Regulation, Industry Structure, and Competitiveness in the U.S. Portland Cement Industry

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The Cement Industry and Pre-1945 Regulation

Between 1880 and 1910, the portland cement industry underwent a period of rapid process and product innovation. During this period, cement making was transformed from a small, labor intensive, batch process industry, into a mass production industry using large-scale continuous process technology [Hounshell, 1984, pp. 1-13]. Plants that previously produced a variable product in amounts measured in hundreds of barrels per week now turned out a greatly improved and standardized product in amounts measured in tens of thousands of barrels per day. The development of cheap and reliable portland cement facilitated a revolution in construction technology as cement, in the form of concrete, became, quite literally, the foundation of cities, transportation systems, and factories.[1]

Cement is produced by burning a mixture of crushed limestone and clay (or similar materials) in enormous, slowly rotating and gently inclined, tube shaped kilns. Raw materials are widely available and represent only a small part of total production costs. Production is capital intensive with large economies of scale and a high minimum efficient scale. Cement production is among the most energy intensive industries using huge quantities of coal to fire the kilns and large amounts of electricity to power grinding, blending, and pollution control equipment. Energy makes up the largest part of variable costs. Cement has a high bulk to value ratio and is expensive to ship, so overlapping regional markets have developed. Little cement is shipped more than 200-300 miles. Ownership is fragmented at the national level with the largest firm controlling less than ten percent of production capacity. Regional markets are more concentrated but usually contain five to ten producers.

Mass production technology gave the portland cement industry not only the means to push competing products and foreign competitors out of the

[1] Concrete is a mixture of cement, water, sand, and stone with cement being the chemically active ingredient. Cement is the intermediate product and concrete a ubiquitous building material. Cement was measured in 376 pound barrels until 1970 although wooden barrels had not been used in the industry since the turn of the century.

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market, it also gave the industry the ability to overproduce. Since early in the twentieth century, the portland cement industry has had persistent trouble balancing supply and demand. The cement industry is closely connected with the volatile construction sector and demand varies regionally, seasonally, and secularly. The cement industry has often struggled to have the right amount of capacity in the right places at the right times.

Both overcapacity and undercapacity are costly conditions but the costs are born differentially. When there is undercapacity, prices rise, shortages occur, and construction projects may be delayed – all costly to contractors and consumers. When overcapacity exists, utilization rates decline, competition increases, and margins, prices, and returns fall. With demand varying temporally and spatially and cement plants representing long-term fixed assets, balancing supply and demand has proven largely beyond the sum of individual producer's decisions.

Overcapacity is a condition fraught with dangers for industries with high fixed costs and relatively low variable costs [Best, 1990, pp. 49-51, 70-2]. Cement plants run much more efficiently at high utilization rates and marginal production costs rise rapidly when plants are run at suboptimal levels. Producers struggling to maintain output levels in declining markets know that because the demand for cement is price-inelastic, lowering prices will only redistribute rather than increase demand. Other producers will match the price cuts and little if any advantage will be gained. Price-cutting is dangerous in high fixed cost industries because prices can fall a long way before variable costs are reached. If prices are reduced to the level of variable costs through intense competition the industry will quickly destroy its capital base. Knowing this, but faced with volatile markets, producers in high fixed-costs industries almost always seek to avoid engaging in price competition when inevitable market declines occur. The means with which cement producers have sought to limit price competition, stabilize volatile markets, and protect their capital base has often drawn the attention from state and federal anti-trust regulators.

The portland cement industry and government antitrust regulators have been struggling to define appropriate competitive behavior for most of the twentieth century. Difficulties most often began during market downturns when activities by cement producers to limit price declines brought complaints. The first occurrence of this was in 1919, when the Justice Department initiated a series of lawsuits against regional trade associations following complaints about the lack of competitive pricing. The industry's powerful northeast trade association (Cement Manufacturers Protective Association) disbanded after losing a preliminary court case but the Supreme Court eventually overturned this decision.

The most celebrated case against the cement industry began in the early years of the Great Depression when cement producers were struggling to stem the steep decline in prices due to the collapse of construction markets. Follow-

ing complaints by state highway departments, the Federal Trade Commission was ordered by the Senate to investigate the cement industry and produced a report in 1932 that concluded that the industry's basing-point price system produced rigid prices and reduced competition [FTC, 1932, p. xxi]. The commission recommended that producers be forced to quote f.o.b. mill prices but no further action was taken at the time [FTC, 1933, pp. xv-xvi].

