee on Antitrust and Monopoly, Committee on the Judiciary, U.S. Senate (1965), pp. 622-31.

Mann, H. Michael, "Advertising, Concentration, and Profitability" in *Industrial Concentration: The New Learning,* edited by H.J. Goldschmid, H.M. Mann, and J.F. Weston (Boston: Little, Brown, 1974), pp. 137-56.

McConnell, J.D., "The Price Quality Relationship in an Experimental Setting," *Journal of Marketing Research* (August 1968), pp. 300-03.

Mueller, Willard F., Testimony, *Mergers and Industrial Concentration,* Hearings, Subcommittee on Antitrust and Monopoly, Committee on the Judiciary, U.S. Senate (1978), pp. 84-124.

Pratten, C.F., *Economies of Scale in Manufacturing Industry* (Cambridge: Cambridge University Press, 1971).

Rewoldt, S.H., J.D. Scott, and M.R. Warshaw, *Introduction to Marketing Management* (Homewood, Ill.: Richard Irwin, 1973).

Scherer, F.M., A. Beckenstein, E. Kaufer, and D.R. Murphy, *The Economics of Multi-Plant Operation: An International Comparisons Study* (Cambridge, Mass.: Harvard Univ. Press, 1975).

Schmalensee, R., "Entry Deterrance in the Ready-to-Eat Breakfast Cereal Industry," *Bell Journal of Economics* (Autumn 1978), pp. 305-27.

Weiss, L.W., "An Evaluation of Mergers in Six Industries," *Reveiw of Economics and Statistics* (May 1966), pp. 172-81.

Weiss, L.W., "Optimal Plant Size and the Extent of Suboptimal Capacity," in *Essays on Industrial Organization,* edited by R.T. Masson and P.D. Qualls (Cambridge, Mass.: Ballinger Publishing Co., 1976), pp. 123-41.