



ECONOMICS COMMITTEE NEWSLETTER

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Welcome

It is with great pleasure that I welcome you to the second issue of the second volume of our newsletter. The goal of this endeavor is to provide a forum where Antitrust Section and Economics Committee members can share their views on the many faceted relationship between antitrust law and economics.

The Committee's newsletter is intended to provoke discussion. As a result, the opinions expressed in this newsletter are only those of the authors. The opinions found herein do not necessarily reflect those of the editor or other members of the Economics Committee.

Sincerely,

Stephan Levy, Editor

Calendar of Events

Brown Bag Luncheon

Marketing and Other Analyses Relevant to Mergers (Particularly Branded Consumer Products)

December 3, 2002
Noon EDT (by teleconference)
White & Case
601 13th Street, NW
Washington, DC

Moderator:

David Balto

Speakers:

David Scheffman, FTC,

Mary Sullivan, Antitrust Division

To register, contact Eunice Wallace, 202/626-6456 or ewallace@whitecase.com.

Antitrust Section Spring Meeting

April 2-4, 2003
JW Marriott Hotel
Washington, DC

Call for Articles

We are looking for articles to be published in the Spring 2003 edition of the newsletter. The Spring 2003 issue will be circulated in time for the Annual Spring Meetings, April 2-4, 2003 in Washington, DC. If you have an article or an idea for an article regarding the current or improved use of economics in analyzing issues of antitrust law, please contact Stephan Levy at (703) 516-7844 or slevy@nathaninc.com for more information.

Merger Simulation and Unilateral Effects: A Primer for Antitrust Lawyers

Roy J. Epstein*
LECG, LLC.

“Merger simulation” is poised to become a standard economic tool to evaluate the potential unilateral effects of mergers. A recent FTC working paper includes merger simulation among the past decade’s “remarkable developments in the quantitative analysis of horizontal mergers.”¹ Moreover, continued progress now makes simulation possible at relatively low cost and with modest data requirements.² Despite its usefulness, however, this area is probably still *terra incognita* to many antitrust lawyers. The most recent advances may not be understood even by those with prior experience with simulation. Consequently, this article is intended as a basic introduction to some of the main applications of simulation from a practitioner’s point of view.

A unilateral effect refers to the incentive for the newly merged firm to raise its prices without overt collusion with competitors. Unilateral effects have been central concerns of the antitrust agencies at least since the 1992 revisions to the *Horizontal Merger Guidelines*. The problem arises when a substantial number of customers who previously would have been lost after a price increase might be retained because the merged firm also offers the alternative brand preferred by these customers. In this case, the merged firm may find that it is profitable to increase prices because relatively few customers would be lost.³ When the agencies expect large unilateral effects from a transaction, they may either attempt to block the deal or insist on a restructuring

(through divestiture or mandatory licensing) to preserve competition.

The practical question is how to assess the significance of potential unilateral effects. Simulation analyzes the usual *Merger Guidelines* elements—market definition, efficiencies, product differentiation, the likelihood of committed entry and product repositioning, and the competitive impact of a divestiture. Simulation integrates these factors

A hypothetical case study is used to illustrate some of these ideas. As will be seen, simulation is really a complement to, and extension of, existing economic and legal methods for merger review. The focus is on the underlying reasoning, details on more technical issues are available elsewhere.⁴

NewCo’s Simulated Unilateral Effects Without Divestiture

Firms A and B have announced plans to merge. The basic facts of the industry are as follows. The transaction will make NewCo the second largest firm in the industry. The merger partners have been losing share to two other competitors for several years, largely because of more limited distribution and product support networks. A and B have complementary assets in this respect: A’s sales are concentrated east of the Mississippi while B is stronger in the West. Also, B has considerable excess production capacity.