In the late 1930s, federal anti-trust activity accelerated, becoming an "anti-monopoly crusade" and the cement industry once again found its marketing practices under scrutiny [Brinkley, 1995, pp. 364-5]. The FTC, picking up where it left off five years earlier, filed a formal complaint in July 1937, directly attacking the cement industry's basing-point price system. Like the Justice Department's 1920's case, the FTC went after the industry organization that collected and disseminated information on prices and freight rates. The FTC argued that the Cement Institute, was "with few exceptions, organized by the same group of men, representing substantially the same manufacturing companies" as the Cement Manufacturers' Protective Association which had disbanded in 1924 [FTC, 1933, p. 98]. The FTC found that both organizations had virtually the same aims and provided the same services.

After a long investigation of the industry's marketing practices, the FTC claimed that the multiple basing-point pricing system used by the cement industry violated the Federal Trade Commission Act and the Robinson-Patman Act [*Minerals Yearbook*, 1943, pp. 1245-6]. A cease and desist order banning the use of the basing-point price system was issued on July 17, 1943, and challenged in Federal court eleven days later by the cement industry. The cement industry won the case in the circuit court but lost on appeal to the Supreme Court. On April 28, 1948, the Supreme Court reinstated the FTC's original Cease and Desist Order of July 1943.[2] This annulled the industry's dominant marketing practice of quoting only prices that included delivery and freight charges. The cement industry promptly gave up this method of colluding on prices without any apparent ill effects. Markets were booming in the postwar period and there was no reason to seek market stabilization through price fixing.

Post-1945 Regulation and Limits on Mergers

In the pro-business climate of the early 1950s both the Justice Department and the FTC backed away from further confrontations with the cement industry over marketing practices [Loescher, 1959, pp. 274-82]. The government's view of the industry does not, however, appear to have changed. In a 1961 divestiture case the FTC's view of the industry came out clearly when it stated: "The historic pattern in the cement industry has been one of

[2] The FTC's Cease and Desist Order of July 17, 1943, that struck down the industry's basing-point price system was overturned by the U.S. Circuit Court of Appeals on September 20, 1946. The Supreme Court agreed to review the case in 1947 and, on April 28, 1948, overturned the Circuit Court's decision and reinstated the FTC order.

concerted activities to devise means and measures to do away with competition within the industry" [*Rock Products*, May, 1965, p. 88].[3] In the eyes of the FTC, the cement industry needed to be closely monitored.

Conflict resumed in the 1960s when overcapacity began to trouble the industry and producers sought ways to maintain production levels while avoiding price competition. One way producers sought to maintain production levels was by gaining assured markets by purchasing ready-mix concrete companies. The FTC moved aggressively against this form of market foreclosure by cement producers who integrated vertically but found that a case-by-case approach taxed their resources. Following an extensive study of the industry in 1966, the FTC published an "Enforcement Policy with Respect to Vertical Mergers in the Cement Industry" which said the commission would oppose any further vertical integration in the industry [FTC, 1966, 1967]. The limits on vertical integration in the Enforcement Policy have been debated in various economic and legal journals. The general conclusion is that vertical integration was a bad move for cement producers and the FTC did them a favor by banning it [Allen, 1971, p. 274].

The FTC not only restricted vertical mergers at this time but also argued for restrictions on both horizontal mergers and market extension mergers [FTC, 1966, pp. 88-9]. The commission had previously blocked mergers by companies competing in the same market, but now, in a clear change of policy, and in opposition to long-term industry trends, the FTC opposed market extension mergers as well.[4] The FTC saw regional cement markets as already highly concentrated and warned that any action by cement producers reducing the number of actual or potential competitors would be considered anti-competitive. The FTC labeled all existing producers as potential competitors, thereby justifying opposition to market extension mergers. Firms could move into new markets by building new plants but were warned against buying an existing producer in that market.

This paper examines six ways in which the FTC policy restricting horizontal integration affected the portland cement industry. The FTC policy:

- encouraged diversification away from core competencies;
- discouraged investment in the cement industry by domestic producers;
- kept older, smaller, less efficient plants operating much longer;
- contributed to a slowdown in technological change;
- made pursuing maximum scale economies difficult; and
- kept the industry fragmented and populated with small companies that had limited managerial, technological, and capital raising abilities.

