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case

Strategic Capacity Preemption: DuPont (Titanium Dioxide) (1980)

Douglas C. Dobson, William G. Shepherd, and
Robert D. Stoner

Introduction

Market (or monopoly) power—its creation and maintenance—long have been of central antitrust concern. Certain acts, when undertaken by a firm with market power, are generally viewed as anticompetitive and, accordingly, challenged. Conduct unlikely to lead to the creation or maintenance of monopoly power is usually viewed as unassailable. There is, however, a significant gray area of conduct that, while not necessarily anticompetitive on its face, can in certain circumstances lead to the creation of durable market power.

Concern over the latter category of conduct led the Federal Trade Commission (FTC) in 1978 to challenge E. I. DuPont de Nemour's (DuPont's) alleged monopolizing behavior in the titanium dioxide industry. Following a fifteen-month staff investigation, the FTC issued a complaint in April 1978, charging DuPont with an attempt to monopolize the United States titanium dioxide market. Adjudicative hearings within the FTC began in December of that year and concluded in March of 1979. On August 31, 1979, the FTC's administrative law judge issued his opinion acquitting DuPont. The FTC's complaint counsel appealed the dismissal of the complaint to the full Commission, which unanimously affirmed the dismissal in an opinion dated October 20, 1980.¹

The *DuPont* lawsuit still represents the most significant attempt to grapple with the important antitrust issue of how to treat strategic conduct that, while on its face unobjectionable, nevertheless is likely to produce enduring market power. The Commission decided that DuPont's particular

Douglas C. Dobson and Robert D. Stoner were significantly involved in the development of the economic analysis underlying the government's antitrust case against DuPont; William G. Shepherd prepared and presented expert testimony in support of the government's case. The authors acknowledge their gratitude to A. Michael Spence and Richard J. Gilbert for their helpful insights during the course of the case theory development. The opinions expressed by the authors are their own; they do not necessarily represent the view of the Federal Trade Commission or any individual commissioner.

strategy, applied to the specific facts of the titanium dioxide industry, did not constitute monopolizing conduct. Left unclear, however, was to what extent and under what conditions other similar behavior that would likely produce durable market power would be cognizable as (attempted or actual) monopolization. In that sense, the core legal and economic issues raised by the case are still unresolved today and have been the subject of recent published studies to test their validity.²

DuPont's Strategy

The *DuPont* case is unique in that there was virtually no disagreement about the "facts" surrounding DuPont's adoption of a strategy that would give it a dominant position in the U.S. titanium dioxide industry. This section will lay out the factual context on which both parties basically agreed. The succeeding sections will present contrasting FTC and DuPont interpretations of that factual predicate, and the outlines of the Commission decision. The final sections will discuss the antitrust policy dilemmas posed by the case and developments since the *DuPont* decision.

Historical Background

Titanium dioxide (TiO₂) is a white chemical pigment employed in the manufacture of paint, paper, and other products to make them whiter or opaque. Prior to the 1950s, all titanium dioxide was produced using a batch "sulfate" process that involves the reaction of sulfuric acid with relatively low-grade titanium feedstocks (principally, ilmenite ore). DuPont, which had entered the industry in 1931 by acquisition, had become aware by the early 1940s of the possibility of producing a superior product and avoiding several problems with the sulfate process through chlorination of titanium-bearing ores. In 1941, DuPont began laboratory development on the commercialization of its "chloride" process. Although this process could use ores of various grades, DuPont's chemical engineers focused on using lower-grade ilmenite ore because very little higher-grade rutile ore was available at this time and because DuPont had access to large captive reserves of ilmenite. Actually, ilmenite had several disadvantages relative to rutile. Perhaps most importantly, the technology to separate out waste materials from the low-grade ore necessitated the development of a complex and costly continuous process that could be learned only through experimentation at large-scale production volumes. Nevertheless, the unavailability of commercial quantities of rutile at this time precluded

alternative approaches. DuPont began experimentation with its proprietary ilmenite chloride process in a small pilot plant in 1944 and, through several years of learning-by-doing at progressively larger plants, began successful operation of a 35,000-ton/year plant at Edge Moor, Delaware, in 1951.

The 1950s were stable and profitable years for the titanium dioxide industry. In 1958, DuPont opened a second ilmenite chloride plant in New Johnsonville, Tennessee, with an initial capacity to produce 45,000 tons of titanium dioxide per year. As DuPont learned to operate the facility at increasingly larger scales, the Tennessee plant was incrementally expanded until it reached an annual capacity of 100,000 tons in 1964. Meanwhile, all the remaining titanium dioxide continued to be produced with the sulfate process (including the output from two small DuPont plants located in Delaware and California). DuPont realized a significant cost advantage at New Johnsonville because of economies of large scale attributable to the continuous chloride process.

Not surprisingly, competitors of DuPont began to develop their own chlorination processes in the late 1950s and early 1960s. However, feedstock circumstances had changed significantly since DuPont's development of the ilmenite chloride process twenty years earlier. Large quantities of higher-grade rutile ore had been discovered in the beach sands of Australia, thus providing DuPont's rivals with the option of developing a chlorine process using rutile instead of ilmenite ore. For a number of reasons, especially the more difficult chemistry of utilizing ilmenite ore at large scales and the lower capital costs associated with investment in rutile chloride capacity, all of DuPont's competitors chose to pursue the rutile chloride process route. Even DuPont itself believed that rutile was the preferable feedstock alternative during the 1960s and built a 25,000-ton plant in 1963 in Antioch, California, with the capability to utilize only rutile ore. By 1970, seven of DuPont's eight domestic competitors had started up rutile chloride plants. In that year, 43 percent of total domestic TiO₂ capacity consisted of chloride capacity.

At the relative ore prices that prevailed throughout most of the 1960s, DuPont's ilmenite (or "special chloride") production cost advantage over its competitors with new investments in rutile (or "regular chloride") plants was only moderate and based largely on scale economies and DuPont's greater experience and know-how accumulated from its two decades of chlorinating titaniferous ores. Under expected circumstances, competitors would have continued to gain experience with their rutile plants, would have expanded them to optimal scale to incorporate learning effects in this growing market, and would have presumably eventually attained production cost parity with DuPont.

Around 1970, there was an unanticipated sudden decrease in the supply of rutile ore. After remaining very stable throughout the 1960s, the

price of rutile ore doubled and then tripled in the early and middle 1970s. As the price of ilmenite ore remained stable while that of rutile skyrocketed, DuPont's ilmenite-based chloride process suddenly gained a significantly increased cost advantage over its rivals. At 1972 relative ore prices, it has been estimated that DuPont's ilmenite plant costs averaged 44 percent less than those of its competitors' rutile plants. By contrast, at 1968 relative ore prices, the DuPont ilmenite process cost advantage was determined to be only 22 percent.³ As a consequence of this long-term shift in relative ore prices, the future of the rutile chloride process for producing titanium dioxide became bleak. At the same time, remaining sulfate capacity was facing much stricter environmental regulations that threatened its existence. By DuPont's own admissions, the company had unexpectedly and suddenly come to possess a significant capital and operating cost advantage over all of its rivals.

Adoption of the "Growth Strategy"

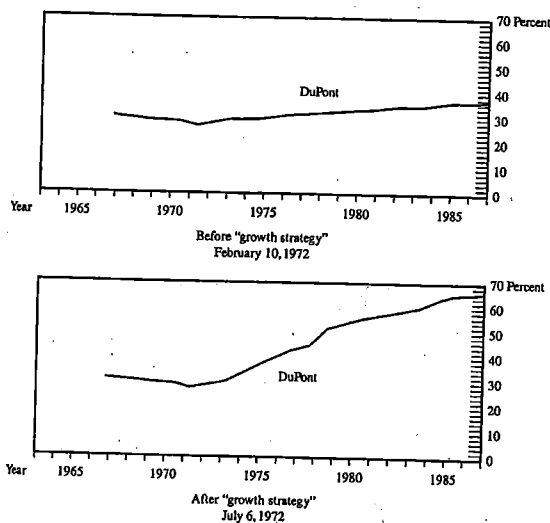
At first, the management of DuPont's Pigments Division continued to advocate a program of only modest capacity expansion despite the company's significant cost advantage. Pricing policy under this so-called maintain-market-share strategy would maintain prices, except to cover inflation, until 1986. Under this strategy, DuPont's share of domestic TiO_2 capacity would increase from 30 percent in 1972 to a projected 37 percent by 1985, principally because of the displacement of sulfate process capacity forced to exit by tougher environmental controls. Large-scale chloride expansions by rivals were anticipated, with competitors beginning to move down the ilmenite chloride process learning curve.