Firm A produces two brands, one with a 9% share and the other with a 4% share. Firm B produces a single brand with a 17% share. Newco would therefore have a share of approximately 30%. The two remaining competitors have shares of 25% and 45%. The merger partners expect they will be able to reduce their marginal costs of production by 5% for each brand. Incidentally, this information was gathered in the course of normal due diligence without the expense of hiring an expert!

Next, an economist determined that the price elasticity of demand for the industry is -1.0 . (That is, a hypothetical simultaneous 1% price increase by all four firms would reduce quantity demanded in the entire market by 1%). The economist also found that the price elasticity of demand for Firm B is -3.0 (raising the price of that brand by 1% when all other prices in the market remained unchanged would reduce the quantity demanded of the brand by 3%).

This is enough information to assess unilateral effects using the recently introduced "PCAIDS" simulation method.⁵ In fact, simulation is now feasible at low cost for nearly any transaction with this method because scanner or transaction-level data are not required (although they can be utilized if they are available) and econometric estimation is unnecessary. Moreover, it is simple to test the sensitivity of the simulation results to changes in the inputs.

A starting point is to consider the transaction without the expected efficiencies and abstracting from possible strategic considerations.⁶ The simulation predicts price increases of 5.1% for the brands produced by A and a 4.2% price increase for B. The weighted average price increase for the entire merged firm is 4.6%. The

agencies might well be concerned about this transaction.

For comparison, the pre-transaction Herfindahl-Hirschman Index ("HHI"), a conventional measure of market concentration, is 3,108 and the change is 442. The change in the HHI far exceeds the safe harbor value of 50, again signaling possible agency action. The HHI is less informative, however, because it provides no specific information on the price increases and is unable to assess the impact of the efficiencies.

The simulation yields a larger unilateral effect for A even though it is the smaller firm. The explanation is that B is a larger "magnet" to attract diverted sales, so it is optimal for the merged firm to institute larger (uniform) price increases for A's brands. Merger simulation can also model brand-specific unilateral effects for each firm to take account of product differentiation in greater detail. This is an important refinement in practice but fuller discussion is beyond the scope of this article.⁷

Continuing on, the example now takes account of the efficiencies. It is assumed that a separate analysis has already been carried out to establish that the efficiencies are admissible under the *Merger Guidelines*. That is, they must be likely with the proposed merger and they cannot be reasonably achieved through other means.

The efficiencies significantly offset the unilateral effects. The simulated price increases for A and B fall to 1.6% and 0.6%, respectively. For sufficiently large efficiencies, the unilateral effects can reach zero and even turn negative. Efficiency arguments are sometimes given less weight in merger reviews than they deserve. Simulation should help ensure more

balanced and credible analysis of efficiencies.

To keep the example going, let's assume that the transaction still causes competitive concern even with the efficiencies. It will be assumed that the firms would be interested in a "fix it first" strategy involving a divestiture.

Divestiture and Merger Review

Divestiture has become an important feature of the merger landscape. For example, the FTC issued about 90 second requests in fiscal 1998 and fiscal 1999. Over 40% of these mergers (38 deals) resulted in consent decrees that involved restructuring. Former FTC Chairman Pitofsky has reported increasing instances in which parties to a proposed merger have indicated they would accept restructuring of well over 50% of the acquired assets.⁸ Simulation can be a valuable additional tool to help determine whether a divestiture is likely to restore competition that might otherwise be lost as a result of a merger.

The agencies have identified a variety of qualitative factors to evaluate a proposed divestiture. For example, the entity created by the divestiture should have minimum viable scale and there should be meaningful potential for the new entity to expand and innovate. To some extent the market should help answer these questions in an actual "fix-it-first" sale or when a bona fide buyer is waiting in the wings. A buyer that assumes the financial risk of investing in the divested assets presumably also has the incentive to perform effective due diligence. Moreover, examination of the buyer's business plan and financial projections should indicate whether the purchase price is consistent with the expectation of operating a successful, growing business.

