Vertical Merger in a High Tech Industry:
INFORMATION SYNERGIES AND ANTITRUST

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On July 26, 2002, the Federal Trade Commission closed an intense investigation to determine whether the consummated vertical acquisition by Synopsys, Inc. of Avant! Corporation violated Section 7 of the Clayton Act or Section 5 of the Federal Trade Commission Act.[1] The transaction involved software tools now used in the design of computer chips.[2] The acquiring party, Synopsys, enjoyed a market share of almost 90% in the "front end" logical synthesis tools for chip design. Avant!, had a share of 40% in "back end" place-and-route tools. The Commission declined to initiate a contemplated action for post-closing relief

The merger involved complex vertical considerations that must now be played out. Conceivably, the acquisition may lead to tighter integration between the respective components, thereby enabling more efficient chip designs for densely-packed ICs. However, the conceivable integrative efficiencies may be offset by competitive harm if Synopsys chooses to raise access barriers to its dominant platform. The key questions then were whether Synopsys would have an incentive to restrict competitive access to its platform, and whether such strategy would be anti-competitive and harmful to consumers.

At a conceptual level, the merger of Synopsys and Avant entails two types of economic efficiency. *Market efficiency* results when goods and services are produced at efficient scale, minimal cost, and lowest practical price. Market efficiency is a perceived resultant of free market competition, which ensues in the rivalry of many independent buyers and sellers.

Information efficiency results when ideas can move to all practical uses. Contrary to the free market optimism of Friedrich von Hayek, informational flow can actually be slowed in a market of independent principals or agents where no party may have good reason to trust another trading partner. The internal structure of the corporation, which is expandable through vertical merger, may be a practical means of providing more security for interacting parties, facilitate the transfer of existing ideas, and secure investments in the production of new innovations.

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[1] *In the Matter of Synopsys, Inc./Avant! Corporation*, File No. 021 0049, Federal Trade Commission, Washington, D.C.

[2] Circuit designers use these tools to create a high-level logical description of the desired performance of an integrated chip, which can be translated into a detailed physical map of the silicon wafer's surface to show where individual transistors should be placed and interconnected. The integrated tools have been used in microwave ovens, cell phones, and personal computers, to name a few.

The Benefits of Market Competition

Competitive markets are heralded institutions for increasing economic efficiency and social welfare. The driving force behind markets is the high-powered incentive that spurs each competitor to maximize profits. In vigorous competition, each rival strives to underprice competitors, cut production costs, improve quality, and design interesting product features.

Corporations that provide competitive goods and services can sometimes economize in areas outside of their core competencies by relying upon layers of independent marketers, producers, or intermediaries to provide complementary inputs, goods, and services. Because outside parties can obtain great rewards by manufacturing or selling products, they may be more attuned to the contingencies of the market and may sense the deep idiosyncratic information that should guide wise decisions. With less bureaucracy, small outside parties may move faster, work harder, and take more risks.

Classical antitrust policy regarding vertical mergers, which brings together companies in upstream and downstream industries, had increasingly come to accept the Chicago viewpoint that corporations would pursue mergers only if they could reduce costs and thereby increase economic efficiency.[3] Under Chicago economic analysis, the merger of two vertically related monopolies was shown to be economically efficient and productive of no anticompetitive effects.

Incorporating subsequent post-Chicago thought, Justice Department's *Non-Horizontal Vertical Merger Guidelines* of 1984 suggested that profitable vertical mergers could nonetheless be anticompetitive if one firm could use the merger to attempt to monopolize or restrict trade in the second market by foreclosing inputs or denying sale space to competitors.[4] Vertical foreclosure is entirely conceivable, for example, if the merging parties can exploit a bottleneck to reduce the ability of independent competitors to scale efficiently or otherwise exploit joint production or promotion costs in an efficient manner. However, while the Department and Federal Trade Commission have recognized that certain vertical relationships may have anticompetitive effects, the Merger Guidelines have recognized limited possibilities for countervailing information synergies that vindicate integration

The Benefits of Internal Organization

Market exchange between vertically related buyers and sellers admittedly often contrasts favorably with integrated corporations and bureaucracies that subsume several production stages. Large organizations are famous for weighty hierarchies, mind-boggling routines, deeply engrained assumptions, and simplistic cultural mores that confine manager decisions, restrict worker roles, drain financial incentives, and deter rational risk-taking. For all their complexity, such organizations would seem at first blush to lack the means to spur the considerable talents of entrepreneurs, managers, and inventors to reach their highest economic potential.

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[3] Distinguished presentations of the Chicago approach include R. Bork, THE ANTITRUST PARADOX: A POLICY AT WAR WITH ITSELF (1978); R. A. Posner, ANTITRUST LAW: AN ECONOMIC PERSPECTIVE (1979), F.H.Easterbrook, *Workable Antitrust Policy*, 84 MICH. L. REV. 1696 (1986).

[4] *Non-Horizontal Merger Guidelines*, U.S. Department of Justice (1984), Washington, D.C.