As DuPont became increasingly aware of its advantageous, competitive position, an internal Task Force was formed to consider ways to improve performance of the Pigments Group. In May of 1972, DuPont significantly altered its long-range strategic plan for participation in the domestic titanium dioxide business. In a report to DuPont's Executive Committee, the head of the Pigments Division advocated a policy of aggressive expansion designed to satisfy virtually all the forecast growth in market demand for TiO_2 during the 1970s. In this scenario, DuPont projected its market share would reach 56 percent by 1980 and perhaps 65 percent by 1985. Significantly, no change in market conditions had occurred to justify the proposed strategic change in direction away from the more moderate "maintain market share" strategy that had been adopted just three months earlier. A comparison of DuPont's market share projections under the alternative strategies is presented in Figure 6-1.

This revised strategic plan, described within DuPont as the "growth" or "aggressive" strategy, involved the building of a large new multiline chloride plant (at a site to be determined) and substantial expansions of the existing chloride plants at Edge Moor and New Johnsonville. Notably, as originally conceived, DuPont's "growth strategy" did not contemplate taking existing sales away from rival TiO_2 producers. The initial plan was simply to capture the forecast growth in demand.

The "growth strategy" was most specifically elaborated in 1975, when the titanium dioxide Task Force presented arguments to the Executive Committee during the course of a major reevaluation of the company's

Figure 6-1



capital spending plans. General economic recession and slumping TiO_2 sales that year had raised doubts about the wisdom of proceeding to build a large new chloride plant in DeLisle, Mississippi, the construction of which had been announced the previous year. In support of continuing to construct DeLisle for late-1970s start-up, the Task Force expressly argued that the "growth strategy" was premised on discouragement of competitive expansion. Preemption of competitive expansion was necessary if DuPont was to maintain its temporal cost advantage and establish a dominant market position by capturing virtually all future growth in TiO_2 demand.

The titanium dioxide Task Force developed two alternative ten-year business strategies: One called for the completion of DeLisle and growth to a 60-percent market share (the "growth" plan); the other would delay new plant construction until 1985 and maintain a market share of 43 percent (the "maintain" plan). In support of its recommendations, the Task Force made a number of calculations and evaluations of the comparative impacts of the alternative plans. The group made estimates of several interesting limit prices, including the prices that would trigger competitive expansion, increased imports, switching to substitutes, and the exit of rivals. It was the express pricing objective of the Task Force under the "growth strategy" to price as high as possible to generate funds for internal capacity expansion without encouraging major competitive expansion or foreign entry. By contrast, the "maintain market share" strategy anticipated balancing profitability with limited competitive expansion and foreign entry. Comparative long-range projections of price and profitability under the alternative strategies showed lower TiO_2 prices under the "growth strategy" than under the "maintain market share" plan until 1981. Thereafter, prices under the "growth strategy" were estimated to be significantly higher than those under the alternative plan because the higher level of competitors' costs, combined with DuPont's growing market position, gave DuPont pricing flexibility. The Task Force's calculations show that DuPont would earn more by pursuing the competitive capacity preemption strategy.

The FTC's Case

The essence of the FTC's case against DuPont was that DuPont, by undertaking the "growth strategy," had knowingly adopted a combination of practices with the purpose and effect of preempting competitive expansion so that DuPont could achieve a position of long-run monopoly power in the domestic titanium dioxide industry. The central thrust of the strategy was alleged to be the limitation of the ability of competitors to gain the experience with low-cost chemical process technology necessary for them to remain competitive. As a result, claimed the government, DuPont intention-

ally converted an otherwise temporary and previously unanticipated production cost advantage into an emerging position of persistent market dominance.

Learning by Doing and Investment Asymmetry

The successful implementation of DuPont's preemptive strategy was predicated on the importance of learning by experience in producing TiO_2 with a continuous chloride process using low-grade ilmenite ore. Only by gaining experience by producing greater cumulative output at larger scales of operation could competitors lower their average cost of production to the level attained by DuPont from years of developing such large-scale technical know-how. Actual learning by operating large ilmenite chloride plants was necessary to replicate DuPont's experience and match its productive efficiency. For example, DuPont officials calculated that TiO_2 prices would be 2-4 cents/lb. higher after 1985 if competitors were denied the opportunity to lower their costs through experience.⁴ Neither increasing investment in research and development nor operating small-scale pilot plants could provide rivals with the experience required to "move down the learning cost curve."⁵

Changes in raw material availability and environmental regulations placed DuPont's competitors in the disadvantageous position that, simply to remain competitively viable, they had to build and learn to operate large-scale chloride process plants using ilmenite ore. Consequently, an investment asymmetry between DuPont and its rival TiO_2 producers resulted.⁶ Given the substantial production cost difference that had occurred, the opportunities for profitable investment in new TiO_2 capacity had become increasingly divergent for DuPont and its competitors. Moreover, uncertainty about the future price and availability of titaniferous ores exacerbated the investment asymmetry, both because there was great concern that rutile would not be commercially accessible and because, even if available, the cost of rutile ore constitutes a much higher percentage of total cost for users of this higher-grade feedstock.

Central to the effective implementation of the "growth strategy" was the maintenance of DuPont's cost advantage. DuPont recognized that its cost advantage was temporary and would likely be eroded over time as competitors invested in large-scale chloride expansions and gained experience in utilizing low-grade ilmenite ore. Consequently, if its cost advantage were to be maintained, DuPont had to discourage expansion and learning by its competitors. To this end, the government contended that DuPont had adopted its "growth strategy" with the primary goal to prevent competitor expansion.

Elements of DuPont's "Growth Strategy"

The "growth strategy" as characterized by the FTC had three principal elements, discussed in more detail below. First, DuPont's pricing policy was developed and implemented with the objective of preempting competitive expansion. Second, DuPont formulated, announced, and timed its own capacity expansions with capacity preemption in mind. Finally, DuPont spurned potential domestic licensing of its special chloride process, in furtherance of maintaining its cost advantage and establishing its long-run market dominance. Yet, it was not any of these practices, viewed separately, that formed the basis for complaint counsel's objection. Rather, it was the "unreasonably exclusionary" effect of the several elements, considered together, that was claimed to constitute monopolizing behavior.

The Pricing Element Complaint counsel contended that DuPont strategically developed a pricing policy that would maintain prices at levels high enough to generate funds for DuPont's own internal expansion, yet not so high that competitors would find it profitable to expand their capacities to produce titanium dioxide. Within a month of the Executive Committee approval of an aggressive redirection of strategy, the head of DuPont's marketing division identified reducing competitors' incentives for expansion as a basis for recommending that DuPont not follow a price increase announced by an expansion-minded competitor.⁷ The express objective of establishing asymmetrical capital investment incentives and opportunities had clearly become evident in DuPont's planning documents, beginning with those prepared by the titanium dioxide Task Force in 1975. DuPont forced other full or partial price rollbacks in early 1975, 1976, 1977, and 1978. By contrast, during the height of the recession in mid-1975, DuPont led a price increase to maintain industry profitability in the face of significant industrywide excess capacity.

Practically, the FTC had little difficulty establishing through DuPont's documentary admissions that a strategic pricing policy had been adopted by 1975. More formidable was explaining how the various pricing changes that actually occurred during the mid-1970s represented the implementation of the stated strategic pricing objective. Variations in market forces—particularly, shortage conditions in 1972, a recession in 1975 that required significant revisions in demand forecasts, generally tight industry capacity at other times during the remaining years of the 1972–1977 period under antitrust scrutiny, and cost inflation due to increased raw material prices—complicated the showing that DuPont set prices so as to make investment in new capacity feasible for itself while simultaneously unattractive to its rivals.

Complaint counsel contended that DuPont's pricing behavior throughout the 1970s intentionally furthered the company's objective of preempting rival capacity expansion despite the confounding influence of external market forces. While acknowledging the complexity of sorting out the many forces operating on TiO_2 price formation, the government's central argument was that DuPont used its increasing control over price to prevent prices from rising to competitive levels (in 1972, early 1975, 1976, 1977, and 1978) and from falling to competitive levels (in mid-1975). By pricing below levels that would trigger competitive expansion yet at high enough levels to fund its own expansion plans, DuPont arguably employed its temporal cost advantage to create a de facto capital investment asymmetry that would permit DuPont to capture all future growth in demand.