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[3] The statement came from a case against Martin Marietta.

[4] Between 1950 and 1965, the FTC blocked two of three proposed horizontal mergers while allowing twenty-six market extension mergers and five acquisitions by outside firms [FTC, 1966, pp. 8-9].

The paper argues that a fragmented industry structure with numerous competitors in each market was not the best way to allocative or productive efficiency in the cement industry. The restrictions on horizontal integration damaged the long-term competitiveness of the industry and weakened the ability of many companies to compete effectively as markets globalized and multinational cement producers moved aggressively into domestic markets.

Postwar Changes in the Cement Industry

In the period before 1945, Alfred D. Chandler, Jr. depicted the portland cement industry as "less concentrated" and with relatively small firms [Chandler, 1990, pp. 113, 121]. Due to high transportation costs, the industry was divided into a series of regional markets each served by 5-10 plants. Economies of scale with existing production technology had been reached and the technology was changing slowly.

This description, however, becomes increasingly inaccurate as the postwar period progresses. New production and distribution technologies allowed plants to grow much larger and distribute more effectively.[5] The industry remained fragmented and full of small firms not because of the constraints mentioned above, but largely because of antitrust enforcement. Consolidation and concentration were pursued by producers but blocked by the FTC. Antitrust policy froze the structure of the cement industry and there was little change until a restructuring was forced upon the declining industry in the 1980s.

While vertical integration was a contentious issue in the cement industry, mergers were seen as a natural way to grow. Most producers saw multiple advantages for larger companies with multi-plant operations.[6] In the mid-1960s, when the FTC moved into action against the industry, cement companies were pursuing mergers in order to maintain or gain market share, to participate in more markets, and to increase the size of their companies.

In the 1960s, with overcapacity creating tighter margins and reduced earnings, and vertical integration blocked, cement companies sought once again to avoid the pitfalls of price competition. They engaged in non-price competition in areas of marketing and distribution while also seeking mergers. Producers sought horizontal mergers to obtain greater market shares in order to consolidate production in newer and more efficient plants and to take advantage of rising scale economies. Running larger, more efficient plants at higher utilization rates was a way to reduce marginal costs and increase

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[5] Electronic control technologies allowed kilns to quickly grow in size from 250 to 450 feet with some kilns reaching 750 feet. Pneumatic bulk loading equipment was developed and facilitated the rapid transfer of cement. Better road systems and larger trucks displaced railroads and brought more timely deliveries to widely scattered customers.

[6] The academic evidence for economies of scale for multi-plant operations is inconclusive [McBride, 1981, pp. 105-115].

operating margins. They pursued market extension mergers because they wanted to be in more markets in order to stabilize earnings. Construction markets were volatile regionally and producers sought to reduce the uncertainty caused by demand variability by moving into more markets. They also sought mergers in order to expand their companies in the belief that larger firms had greater managerial, marketing, research and development, and capital formation capabilities. The FTC blocked these avenues for growth within the industry so producers sought opportunities outside the cement industry.

Diversification

During the 1960s, cement companies were tempted by diversification and threatened by conglomeration. Cement firms were diversifying and diversified firms were buying cement companies. As late as the mid-1950s, less than 15% of capacity was owned by firms with significant outside interests and most of this was represented by United States Steel's Universal Atlas Cement Company. By the end of the 1960s the industry looked very different, with twenty-six diversified companies owning 75% of capacity. There remained just 18 firms, mostly small, single plant operations, making only cement.

Diversification was a 180-degree turn for many in the cement industry.[7] Where very recently, even moving into ready-mix concrete was seen as beyond the scope of "real cement men," now "more and more producers feel that it is sound business policy to enter into any field with a good profit potential" [*Pit & Quarry*, Jan. 1970, p. 87]. In an attempt to move further away from their roots and remake their image, several companies removed "cement" from their name at this time. Lone Star Cement became Lone Star Industries and General Portland Cement became just General Portland Inc [*Rock Products*, Dec. 1974, p. 57]. In retrospect, diversification was not a good idea for U.S. cement producers. Very few diversification moves were successful and several cost firms dearly [*Rock Products*, May 1978, p. 10]. Many later sold their outside interests to refocus on cement production.