Yet integrated corporations do exist in the twenty-first century, and a primary question for economists is necessarily why. One compelling answer is transactions and information efficiency.[5] High-powered incentives notwithstanding, market transactions are often costly to undertake. That is, it would be administratively burdensome to define all contingencies and negotiate contracts for a good number of market exchanges.

To the point, key market information can be impacted in market exchange. That is, it is difficult for bargaining parties to communicate to one another the idiosyncratic data and properties needed to prove the true value of a particular exchange. The problem worsens when the resulting value depends upon the outcome of related events – e.g., rain or shine. This vacuum of information leads to considerable uncertainty on the part of each player. By bringing vertically related jobs into the same organization and providing some rationale for self-transcendence and common objectives, large organizations and the resulting psychic security can facilitate the exchange of idiosyncratic information and the performance of related tasks.

Mergers and Intellectual Property

In comparison with internal transactions in integrated organizations, market exchange of intellectual property can be problematic: IP is an intangible product, IP is more freely appropriable, and the free exchange of ideas may be inhibited. We consider each in turn.

First, IP is an intangible asset that differs from physical assets; use by one party does not exclude uses by others, product definition is fuzzy, transfer costs are hard to calibrate, the product does not wear out, and product value depreciates rapidly as new ideas emerge. Of primary importance, innovation costs are often incurred upfront and are nonrecoverable in secondary aftermarkets. As a consequence, the production of IP can scale efficiently only when the resulting product earns a large customer base. This phenomenon is made risky by the dangers of new invention and imitation, as well as the additional marketing requirement that is necessary to increase market size.

Second, intellectual property can be appropriable; i.e., it can be exploited or taken without payment even in the most protective legal system. As a legal consideration, independent parties may invent around existing patents. As a practical complication, complementary assets can be built on the primary capabilities of a patented work. The respective economic gains from both might not redound to the original inventor.

A perceived fear of appropriation can chill investments to produce new innovations. A partial solution to the problem is the patent system, which provides to the current patent owner rights for exclusive production and licensing and higher possible compensation. The capacity of the patent system to provide these incentives is of primary economic importance.

However, patent protections are never perfect and enforcement can be costly. An important study found that about 60 percent of patented innovations were imitated within four years.[6] A subsequent study found that information related to certain product and process decisions was in

[5]The seminal idea is due to R. Coase, *The Nature of the Firm*, 4 ECONOMICA 383 (1937).

[6] E. Mansfield, M. Schwartz, and S. Wagner, *Imitation Costs and Patents – An Empirical Study*, 91 ECONOMIC JOURNAL 907 (1981).

the hands of competitors within 18 months of the decision.[7] The recent Supreme Court decision on *Festo Corporation v. Shoketsu Kinzoku Kogyo Kabuskiki Co.Ltd*.,[8] which eliminated the application of the doctrine of equivalents when applied to foreseeable modifications in amended claims, will heighten investor concerns related to patent protection and enforcement.

Third, ideas in different production stages are often complementary. As a result, organizations can build product synergies from combinations provided participants feel safe to interact without fearing expropriation. These interactions seem safer within an integrated entity -- where conflicting interests are subject to organizational confines and presumably internalized -- than in the market -- where interacting parties are independent and sometimes unable to offer requisite security.

A firm then can be conceived as a repository of knowledge that is capable not only of producing products, but of developing over time a set of durable core competencies that can be incrementally extended into related areas. The firm's abilities to sense and seize market opportunities and to adapt and reconfigure pricing, R&D, and organizational form are primary measures of its dynamic capabilities.

These potential complementarities in the transfer of ideas lead to David Teece's and Henry Chesbrough's distinction between *autonomous* and *systemic* innovations.[9] Autonomous innovations can be pursued independently from other innovations in related markets. For example, it is not then generally necessary for drug companies to integrate into adjacent industries, nor should Microsoft merge with PC manufacturers to exploit synergies between operating systems and computer "boxes". Indeed, nonintegrated research has well served the domain of autonomous innovation, where most major inventions in the twentieth century have been made outside of major firms[10] and small and new firms now favorably compare with larger brethren in their recent ability to pursue breakthrough innovations that destroy core competencies.[11]

By contrast, the benefits of systemic innovations redound in combination with other related innovations, such as camera and film in the technology for instant photography. Systemic innovations require information-sharing between related goods during production. In this respect, arms-lengths contracts between two independent parties may fail to protect completely information exchange between two vertically related but independent market participants. Each company under independent governance strives to maximize private gain, each wants the other to do more, and each will perform best when it feels secure. However, neither can make a believable blanket commitment to avoid expropriating its IP partner after knowledge is advanced.

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[7] E. Mansfield, *How Rapidly Does New Industrial Technology Leak Out?*, 34 JOURNAL OF INDUSTRIAL ECONOMICS 217 (1985).

[8] 535 U.S. _____ (2002).

[9] Infra note 14, 127.

[10] J. Jewkes, D. Sawers, and R. Stillerman, THE SOURCES OF INNOVATION (1969).

[11] C.M. Christensen and R. S. Rosenbloom, *Explaining the Attacker's Advantages: Technological Paradigms. Organizational Dynamics, and Value Network*, CCC Working Paper No. 93-16 (1993).