The Capacity Expansion Element It was complaint counsel's contention that DuPont strategically announced its intentions to build new capacity in order to inhibit competitive expansion and that DuPont actually constructed and brought new capacity on stream prematurely to place competitors in a tenuous (if not untenable) expansion position. Prior to the adoption of its "growth strategy" in mid-1972, DuPont had finalized rather modest expansion plans, as indicated above. As of February 1972, DuPont officials believed that the planned capacity changes would provide them with sufficient capacity through 1981 to meet their strategic objectives. However, with the adoption of DuPont's aggressive "growth strategy" in May of 1972, a very different plant capacity configuration was planned for the coming decade—with major expansions of existing plants and the building of a large new (and subsequently expandable) special process chloride plant at an unspecified site that would become the DeLisle facility. DuPont's internal documents clearly indicate that the company's strategic planners believed that such aggressive expansion by DuPont would discourage competitive expansion and that announcements of these plans had actually preempted rival expansion.⁸

Whether DuPont announced its expansion plans early or prematurely (i.e., prior to gaining full authorization to proceed) turned out to be difficult to document. Determining whether the actual announcements adversely affected its rivals' incentives to expand was more easily established by reference to DuPont documents and to the fact that no significant rival expansion had occurred since 1970. The construction of DeLisle, though planned in 1972, was not announced until mid-1974, when funds were first authorized for preliminary engineering design study. Complaint counsel argued that the public announcements accompanying the initial DeLisle spending authorizations were exaggerated and premature. By signaling competitors that DuPont intended to have sufficient capacity in place to capture all growth in domestic TiO_2 demand well into the 1980s before

the company had committed the capital funds to finance the announced expansions, the government complained that DuPont misleadingly discouraged competitive expansion.

More important to the government's capacity preemption argument than the impact of expansion announcements was the effect of DuPont's timing of its capacity expansions, especially DeLisle. The sharp business downturn in 1975 occasioned a reconsideration within DuPont of the timing of DeLisle's actual construction and start-up target date. The DuPont Pigments Department, despite acknowledged cash flow savings from delay, fought vigorously to keep the DeLisle project on its initial schedule so that competitors' expansion would be discouraged. The "early" construction of DeLisle made rational business sense only when the strategic value of competitor capacity preemption was considered in the calculation of the expected long-run rate of return on investment. Thus, it was determined to proceed with the construction of DeLisle as initially planned, despite the acknowledgment that the completed facility might have to be held in readiness for operation beyond its originally conceived start-up date until market conditions had sufficiently improved.⁹

The Refusal-to-License Element DuPont strictly adhered to a policy of not licensing the use of its proprietary chloride technology for domestic production, even though it was willing to license the ilmenite chloride process to foreign producers¹⁰ and had previously licensed its rutile chloride process to Sherwin Williams in 1970. For example, NL Industries, totally reliant on environmentally undesirable sulfate capacity, was rebuffed in 1974 in its efforts to gain access to DuPont's special chloride process.

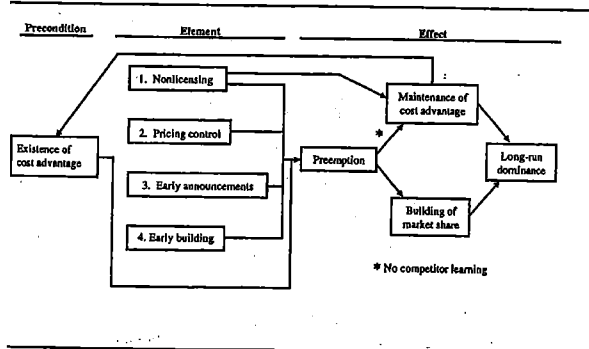
Complaint counsel considered nonlicensing to be an integral part of DuPont's strategic course of conduct to preempt capacity expansion by rivals. Licensing the technology, even at handsome royalty rates, would have ultimately enabled rivals to learn how to operate large-scale ilmenite plants and erode DuPont's emerging market dominance. Thus, the FTC alleged that licensing would have shortened the learning period and gradually eliminated the capital investment asymmetry between DuPont and its rivals.

The Strategic Elements Combined The government readily acknowledged that none of the individual elements of DuPont's growth strategy, standing alone, was unlawful. DuPont's pricing to limit competitive expansion did not constitute predatory pricing; the "early" announcement and timing of capacity expansions by DuPont were not unfair practices; and DuPont's refusal to license its special chloride process was not

independently objectionable. Rather, the FTC maintained that it was the *interdependent effect* of the elements that made the combined course of strategic conduct cognizable as monopolizing behavior.

A simple diagram can show how the various elements of DuPont's growth strategy fit together to permit DuPont to achieve a position of long-run market dominance. Figure 6-2 depicts how the DuPont strategy worked to maintain the company's initial cost advantage through preemption of competitive capacity expansion.¹¹ Absent the strategy, the cost advantage likely would be temporary and would disappear as a result of competitor learning before DuPont could establish a dominant market position. However, by combining the elements of its strategy to capture all growth in demand with its basic cost advantage, DuPont was able to preempt competitive expansion and thus prevent the competitor learning necessary to eliminate the cost asymmetry. Preemption of competitive expansion allowed DuPont to build its market share and establish a dominant market position secure from future erosion as long as it maintained its cost advantage. The process would be self-perpetuating, for each increment of expansion exclusively by DuPont denied rivals the opportunity to gain the experience necessary to achieve cost parity and allow them to challenge DuPont's increasing dominance.

Figure 6-2



Competitive Consequences

The FTC believed a number of anticompetitive effects could be attributed to the adoption of DuPont's strategic course of preemptive conduct. These included DuPont's achievement of persistent market dominance and adverse economic welfare effects.

DuPont Would Achieve Persistent Market Dominance

DuPont's strategy was allowing it to achieve a position of market dominance that was likely to be persistent. Despite the failure of demand growth to materialize as forecast and the continued production of sulfate plants that had been expected to exit, DuPont had nevertheless increased its share of domestic capacity to 41 percent by 1977 and was then projecting further share growth to an estimated 55 percent in 1981, when the DeLisle plant would become fully operational.¹² Future expansion of DeLisle, which was incorporated in the plant design, and the feasibility of further expansion of the New Johnsonville facility positioned DuPont to control well over 60 percent of productive capacity in the early 1990s.¹³

More important, DuPont's preemptive strategy was working: No competitive expansion occurred during the period under antitrust scrutiny. Only DuPont increased domestic TiO₂ capacity during the 1970s,¹⁴ more than doubling its capacity with the addition of 270,000 tons per year of low-cost ilmenite chloride capacity.¹⁵ DuPont's estimated initial cost advantage over competitors of 30-40 percent in 1972 had largely been maintained by the successful preemption of competitive expansion and learning; the advantage was estimated in 1978 to be in the range of 20-30 percent and was expected to increase markedly between 1978 and 1987.¹⁶

Definitive prediction of DuPont's long-run dominance also required an assessment of the possibility that DuPont's special ilmenite chloride process would lose its relative cost advantage over other current technologies or new technologies that might supplant the ilmenite process. The major existing rival chloride processes (high-grade technologies using costly rutile or beneficiated ilmenite ores) showed little future promise of cost-competitiveness with DuPont's low-grade ilmenite process. No novel experimental technologies presented any greater threat to the maintenance of DuPont's cost advantage.¹⁷ DuPont's growth strategy appeared very likely to succeed in creating a long-run dominant position not foreseeably erodible by unassisted market forces.

Adverse Economic Welfare Effects The FTC did not object to DuPont's growth strategy simply because DuPont's market share would

increase substantially as a consequence of its implementation. Rather, complaint counsel argued that DuPont's challenged course of conduct constituted unlawful monopolizing behavior because the behavior would have the *net effect* of harming long-run competition in the domestic market for titanium dioxide. DuPont's own documents indicated that adoption of the "growth strategy" would confer sufficient pricing control upon DuPont that TiO₂ prices would be higher after 1981 until at least 1992 than if DuPont stayed the pre-1972 course with a "maintain market share" strategy.¹⁸ Prices from 1975 through 1980 would be lower under the more aggressive growth strategy as DuPont priced to limit competitive expansion until its dominance became firmly established with the completion of its large new plant at DeLisle. Thereafter, DuPont would be able to control price at a higher level than if competitive expansion had not been thwarted because DuPont's pricing strategy keyed market prices to competitors' (still-elevated) costs.