Diversification was a direct reaction to the FTC's merger policy and diverted managers' attention from their core capabilities in cement [Aranoff, 1975, p. 92]. One gets a feeling they took their eye off the ball at this point, losing focus on cement making and marketing. Cement is an industry where a long-term commitment is needed, and losing focus for a decade caused the U.S. industry to fall behind just when conditions were undergoing rapid change. Cement markets were beginning to globalize, the competitive structure of domestic markets was undergoing fundamental change, and the Energy Crises necessitated new production technologies. The U.S. cement industry was

[7] "We don't think diversification is good for the cement industry, either from inside or outside, because of its high degree of specialization" [RP, May 1959, p. 89].

distracted by diversification just when it faced a series of changes that demanded all of its resources.

Declining Investment, Smaller Plants, and Technological Change

Diversification not only diverted manager's attention, it also diverted available funds away from investment in the industry. Capital spending fell off as cement producers turned away from cement production. There were fears expressed in the late 1960s that investment was not keeping pace with long-term needs, and that much of the industry was obsolete [*Pit & Quarry*, Jan. 1966, p. 98, 120; *Rock Products*, April 1968, p. 62; *Minerals Yearbook*, 1970, p. 269]. These fears were given expression in the dramatic slowing of productivity growth in the 1970s.[8] Capacity fell for the first time in the post-war period in 1969 and fell further in 1970 as old plants were retired and producers failed to invest in new capacity. The fall in output contributed to severe shortages during the next building boom in 1972-73. The widespread shortages brought imports pouring into the country as producers sought alternative sources to supply their customers. This period of widespread shortages alerted foreign producers to opportunities in U.S. cement markets that would be exploited more fully in the 1980s.

Domestic producers were discouraged from building new plants by their high cost and the structure of the markets. Building a large modern plant entailed significant capital expenses and high depreciation charges. Regional markets, in most cases, had multiple producers and were difficult and expensive to penetrate. Producers knew it was almost impossible to gain market share by squeezing an old plant out of the market. Older plants remained competitive because they were fully depreciated and paid for. Producers saw no way to gain enough market share to allow a large modern plant to run at utilization rates where margins would be sufficient to recover capital costs and earn acceptable profit rates. Unable to profit in markets crowded with numerous small plants, producers were reluctant to commit the necessary capital. Small producers, largely prohibited from selling out to existing producers, carried on as long as possible. Their situation was terminal, but in the short term, they could ruin the market.

The FTC had determined that regional markets were already "oligopolistically structured" and operated such that "firms cannot establish policies without reference to the practices of specific competitors" [FTC, 1966, p. 87]. The FTC, in its determination to maintain as many competitors in each regional market as possible, opposed mergers where a producer would have more than 30 percent of a market. This rule was taken from a Supreme Court case concerning the banking industry [FTC, 1966, pp. 75-6]. The 30 percent rule was applied to all industries and did not take account of how many other

[8] Labor productivity rose only 3% between 1970 and 1980; between 1960-1970 the increase was 61%.

producers there were in a particular market.[9] There was no provision for differentiating industry by capital intensity or scale economies.

Technological Change and Scale Economies

The low rate of investment and the decline in plant building in the cement industry beginning in the late 1960s slowed the introduction of new technology. New production technologies made possible much larger and more efficient plants, but producers, unable to consolidate markets and reap the benefits of scale economies, were not building new plants. With slow capacity growth and low investment levels, innovation in production technology lagged among U.S. equipment suppliers. New production technology was increasingly coming from overseas, with domestic equipment suppliers operating under licenses to European and Japanese firms [Colson, 1980, p. 195].

New production technologies that allowed much larger and efficient plants raised the issue of foregoing greater efficiency for the sake of maintaining competition. The conflict between scale economies and market concentration was explored in a paper by a U.S. academic economist in 1993. The paper acknowledged significant scale economies but worried, like the FTC, that greater concentration would allow producers to extract more than competitive returns [Rosenbaum, 1994, pp. 379-92]. The study claims that producers were able to appropriate 30 percent of the efficiency savings from larger plants because of increased concentration, although no mechanism is specified. There is, however, only scant recognition of the large gains that accrued to consumers. Without the investment in new plants, production costs and prices would have been significantly higher. Producers, according to this study, profited more than theoretical models predict they should, but there is no mention of absolute rates of return for the industry. Industry profits during this period averaged only about 10%, hardly extraordinary returns. Instead of worrying about the hypothetical dangers of increased concentration levels, one might look for ways to increase investment in larger cement plants. Furthermore, industry profit levels were more closely related to demand conditions than to concentration levels.