Some Lessons from History

Our conceptual points appear throughout economic history. A seminal study of the key British textile and steel industries at the turn of the last century concluded that technological diffusion was slowed because the firms in these industries were not vertically integrated.[12] Britain may then have ceded its early industrial lead to corporations in Japan and Germany, which were more thoroughly integrated.[13] Indeed, the new industries of the time – chemicals, steel, and railroads – were led by companies that made major investments to shape markets rather than rely upon competitive interfaces and outsourcing.

David Teece and Henry Chesbrough provide a good example of market success and failure involving independent layering in the case of the IBM personal computer.[14] IBM in 1981 brought its first PC to market by outsourcing all major components, including Intel's 8088 chip and Microsoft's operating system PC-DOS, in clear distinction to Apple's more integrated machine. IBM's resulting open platform was successfully promoted to software and hardware developers who could build to a widening standard. With no retailing exclusivity, IBM sold through a wide chain of outlets including Computer-Land and Sears.

However, while IBM passed Apple in sales in 1984, such sales soon fell behind surging rivals Dell and Compaq. IBM soon lost control over its own open platform, which related producers (Intel and Microsoft) moved in a direction that reduced its importance. After the capacity of a floppy disk increased from 180 kB to 1.44 MB in 1982-84, this amount stayed put for the next decade as IBM lost its capacity to coordinate individual choices. IBM's subsequent introduction of a new operating system, OS2, as a means of reasserting control also fell flat as Microsoft simultaneously introduced Windows.

Conclusion

Returning to the merger of Synopsys and Avant!, traditional Chicago economists might have suggested that a dominant upstream provider could not increase profits by foreclosing downstream rivals and that the merger is necessarily competitive. From a different perspective, "new institutional economists" would suggest that the resulting information synergies between the two companies may offset potential competitive harms arising from market foreclosure or "raising rivals costs". Though the outcome may be the same, the routes are quite different.

As evidenced by the cautious statements of Federal Trade Commissioners Thomas Leary, Sheila Anthony, and Mozelle Thompson, the Commission adopted the second line of reasoning.[15] The public benefits from non-ideological realism and recognition simultaneously of potential anticompetitive effects and information synergies. The commissioners expressed deep concerns

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[12]Frankel, M., *Obsolescence and Technological Changes in a Maturing Economy*, AMERICAN ECONOMIC REVIEW (1955).

[13]C. Kindleberger, ECONOMIC GROWTH IN FRANCE AND BRITAIN 1850-1950 (1964).

[14] D. Teece and H. Chesbrough, *Outsourcing and Insourcing Strategies for Innovators: Opportunities and Limits*, in D. Teece, MANAGING INTELLECTUAL CAPITAL (2000), 129-31.

[15]The statements, news release, and closing letters are found at http://www.ftc.gov/os/caselist/0210049.htm (visited November 12, 2002).

and vowed to maintain continued surveillance over the merged entity. Their action and prospective attendance further extends a viable alternative paradigm for analysis of vertical mergers in an information age.

The issue should also point to the relative lack of attention paid to information efficiencies in the present Merger Guidelines. The Justice Department's 1984 *Non-Horizontal Merger Guidelines*, a statement of post-Chicago theory and policy, devotes three cursory sentences to vertical efficiencies. [16] As modified in 1997, the Joint Agency *Horizontal Guidelines* promise limited recognition of potential information synergies as a cognizable efficiency, particularly as compared with manufacturing economies.[17] This suggests that a paradigmatic recognition of the realities behind organizational information and R&D is in an emergent state at best.

[16]"As in the case of horizontal mergers, the Department will consider expected efficiencies in determining whether to challenge a vertical merger. [See Horizontal Guidelines] An extensive pattern of vertical integration may constitute evidence that substantial economies are afforded by vertical integration. Therefore, the Department will give relatively more weight to expected efficiencies in determining whether to challenge a vertical merger than in determining whether to challenge a horizontal merger." *Supra* note 4.

[17]"The Agency has found that certain types of efficiencies are more likely to be cognizable and substantial than others … For example, efficiencies resulting from shifting production among facilities formerly owned separately, which enable the merging firms to reduce the marginal cost of production, are more likely to be susceptible to verification, merger-specific, and substantial, and are less likely to result from anticompetitive reductions in output. Other efficiencies, *such as those relating to research and development*, are potentially substantial but are generally less susceptible to verification and may be the result of anticompetitive output reductions." [emphasis mine] *Horizontal Merger Guidelines*, U.S. Department of Justice and Federal Trade Commission, (Issued: 1992; Revised 1997), Washington, D.C.

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Matters involving trademark damages have included the Kardashians/BOLDFACE Licensing, Oprah Winfrey/Harpo Productions, Madonna/Material Girl, CompUSA, Steve Madden Shoes, Kohl's Department Stores, *The New York Observer*, and Avon Cosmetics. Matters in publicity right damages have involved Zooey Deschanel, Arnold Schwarzenegger, Rosa Parks, Diane Keaton, Michelle Pfeiffer, Yogi Berra, Melina Kanakaredes, Woody Allen, and Sandra Bullock.

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