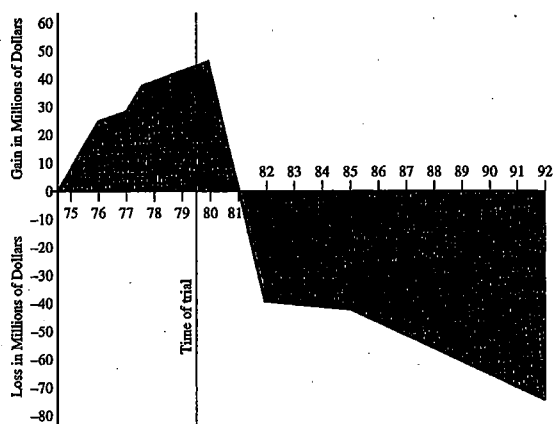
Using DuPont's own internal analyses of the prices and sales that were forecast to prevail under the alternative strategic scenarios over the period 1975 through 1992, the government prepared a "welfare analysis" showing that, on balance, economic welfare would be adversely affected by DuPont's adoption of the strategic plan to preempt competitive expansion. The market prices that DuPont expected to prevail under the alternative strategic plans were weighted by the total projected TiO₂ pigments sales for each of the years from 1975 through 1992, and the customer pigments costs under the two strategic plans were compared. The exercise showed that an undiscounted net loss to consumers of more than \$387 million would result from adoption of the "growth strategy" by 1992. (Discounting would have changed the magnitude but not the basic thrust of the loss calculation.) The differential impact of DuPont's "growth strategy" on TiO₂ pigments costs to customers is pictorially displayed in Figure 6-3.

Complaint counsel argued that DuPont would not have charged lower prices and sacrificed short-run profits under its growth strategy without expecting to reap a greater long-run payoff through higher prices made possible by the preemptive effect of that strategy. The knowing sacrifice of near-term profits only made sense, in the government's view, if DuPont believed its preemptive strategy would enable recoupment of those "losses" by realizing future monopoly "gains" made feasible by adoption of that strategy.

Proposed Remedy

The relief sought by the government included mandatory licensing of technology by DuPont and partial divestiture of DuPont's TiO₂ facilities. Both

Figure 6-3



elements of the proposed remedy were argued to be necessary to undo the exclusionary effects of DuPont's "growth strategy" and to restore workable competition to the present and future domestic titanium dioxide market.

Royalty-Free Licensing The DuPont "growth strategy" was premised on maintenance of DuPont's production cost advantage. The FTC argued that mandatory licensing would contribute to bringing the benefits of the superior DuPont technology to the market at large. In addition, licensing of DuPont's special chloride process would break the cycle of continuous preemption that the "growth strategy" had fostered. With mandatory licensing, competitors would no longer have to overcome a learning-related cost advantage in order to justify investment in capacity expansion. Under these circumstances DuPont's "growth strategy" would become unworkable.

The FTC maintained that royalty-free licensing would be preferable to licensing with royalties. Licensing, even with nominal royalty fees, might restore opportunities for some competitive expansion. However, it would not be nearly as effective as royalty-free licensing in upsetting the preemp-

tive effects of DuPont's strategic behavior because it would permit DuPont to maintain a relative cost advantage over its rivals.

Plant Divestiture Complaint counsel claimed that licensing alone, even without royalties, would not suffice to restore competition to the domestic TiO_2 market. Slowed projected demand growth during the 1980s would present few opportunities for competitive expansion, even if a royalty-free license to use DuPont's technology could be obtained. DuPont's emergent dominance was also shielded from competitive erosion by the slow pace of technological evolution characteristic of the industry that would inhibit competitive challenge of DuPont's newly established leadership position.

DuPont, argued the FTC, had already succeeded in establishing a position of market dominance that would become increasingly resistant to competitive challenge even if DuPont were to discontinue its preemptive course of conduct. Consequently, injunction of the continued implementation of DuPont's "growth strategy" would neither prevent further accretion of DuPont's market power nor undo the anticompetitive structural changes that had already occurred. Restoration of competitive forces to challenge DuPont's market position required that DuPont's fortuitously acquired cost position be readily attainable by its actual and potential rivals in a market setting in which no firm could exercise independent pricing control.

Anticipating the objection that ordering royalty-free licensing and partial divestiture would penalize success and discourage progressive efforts, complaint counsel argued that the proposed remedy would not be punitive or inhibitory. The relief would apply only to DuPont's strategic business conduct since 1972, having no effect on the legitimate rewards from innovation that occurred previously or on the uncontrived aggressive competition and invention that might occur in the future.

DuPont's Defense

DuPont's defense was as simple and direct as its "growth strategy" was complex and intricate. DuPont's central contentions were (1) yes, the events described by complaint counsel occurred pretty much as stated; but (2) the challenged conduct was motivated by legitimate business goals, not by any intent to harm competition; and (3) in any event, DuPont should be lauded for its innovation and productive efficiency, not subjected to damaging regulatory interference in its aggressive business conduct.

DuPont did little to dispute most of the basic "facts" as presented by complaint counsel. Over the period 1970 through 1977, TiO_2 prices changed and capacity expansions occurred as described by the government; DuPont acknowledged its lack of interest in licensing its ilmenite chloride

process to domestic competitors. Instead, respondent's counsel principally objected to complaint counsel's characterization of those "facts" as representative of a specific monopolizing intent by DuPont or as constituting the anticompetitive conduct cognizable as monopolizing behavior under prevailing Sherman Act Section 2 case law.

DuPont's argument on the "facts" began with the "lower-level" defense. According to DuPont's counsel, the titanium dioxide Task Force that meticulously prepared the alternative "growth" and "maintain market share" strategic planning analyses was initially portrayed as comprising rogue lower-level employees whose imaginations had run wild. However, when DuPont's own internal documents were shown to indicate the substantial reliance of DuPont's senior executives on the work product of the task force in establishing pricing and expansion policies, this line of defense was effectively abandoned.

Much more effective were respondent's arguments that DuPont's actual business conduct was consistent with legitimate business purposes. Competitor exclusion, to the extent it even occurred, was merely incidental to DuPont's independent pursuit of its own valid business objectives. Thus, DuPont went to some length to show that its pricing actions were dictated by market forces over which it had no control and that its expansion plans were consistent with meeting its own projections of demand growth without creating excess capacity for itself or other producers. With respect to its alleged refusal to license its superior technology for domestic production, DuPont simply claimed that it was its view that the company's stockholders were better served by internalizing that source of competitive advantage in the construction of additional DuPont capacity to produce titanium dioxide.

The principal factual dispute between the parties centered on the authenticity and practical business significance of the titanium dioxide Task Force computer printouts that were alleged to support the government's position that DuPont knowingly adopted its "growth strategy" with an awareness that TiO₂ prices would be higher after DeLisle came on stream. DuPont fought strenuously to counter evidence from DuPont's own contemporaneous documents that purportedly showed that DuPont's Executive Committee had relied on the projection of higher future prices when it embraced the "growth strategy" and later when it decided on the early construction of DeLisle. A central thrust of respondent's factual counterargument was that not only was any projection of prices more than a decade distant highly speculative but that the projection itself was flawed because the outer-year prices were merely extrapolations rather than analytically determined statistics.

The factual dispute over the relative prices implied by the alternative strategic planning models became, more generally, an argument over the credibility and relevancy of the "welfare analysis" conducted by the titanium dioxide Task Force and relied upon by complaint counsel as an

admission of respondent's state of mind in adopting and implementing its "growth strategy." DuPont's counsel, while not expressly rejecting the propriety of proper analysis to determine the long-term net economic cost of suspect strategic conduct, objected to its own staff's study as unduly speculative. Already, at the time that the trial took place, the basic assumptions of the welfare analysis had been undermined by an unanticipated slump in the growth of TiO₂ demand and the resulting establishment of market prices below projected levels. Yet, perhaps the most compelling "factual" contention of DuPont's counsel was that DuPont's behavior had indisputably been procompetitive to that point: Prices were lower than they would otherwise have been under the "maintain" alternative, and all industry capacity expansion employed the lowest-cost technology. Even complaint counsel's welfare analysis (see Figure 6-3) indicated that consumers had realized a total net gain in excess of \$100 million at the time of trial. In DuPont's view, a major leap of unwarranted faith was required to conclude that customer losses yet to occur over the decade 1982 through 1992 would more than offset gains still being realized by customers as the hearing and appeals process proceeded.

DuPont also emphatically denied that it built TiO₂ capacity in advance of demand as the FTC alleged. DuPont argued that the announcement of DeLisle before construction plans were finalized was necessitated to gain community support and government approval for the siting of such an uncommonly dirty plant. DuPont further maintained that it did not build DeLisle in advance of demand because, according to its capital budgeting documents, the plant could not be sold out within the acceptable three to four years from actual completion unless it was constructed as originally scheduled.