The concern with regional concentration levels by the FTC and academic economists ignores the growing globalization of cement markets and the role of imports during the 1970s and 1980s. As imports became a large force in many markets during this period, the ability of domestic producers to influence prices declined. With the development of independent import facilities and direct importing by large customers, domestic producers lost the

[9] The 30% rule came from Justice William J. Brennan's decision in the U.S. vs. Philadelphia National Bank, June 17, 1963. Brennan stated: "Without attempting to specify the smallest market share considered to threaten undue concentration, we are clear that 30 percent presents that threat" [374 U.S. at 364].

potential to extract extraordinary margins, even during construction sector upswings. In the mid-1980s, domestic producers were operating at full capacity but were still unable to stem the dramatic, decade-long fall in prices. As U.S. cement markets were increasingly integrated into global markets, the ability to set prices based on regional market structure was significantly weakened.

The Structure of Foreign Industries

The Canadian cement industry, operating under very different antitrust rules, is consolidated both horizontally and vertically. The top three producers are foreign-owned and control over 75% of productive capacity. In 1963 average plant sizes were similar to those in the United States, but by 1975 Canadian plants were, on average, 15% larger. Plants were newer and used more modern technology and the Canadian industry was quicker to move to more energy-efficient production technologies after the 1973 energy crises [Aranoff, 1975, pp. 86-94]. Canada opted for fewer competitors and in return got large, modern, efficient plants [Nisbet & Skehill, 1986, p. 6].

A U.S. academic economist looking at the Canadian industry in 1993 saw the foreign ownership, high levels of concentration, and "more disciplined" pricing as a negative situation. His conclusion was that public policy in the U.S. should be aimed at stopping further concentration lest they end up like the Canadians [Allen, 1993, pp. 697-715]. What is not mentioned is that Canadian plants have successfully pushed large amounts of cement into U.S. markets for years. Canadian producers, with large-scale plants located on deep-water ports and extensive distribution networks, are able to dominate some U.S. markets. If domestic Canadian cement prices were significantly above those of their exports, U.S. producers would be shipping large quantities across the northern border or filing anti-dumping suits, neither of which happened.[10]

European cement industries are even more concentrated than Canada's. Markets are highly concentrated horizontally, and in most cases vertically as well. Explicit pricing agreements have long existed, although these have been under attack by the European Union in recent years. Oligopolistic industry structure has not meant stagnation. By and large, plants in Europe are large, modern, and technologically advanced with several countries exporting large quantities to the United States.

Europe is the home base for the largest cement companies in the world. Blue Circle, Holderbank, and Lafarge are global companies, and they are much larger, with far greater resources, than any U.S. company. They have tremendous in-house resources for plant construction, plant management, marketing, R&D, and capital formation. Consolidated and integrated markets have not ruined the competitiveness of Canadian and European producers who bought up much of the fragmented and failing U.S. industry in the 1980s. In the 1990s,

[10] Canada was the only major importer not included in a wide-ranging anti-dumping suit filed in 1986.

Mexico's largest producer Cemex is following this model, and is now a multinational producer with plants in the United States, Europe, and South America.

Conclusion

The FTC's antitrust policy of actively maintaining horizontal fragmentation was not the best way to long-term productive or allocative efficiency in the cement industry. Regulation focused on maintaining multiple producers competing in proscribed regional markets ignores technological possibilities, the globalization of cement markets, and the advantages held by large firms in capital intensive industries. As Joseph Schumpeter warned almost fifty years ago, "perfect competition is not only impossible but inferior, and has no title to being set up as a model of ideal efficiency. It is hence a mistake to base the theory of government regulation of industry on the principle that big business should be made to work as the respective industry would work in perfect competition" [Schumpeter, 1950, p. 106]. In the end, classical economic theory would argue in favor of multiple producers and greater competition while historical comparisons favor greater concentration for the cement industry.

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