DuPont agreed that its challenged course of conduct should be evaluated within a "rule of reason" framework that weighed intent, effect, and actual conduct. Clearly, the near-term consequences of its behavior were beneficial to competition, and even complaint counsel conceded that the individual elements of DuPont's strategic course of conduct were not independently objectionable under the anticompetitive conduct standard established in earlier attempt to monopolize actions. While DuPont steadfastly maintained that it had no specific intent to monopolize the domestic titanium dioxide industry, the essential argument related less to intent than to effects and the merit of the conclusion urged by complaint counsel that a showing of anticompetitive effects properly permitted an inference of the requisite anticompetitive conduct. DuPont, of course, denied that its conduct would produce any harm to competition and was relentless in reminding the court that, to date, its challenged behavior had led to lower prices and greater production efficiency. On a more interpretive level, respondent's counsel argued that the mere awareness of a possibly harmful effect of DuPont's "growth strategy" does not, absent the specific showing of

anticompetitive conduct, indicate an illegal attempt to monopolize. In any event, DuPont denied its possession of any such credible awareness of the net effect of its plan to capture all future growth in domestic titanium dioxide demand.

Finally, DuPont's counsel sought to establish that its success was merited. It was the view of the company, testified to by its most senior executives, that DuPont had earned its current strategic advantage by engaging over an extensive period of time in costly process innovations for which it had never been properly compensated.¹⁹ Indisputedly, the short-run effect of its "growth strategy" had been to lower the prices and to increase the supply of efficiently produced titanium dioxide. The government, contended DuPont, was embarked on the overzealous folly of bringing an unprecedented "no-fault" (i.e., no required proof of bad conduct) attempt-to-monopolize case where otherwise beneficial behavior is transformed into anticompetitive conduct simply because the speculative end result of the behavior may be structural market dominance.

The Commission Decision

The 1979 decision of the administrative law judge (ALJ) basically agreed with complaint counsel as to the exclusionary effect of DuPont's strategy, but nonetheless found no "unfair" conduct upon which to formulate a law violation. In affirming the decision of the ALJ to dismiss the complaint against DuPont, the FTC directed its attention almost entirely to an evaluation of the "reasonableness" of the challenged course of conduct. The Commission was afforded the uncommon opportunity to focus its decision narrowly because there were no seriously contested issues relating to relevant market definition or even concerning DuPont's specific intent or its likely success in establishing a position of market dominance in the relevant market. Because the FTC's case relied so heavily on DuPont's own documents that laid out in great detail DuPont's strategic options, the Commission decision essentially involved reviewing the record and rendering its interpretation of whether the conduct was "unreasonable" or "anticompetitive" or "predatory," in the words of earlier decisions in attempt-to-monopolize cases. Writing for the Commission, Acting Chairman Clanton stated:

This case raises fundamental questions about the extent to which dominant firms may aggressively pursue competitive opportunities, especially where they enjoy some form of cost or technological advantage over their rivals. More specifically, the crucial issue facing us is not whether such firms may legitimately compete or

capitalize on their advantages, but whether those opportunities are exploited in an *unreasonable* fashion. . . . In the context of this case the question is not so much whether DuPont had the right to expand but whether it did so by measures that went beyond what were justified by its cost advantage.²⁰

The Commission basically chose to consider the legitimacy of DuPont's challenged course of conduct one element at a time rather than in its entirety and without reference to the net long-term effects of the dynamic behavior. The Commission thus rejected the analytical framework urged by complaint counsel. Since the government, in its briefs, had conceded that the individual elements of the "growth strategy" were unobjectionable when viewed separately and that even the combined course of conduct was inoffensive without reference to its net long-run economic effects, the outcome of the Commission decision became readily apparent once the traditional conduct-oriented approach to establishing antitrust liability was adopted.

Specifically, the Commission found that DuPont's (above-cost) pricing to preempt competitive expansion "may well have reflected short-term market conditions more than long-term strategic considerations."²¹ Additionally, the Commission opined that "even if DuPont's pricing can be characterized as a form of limit [strategic] pricing, we do not find it to be unreasonable, absent at least some evidence of below-cost pricing, in view of the firm's cost advantage, its market position and its legitimate expansion efforts."²²

With respect to the allegations of early announcement and timing of DuPont's expansions, the Commission concluded that "[t]here is no evidence that DuPont planned to build excess capacity or that its plans to fulfill the foreseen demand with new and expanded plants were inconsistent with scale economies."²³ Moreover, the Commission concluded that "[t]he rationality of DuPont's [expansion] program hardly seems dependent on its ability to extract monopoly profits in the future. Dupont had a highly efficient process, indeed the most efficient in the industry, and it anticipated expanding market demand. . . . Given respondent's level of efficiency, expansion of the magnitude undertaken would make sense, regardless of whether the firm would eventually be able to raise prices above competitive levels."²⁴

The Commission was similarly unpersuaded that the alleged refusal-to-license element of DuPont's "growth strategy" was unreasonable, considered either alone or in combination with the other elements. The advantage appears to have been legitimately acquired and, besides, there is no recognized duty for even an actual monopolist, much less an emergent one, to license or disclose its technological know-how to its rivals.

In short, the Commission concluded that the challenged course of strategic conduct was not unreasonable, whether or not it induced monopoly, because the behavior was consistent with legitimate business rationales. In the words of the Commission Opinion:

DuPont's actions may make future competitive expansion more difficult, but that *effect* is not the product of artificially induced conduct that is unrelated to market conditions, cost differences or scale economies.²⁵

Indeed, the essence of the competitive process is to induce firms to become more efficient and to pass the benefits of the efficiency along to consumers. That process would be ill-served by using antitrust to block hard, aggressive competition that is solidly based on efficiencies and growth opportunities, *even if* monopoly is a possible result.²⁶

In reaching the judgment that DuPont had not engaged in anticompetitive conduct, the Commission rejected complaint counsel's critical contention that DuPont's "growth strategy" was illegitimately founded upon a fortuitous and otherwise temporal cost advantage attributable to noncontemporaneous innovation. The Commission stated simply that

. . . it would be anomalous to downgrade the significance of DuPont's technological superiority simply because the fruits were not reaped simultaneously with the discovery of the process. . . . DuPont's development of an alternative supply source reflects the kind of skill and foresight that should be encouraged, whether the benefits materialize immediately or at some later date.²⁷

Finally, the Commission distinguished the TiO_2 fact situation from those involved in the few other preemption cases that had been decided. The Commission largely dismissed the relevancy of the landmark *Alcoa* case,²⁸ in which monopolization was found from embracing every competitive opportunity to expand in advance of rivals, because the *Alcoa* case was not an incipient attempted monopolization action and because the case did not indicate whether the monopolist's expansions were justified by scale economies or demand growth expectations.²⁹ A Fourth Circuit case involving expansion plans by the National Football League had found no attempt to monopolize because the expansion plans predated the aggrieved plaintiff's formation and were premised on legitimate, nonpreemptive rationales.³⁰ While the expansion plans of the National Hockey League were implicated in its monopolization conviction, the additional presence of unrelated offensive practices complicates evaluation of the precedential significance of this decision.³¹

Quite simply, the Commission opinion in the *DuPont* titanium dioxide case found DuPont's challenged course of strategic conduct to be reasonable. DuPont's conduct was consistent with its technological capabilities and the market opportunities that it faced.³²

The Antitrust Policy Dilemma: What Constitutes "Unreasonably Exclusionary" Monopolizing Behavior?

Throughout the course of antitrust enforcement of the laws against monopolization, the Commission and the courts have struggled to develop and refine a "rule of reason" analysis that would be used to determine the lawfulness of alleged monopolizing behavior. By the late 1970s it had become established law that proof of a charge of attempted monopolization required a showing of exclusionary or anticompetitive conduct by a firm having a "specific intent" to monopolize the defined market and that there was a "dangerous probability" that the firm would succeed.³³ The *DuPont* case presented an unusually clear fact pattern in which there was little doubt that DuPont intended to achieve a position of market power in the domestic titanium dioxide industry and that accomplishment of its strategic objective was well within its reach. The *DuPont* case, consequently, may be viewed as focusing rather clearly on whether certain strategic entry-detering behavior constituted unreasonably exclusionary conduct.

The Commission, as noted previously, indicated why it found the individual elements of the DuPont "growth strategy" to fall within the bounds of acceptable conduct. However, while the Commission thus determined that DuPont's strategic course of conduct was not "unreasonably exclusionary," the opinion provides little insight into where and how the line between acceptable and unacceptable behavior in furtherance of a dominant market position should generally be drawn.³⁴ The antitrust policy dilemma posed by the *DuPont* case is when, if ever, a purposeful pattern of effective strategic conduct should be considered to constitute unlawful behavior because it unreasonably excludes competition. Unfortunately, the case on appeal framed the issue of "unreasonable exclusion" in terms of the prevailing legal and economic standards governing the definition of "predatory" conduct rather than in reference to the conduct's net long-term effect on competition. Complaint counsel was charting new waters in this endeavor, attempting to establish that strategic entry-detering conduct should be considered "predatory" even though not calculated to destroy or drive rivals out of business, as the term had come to be legally interpreted. Rather, it was complaint counsel's more general contention that predatory

behavior "has the exclusionary goal of impairing the capacity of existing and potential rivals to compete effectively, thereby serving to build and maintain the predator's long run monopoly power."³⁵

Discussion of the *DuPont* case in terms of predation obfuscates the central enforcement issues presented. Instead, a better understanding of the antitrust policy questions raised by the case is gained by considering, more generally, the problem of monopolization and how the behavior has been treated under the evolving rule of reason analysis applicable to this offense. The Supreme Court's most recent extensive guidance on the offense of monopolization was expressed in its *Grinnell* decision,³⁶ which found that monopolization is not unlawful if attributable to "a superior product, business acumen, or historic accident."³⁷ A respectable body of authority would confine the applicability of these legally acceptable bases for monopolization only to those situations in which the firm's emerging or already-established market power is attributable to economies of scale (natural monopoly) or is still based on unexpired patents that were the original source of monopoly power.³⁸ All other monopolizing behavior that leads to the establishment of structural dominance that is relatively impervious to competitive erosion would be subjected to a rule-of-reason analysis to determine the net competitive effects of the challenged conduct and its amenability to efficacious remedy.³⁹

Oliver Williamson has been particularly critical of the traditional judicial interpretation of monopolization offenses for focusing on the presence or absence of predatory or exclusionary practices.⁴⁰ In his view, the usual approach implicitly assumes that competition works such that unassisted market forces will prevent the establishment of relatively secure positions of market dominance. A more realistic approach would acknowledge that dominant firm outcomes may result from market failures as well as from cost-based natural monopolies or superior product or process patent monopolies. Business acumen may sometimes be associated with superiority from earlier times that has since lapsed or may be due to the ineptitude of actual and potential rivals (so-called default failure). In addition, even when rivals have been performing competently, it is nevertheless also possible that market dominance could result from an unusual sequence of fortuitous events (so-called chance event failure). Moreover, to the extent that market dominance based upon business acumen and historic accident is sanctioned because competitive market performance will naturally be restored, the *Grinnell* doctrine may ignore the significance of nontrivial transactional advantages realized by the dominant firm, especially in a mature market such as titanium dioxide.

It is instructive to evaluate how DuPont's strategic course of conduct comports with the *Grinnell* defenses for establishing and perpetuating legitimate market dominance. Through the development and implementation of

sophisticated strategic planning, DuPont clearly intended to exploit a significant cost advantage into a position of market dominance. An unusual sequence of unanticipated events conferred a temporal cost advantage upon the production process predominately employed by DuPont to produce titanium dioxide. DuPont's cost advantage resulted from changed relative factor prices and from the learning-by-doing benefits achieved through innovative process engineering undertaken decades earlier and unprotected by patents at the time its "growth strategy" was adopted. Through its strategic course of conduct to capture all future growth in demand, DuPont expected to parlay its temporal cost advantage into a position of unassailable market dominance. Without funds to expand and capacity to embrace new sales opportunities in the growing TiO₂ market, competitors would not construct the costly new large-scale facilities required to gain the necessary experience to restore cost parity with DuPont and each other. DuPont's refusal to license its proprietary technology precluded the only other means available to competitors to move down the experience curve and eventually erode DuPont's market dominance.

Under the traditional conduct approach enunciated in *Grinnell*, DuPont arguably owed its emergent dominance to a superior process. Dupont, after all, did have unique technical know-how that was not easily replicable without retracing its arduous experimentation. Furthermore, business acumen was clearly exemplified by DuPont's solving the difficult chemical process engineering problems involved in using low-grade ilmenite ore in large-scale chloride plants. It is true that much of that learning was not contemporaneous and would have been of little competitive significance but for the fortuitous shortage of rutile ore. More aptly, although the argument was never put forward, the actual development and implementation of DuPont's "growth strategy" could itself be considered to involve considerable organizational and managerial skill. Finally, DuPont clearly was the lucky beneficiary of historical accident. While not anticipated, DuPont's strategically advantageous position was essentially "thrust upon" the firm, placing it in a situation that not unnaturally caused the company to rethink its strategic options. Thus, the traditional conduct-based judicial interpretation of the offense of monopolization, which is the law of the land to this day, vindicates DuPont's behavior.

Proponents of an "effects-based" rule-of-reason analysis might view the legitimacy of DuPont's strategic course of conduct differently. On the assumption that an effective remedy could be devised that did not chill legitimate competitive behavior, the question of liability in a strategic behavior case like *DuPont* arguably should focus on the net long-run welfare consequences of the structural dominance. A finding that the alleged conduct was about to establish a dominant market position unattributable to unexpired patents or economies of scale and unerodible by unassisted

market forces might then justify intervention and restructuring. The definition of behavioral impropriety and the quantification of its exclusionary degree would focus "on the objective characteristics of the challenged behavior in its market context."⁴¹ The requisite legal niceties of placing such a judgment within the parameters of current conduct-based case law could be accomplished by "characterizing" or "inferring that" the strategic course of conduct was "anticompetitive," "exclusionary," or "predatory" because it produced, on balance, anticompetitive effects.⁴² This was the fundamental position that complaint counsel argued unsuccessfully before the Commission. Nevertheless, despite its finding that DuPont's challenged course of conduct was consistent with "legitimate business purpose," the Commission appeared to leave the door open for a net-effects-based analysis of monopolizing behavior when it stated:

No one simple test seems adequate. We suspect, however, that in many instances the challenged conduct can be fairly categorized as clearly legitimate competitive behavior, on the one hand, or as behavior which clearly has little redeeming justification, on the other hand. For the gray areas in between, we believe there is no substitute for a careful, considered look at the overall competitive effects of the practices under scrutiny.⁴³

Of course, even if the plaintiff could predict with certainty that an uncompleted course of conduct was destined to harm competition (say, through output restriction and diminished incentives to innovate), there remains the issue of whether the social benefits from intervention to redress the immediate economic welfare loss would be outweighed by the social costs from possibly chilling legitimate aggressive behavior in other markets at other times. This broader social welfare perspective requires accuracy in the prediction of the effects of complicated economic interactions and reliability in the quantification of complex economic welfare comparisons. Conceivably, if one viewed potential *economywide* chilling effects as extremely large and certain, one would never want to challenge narrowly viewed welfare-reducing strategic behavior even if it definitely caused a monopoly in a *particular market*. Ultimately, the determination of what constitutes "unreasonably exclusionary" monopolizing behavior becomes a policy question that may never be amenable to definition in accordance with bright lines of demarcation. Many additional panels will likely sit in judgment of the legality of challenged strategic entry deterring behavior before a consensus emerges on the proper shading of gray to accord behavior that is at once both vigorously aggressive (white) and harmful to competition within the affected markets (black).

Developments Since the DuPont Decision

In 1980, when the Commission rendered its opinion and as DeLisle was coming on stream, DuPont's share of domestic TiO₂ capacity had grown to about 51 percent from the 30 percent that it controlled when the aggressive preemptive strategy originated in 1972. Throughout the 1970s, only DuPont added significantly to domestic capacity, more than doubling its capacity from 198,000 tons per year in 1970 to nearly 450,000 tons per year in 1980.⁴⁴ DuPont's competitors engaged in no substantial plant expansion and actually closed four of their twelve domestic plants during the decade. By 1985, five of the firms competing with DuPont in the domestic supply of titanium dioxide had exited: three by acquisition (Sherwin-Williams, Gulf & Western, and American Cyanamid); one by complete cessation of operations (PPG); and one (NL Industries) by shutting down its U.S. sulfate plants and supplying the domestic market from a less-onerously regulated Canadian sulfate plant. Although DuPont has never reached the 65-percent share objective of its "growth strategy," the company did achieve a 57-percent market share when DeLisle became fully operational in 1981 and has maintained that share level throughout the 1980s.⁴⁵ Thus, the prediction that DuPont's adoption of the "growth strategy" would be accompanied by a significant and durable increase in DuPont's relative market position is consistent with the postcase market history.

More specifically, since the express adoption of DuPont's "growth strategy" in 1975, several notable changes have taken place in the industrial organization of the domestic titanium dioxide industry: (1) NL Industries (now renamed Kronos, Inc.) closed its two remaining domestic sulfate plants in 1978 and 1982, but continued to supply the U.S. market with sulfate-process TiO₂ produced in Canada; (2) in 1983, Gulf & Western exited, selling a small rutile chloride plant to SCM and permanently closing a somewhat larger sulfate plant; (3) in 1985, American Cyanamid exited, selling its two remaining plants to Kemira Oy, a Finnish company not previously engaged in supplying the domestic market; and (4) SCM (now a subsidiary of Hanson Industries) grew, via relatively minor incremental plant expansions, to become the second-largest domestic producer with a 21-percent share of 1990 domestic capacity compared with its 12-percent share in 1975.

Interestingly, the advent of the 1990s appears to represent a new stage in the industry's evolution. DuPont no longer seems determined to capture the future growth in domestic demand (predicted to average 2.5 percent annually through 1995⁴⁶) by preemptive capacity expansion, but appears content to maintain its 55- to 60-percent share of domestic capacity by

sharing investment opportunities with its rivals. Major domestic expansions during the early 1990s have been undertaken by a number of competitors. DuPont added 100,000 tons per year at its DeLisle site. At the same time, SCM increased the capacity of its acquired Ashtabula plant by 62,000 tons per year. Kemira completed a 54,000-ton-per-year expansion of the Savannah chloride plant that it bought in 1985. Kerr-McGee planned to build a 60,000-ton-per-year plant at an undisclosed site for start-up in late 1992 or early 1993.⁴⁷ Kronos planned to reenter domestic production by constructing a 90,000-ton-per-year greenfield plant in Louisiana on the site of a former chloride facility that had been mothballed for nearly a decade.⁴⁸ In addition, Tioxide, a Canadian producer with a 55,000-ton-per-year sulfate-process plant in Canada, announced plans to construct a 60,000-ton-per-year chloride plant in the southeastern United States.⁴⁹ Not to be outdone, Sherwin-Williams, a large customer that exited in 1974, was seriously considering reentry using an unproven Australian chloride production process, the exclusive rights to which it acquired in 1990.⁵⁰

The recent spate of competitive expansions was prompted by a "capacity crunch" that began in 1988-1989. This capacity crunch came about because apparent domestic consumption of titanium dioxide grew uninterrupted at a rate of 5.1 percent per year between 1983 and 1988, and imports, despite reaching the record level of 18.7 percent of apparent consumption in 1988, were not sufficient to fill the gap.⁵¹ During the "crunch" period, prices climbed steadily, and many customers were placed on allocation.⁵² At first, DuPont, and to a lesser extent, Kerr-McGee, added several thousand tons of annual capacity through minor expansions and debottlenecking. Soon, however, it became clear to all the producers that additional capacity must be built to meet projected increases in future demand, and each made preparations for major expansions to come on stream throughout the period 1990 to 1993. Then the recession hit, and the mid-1980s annual growth rates of as much as 6 percent fell to 1 percent in 1990, creating oversupply and falling prices just as the previously planned lumpy investments in new capacity were due to start operations. As of mid-1992, demand was still soft, and a number of planned expansion projects were being delayed until economic conditions improved.⁵³

Thus, it appears that DuPont has finally abandoned its "growth strategy" in favor of a modern-day version of a "maintain market share" strategy. Without the benefit of reading DuPont's own documents, we cannot be sure what present strategic course the company is pursuing in managing its domestic titanium dioxide business. We do know, however, that DuPont gained and maintained a dominant market position during the 1980s and that the magnitude of DuPont's recent investment in TiO₂ capacity expansion is consistent with maintaining that market position. Less clear is how well DuPont has been able to maintain the production cost advantage that

was the necessary precondition upon which its preemptive "growth strategy" was predicated. Clearly, DuPont no longer is inhibiting competitive expansion, but that outcome may be as much due to DuPont's tolerance of the fringe competition of domestic and foreign rivals at supracompetitive prices credibly maintained by DuPont's commanding market position as to the consequence of a substantially diminished cost advantage.⁵⁴ Price-cost margins are likely higher now than they were in the early 1970's,⁵⁵ rutile reserves are becoming depleted,⁵⁶ and fewer plants are now operated by fewer producers. Much more thorough evaluation and analysis would be required to determine how correctly DuPont and the government predicted the net loss to consumers from adoption of the "growth strategy" relative to pursuit of the "maintain market share" alternative that preceded it. It is clear, however, that DuPont's strategy led to a significant restructuring of the domestic titanium dioxide industry, the effects of which are still being felt today.

Conclusion

In one sense, the *DuPont* decision set the stage for other cases (which were not forthcoming) that could have more clearly defined a "brighter line" test for effects-based monopolizing behavior. In another sense, however, the case was sui generis in that it would be virtually impossible to challenge conduct grounded in such effects-based analysis without relying on the contemporaneous "admissions" contained in detailed internal planning documents that were seen by managing executives. This kind of very specific strategic planning document that, for example, forecasts prices over an eighteen-year period under two different strategies is not likely to appear in many antitrust cases. Thus, on reflection, it is really not that surprising that more *DuPont*-like cases have not materialized, based solely on the difficulty of obtaining similar relevant evidence.

Despite the special nature of the evidence collected in *DuPont*, the case is not without precedential value. The essential theory of complaint counsel—that strategic deterrence behavior, when evaluated by reference to effects on competition rather than the inherent destructiveness of the conduct, may at some point "cross the line" and become "unreasonably exclusionary"—was not rejected by the Commission. Rather, the Commission placed a seemingly advisable weighty burden on plaintiffs to evidence that the challenged behavior is not reasonably related to legitimate business justifications but instead is conduct clearly meant to hurt competitors and, in the process, harm competition. While this was not the interpretation sought at the time by complaint counsel, the Commission opinion does not prevent

future tribunals from discerning sufficient competitive harm to find other strategic fact situations objectionable.

Notes

1. *E. I. duPont de Nemours & Company*, 96 F.T.C. 653 (1980), hereafter referred to as the "Commission Opinion." All references to the trial record in this case study are to publicly available information; care has been taken to avoid reference to any materials accorded in camera treatment.
2. Ghemawat (1984) modeled the capacity expansion process in capital-intensive industries with dynamic scale economies and absolute cost disparities across producers and predicted that DuPont's "growth strategy" would lead to capacity preemption of higher cost rivals and to strategic pricing to hold prices artificially low until after new capacity became operative. More recently, Hall (1990) has tested the consistency of DuPont's strategic behavior with the capital commitment model of preemptive behavior and found evidence that DuPont succeeded in preempting some of its rivals.
3. See complaint counsel's Appeal Brief, pp. 8-9, and the citation to trial exhibits indicated there.
4. See complaint counsel's Proposed Findings of Fact, Conclusions of Law, and Order, May 16, 1979, p. 90.
5. Several economic articles analyzing the implications of the learning curve on competition have appeared since the decision in *DuPont*; see, for example, Spence (1981), Gilbert and Harris (1981), and Pudenberg and Tirole (1983).
6. A pioneering economic analysis of preemptive entry deterrence by exploiting capital investment asymmetries was presented in Spence (1977). See also Gilbert and Harris (1984).
7. See memo from Kramer to Baird, June 1972, commission exhibit 28A.
8. The effect of DuPont's expansion plan announcements on competitive expansion possibilities and opportunities is indicated, for example, in commission exhibits 113F and 118A.
9. The 1977 Pigments Department Annual Report to the Executive Committee clearly indicates a willingness to proceed with construction despite the risk that the plant might come on stream ahead of demand; see commission exhibit 196W.
10. DuPont held licensing negotiations with Mitsubishi and the USSR and calculated the present value of rather substantial royalties that might be earned from licensing the Ilmenite chloride process to foreign TiO_2 producers; see commission exhibit 157.
11. The figure and discussion in the text are adapted from Dr. Shepherd's direct testimony; see commission exhibit 218, pp. 45-47.
12. See complaint counsel's Appeal Brief, p. 24.
13. Given the local environmental attitudes toward new siting of TiO_2 plants and the Environmental Protection Agency's designation of the industry as "the worst polluters in the inorganic chemical industry," future additions to capacity at these existing sites by DuPont could reasonably have been expected to proceed more quickly and more inexpensively than new construction by competitors; see commission exhibits 51B and 218, p. 50.
14. When the trial record was closed in 1979, the last major competitive expansion was the 25,000-tons-per-year increment in rutile chloride capacity added to its Baltimore plant by Glidden in 1970 before DuPont adopted its growth strategy. The next major competitive expansion did not occur until Kemira added 54,000 tons to its Savannah chloride facility in 1990. See "Developments since the *DuPont* Decision," below.
15. Kerr-McGee indefinitely postponed a planned 50,000 increment in its rutile chloride capacity in 1977. While other competitive expansions were contemplated, none progressed to a similarly concrete phase during the period encompassed by the trial record.
16. See commission exhibits 23F and 26M (for 1972); commission exhibits 125, 126, 209M, and 211 (for 1978); and commission exhibit 209 (for 1987).
17. See complaint counsel's Proposed Findings of Fact, Conclusions of Law, and Order, May 16, 1979, pp. 65-67.
18. See, especially, commission exhibits 125 and 126.
19. Elsewhere, it recently has been argued that the Commission incorrectly assessed the incentive-reward function in its *DuPont* decision; see Shepherd (1989), pp. 140-142.
20. Commission Opinion, p. 724 (emphasis added).
21. Commission Opinion, p. 722 (footnote omitted).
22. *Ibid.*, p. 749.
23. *Ibid.*, p. 710.
24. *Ibid.*, p. 747.
25. *Ibid.*, p. 745 (emphasis added).
26. *Ibid.*, pp. 750-751 (emphasis added). In a footnote, the Commission acknowledges that antitrust action, even in the absence of abusive conduct, may be warranted if a monopoly results that is impervious to competitive constraints and is unjustified by scale economies or other efficiencies. See *ibid.*, p. 751, fn. 42.
27. *Ibid.*, p. 750.
28. See *United States v. Aluminum Company of America*, 148 F.2d 416 (2d Cir. 1945) discussed in *ibid.*, pp. 729-732 and 750.
29. *Ibid.*, pp. 731-732 and 750.
30. See *American Football League v. National Football League*, 323 F.2d 124 (4th Cir. 1963) discussed in *ibid.*, p. 733.
31. See *Philadelphia World Hockey Club v. Philadelphia Hockey Club*, 351 F. Supp. 462 (E.D. Pa. 1972) discussed in *ibid.*, p. 733.
32. The Commission stated that "[e]ven behavior that improves efficiency or technology may still be unreasonable, since the benefits may be only incidental in relation to the adverse effects," but unfortunately provided little guidance concerning how to conduct such a cost-benefit analysis. See *ibid.*, p. 746, fn. 38.
33. See Areeda and Turner (1978), pp. 312-355.
34. See Krattenmaker, Lande, and Salop (1987) for an interesting discussion of how explicit consideration of the "power to exclude" as well as the "power over price" might clarify the definition of "unreasonably exclusionary" behavior.
35. See complaint counsel's Appeal Brief, p. 48.

36. *United States v. Grinnell Corp.*, 384 U.S. 563 (1966). The U.S. Supreme Court, in its recent summary decision in *Eastman Kodak Co. v. Image Technical Services, Inc., et al.*, 112 S. Ct. 2072 (1993) and its earlier *Aspen Sking Co. v. Aspen Highlands Sking Corp.*, 105 S. Ct. 2847 (1985), accepted the basic Grinnell analytical framework.
37. See Grinnell, *ibid.*, p. 571.
38. See, principally, Turner (1969) and Williamson (1972); see also Shepherd (1990a; 1990b).
39. *Ibid.*
40. See Williamson (1972).
41. Areeda (1987, p. 972). Areeda presents a strong argument that, as a practical matter, the analysis of bad conduct in attempt to monopolize cases has been largely replaced by the "specific intent" requirement that focuses on whether the defendant's actions were motivated by "legitimate business purpose." In his view, "it would be far better for the court to analyze the conduct, focusing on its anticompetitive tendencies in the light of its redeeming virtues." *Ibid.*, pp. 972-973.
42. This appears to be the view expressed by the Supreme Court in its *Aspen* decision when it stated that "[t]he question whether Ski Co.'s conduct may properly be characterized as exclusionary cannot be answered by simply considering its effects on Highlands. In addition, it is relevant to consider its impact on consumers and whether it has impaired competition in an unnecessarily restrictive way" (pp. 2858-2859; emphasis added and footnote omitted); and later when it concluded that "... the evidence supports an inference that Ski Co. was not motivated by efficiency concerns and that it was willing to sacrifice short-run benefits and consumer goodwill in exchange for a perceived long-run impact on its smaller rival" (p. 2861; emphasis added and footnote omitted).
43. Commission Opinion, p. 745 (emphasis added; footnote omitted).
44. See SRI (1991). Kerr-McGee, through a series of minor incremental improvements, did manage to increase its nameplate capacity from 50,000 tons per year in 1975 to 92,000 tons per year in 1989.
45. DuPont's share of domestic capacity actually peaked at about 59 percent in 1989; see *ibid.*
46. *CIS Chemical Report*, May 14, 1990, p. 1.
47. *Chemical Engineering*, January 1990, p. 64L.
48. *Chemical Marketing Reporter*, October 23, 1989, p. 4.
49. *Farbe & Lack*, January 1991, p. 68.
50. *Chemical Week*, April 25, 1990, p. 5.
51. SRI (1991), pp. 788.5001R and 788.5002Q.
52. *Chemical Marketing Reporter*, April 15, 1991, p. 3.
53. *Ibid.*, pp. 3, 22.
54. DuPont publicly estimated that the acid waste recycling necessary for sulfate-process plants to meet environmental regulations conferred a 20-percent cost advantage on DuPont's proprietary chloride process, even before taking learning effects into account; see *Chemical Week*, November 8, 1989, p. 36. While it is still the case that only DuPont uses lower-grade ilmenite as feedstock in its chloride process, it is not known to what extent rutile chloride producers may have closed the production cost gap that existed in 1975.

55. The bulk price of rutile ore peaked at \$710 per short ton in 1974-1975 and has been relatively stable in the \$400-\$450 per short-ton range throughout the 1980s. Similarly, the bulk price of ilmenite remained rather stable in the late 1970s at about \$49 per short ton, rising to over \$62 through the first half of the 1980s until it sharply declined to about \$35 in 1985, gradually rising thereafter to its earlier \$60 per short-ton level. Meanwhile, TiO₂ prices have increased steadily over the past twenty years, from 23 cents per pound in 1971 to 54 cents in 1980 to 67 cents in 1985 to 95 cents in 1989. See SRI (1991), pp. 788.5002K (raw material price series) and 788.5002M (product price series).
56. See *ibid.*, pp. 788.5000V and 788.5004S.

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7

Practices That Facilitate Cooperation: The Ethyl Case (1984)

case

George A. Hay

Introduction

Section 1 of the Sherman Act makes "every contract, combination . . . or conspiracy in restraint of trade" illegal. The most obvious application of Section 1 is to price-fixing agreements, and through its prohibition of price-fixing agreements Section 1 seeks to protect consumers against supracompetitive prices. However, the economic theory of oligopoly teaches us that there are circumstances in which a group of firms can achieve supracompetitive prices without the need for any formal agreement. In such cases, what is the antitrust response?

This case study is about this "oligopoly problem" and the efforts of the antitrust authorities to deal with it. It involves an antitrust case brought by the Federal Trade Commission (FTC) against the four manufacturers of lead-based antiknock gasoline additives, who were alleged to have succeeded in substantially eliminating price competition among themselves without entering into any formal price-fixing agreement.

Lead-based antiknock compounds have been used in the refining of gasoline since the 1920s. The compounds are added to gasoline to prevent engine "knock," the premature detonation of gasoline in the engine's cylinders. Resistance to knock is measured by octane ratings, and for a gasoline refiner the use of lead-based compounds is the most economical way to raise the octane rating of gasoline for cars that take leaded gas. From the 1920s until 1948, the Ethyl Corporation was the sole domestic producer of lead-based antiknock compounds. Demand for the compounds increased with the increase in gasoline use, however, and in 1948 DuPont entered the industry and captured a substantial market share. In 1961, PPG Industries began to manufacture and sell the compounds, followed by the Nalco

George A. Hay consulted with and testified on behalf of the FTC in the Ethyl case.