Divestiture raises issues beyond mere economic viability. Since the goal is to prevent a loss of competition, the agencies are often interested in whether the seller has truly relinquished control over the divested assets. For example, the new entity may require supply contracts, technical or marketing assistance, access to intellectual property rights, physical facilities, and other continuing relationships with the seller. If the relationship gives the seller influence over the pricing, availability, or quality of the goods produced by the new entity then the divestiture is likely to be challenged as inadequate.⁹

Let's assume a proposed divestiture of A's brand with the 4% share and that this restructuring passes the screens just described. Assume further that the merger partners will realize the 5% efficiencies on the brands they retain but there will be no efficiencies for the divested brand.

Two kinds of acquirer are of interest: an existing competitor and a new firm not currently in the market. Simulation can handle both cases. If the brand is sold to the 25% competitor, for example, the unilateral effects for A and B become 0.7% and *negative* 0.3%, respectively. A sale to a new firm yields effects of only 0.2% and *negative* 0.7%. The simulations indicate that the combination of efficiencies and divestiture essentially eliminate the unilateral effects.

Conclusion

Merger simulation is a versatile new tool to investigate unilateral effects. It can now be performed at relatively low cost and with very little data. Most importantly, simulation provides a coherent economic framework to analyze options for complex transactions that might otherwise be quite difficult to quantify reliably. For example, it

can take account of the joint effects of market definition, efficiencies, product differentiation, divestitures, and entry/product repositioning. This article has focused on the basics but many more types of analyses are possible. As understanding of the method grows, it is likely that simulation will become a standard part of merger review.

*This article solely represents the views of the author, who remains responsible for any errors.

¹ See *Issues in Econometric Analysis of Scanner Data* available at www.ftc.gov. The FTC also hosted an academic conference in 2001 where merger simulation was a major theme. See “Empirical Industrial Organization Roundtable Transcript” available at www.ftc.gov.

² See, among others, Roy J. Epstein & Daniel L. Rubinfeld, *Merger Simulation: A Simplified Approach with New Applications*, 69 *Antitrust Law Journal* (2002); Gregory J. Werden & Luke M. Froeb, *The Effects of Mergers in Differentiated Products Industries: Logit Demand and Merger Policy*, 10 *J.L. Econ. & Org.* 407 (1994). A more complex and data intensive approach to simulation is described in Jerry Hausman, Gregory Leonard, & J. Douglas Zona, *Competitive Analysis with Differentiated Products*, 34 *Annales D’Économie et de Statistique* (1994).

³ More precisely, brand switching involves unilateral effects with differentiated products. The *Merger Guidelines* also discuss how unilateral effects could arise when products are relatively undifferentiated and firms are distinguished primarily by their capacities.

⁴ See, for example, the Appendix in Epstein & Rubinfeld, *supra* note 2.

⁵ See Epstein & Rubinfeld, *supra* note 2.

⁶ “Strategic considerations” encompass factors that may be economically relevant but are not represented in the mathematics of the simulation model. For example, the merged firm may not want to raise its prices, even when it would be profitable in the short-run, in order to preserve a reputation as an aggressive discounter.

⁷ The more detailed analysis uses the concept of product “nests,” or, alternatively, “multi-stage budgeting.” For more details see Epstein & Rubinfeld, *supra* note 2 and Daniel L. Rubinfeld, *Market Definition with Differentiated Products: The Post/Nabisco Cereal Merger*, 68 *ANTITRUST L.J.* (2000).

⁸ See Robert Pitofsky, Chairman, FTC, *The Nature and Limits of Restructuring in Merger Review*, Remarks at Cutting Edge Antitrust Conference (Feb. 17, 2000), available at www.ftc.gov.

⁹ These comments are drawn from Pitofsky, *supra* note 8; Richard G. Parker & David A. Balto, *The Evolving Approach to Merger Remedies*, Antitrust Report, May 2000; and FTC Bureau of Competition, *A Study of the Commission’s Divestiture Process* (1999), available at www.ftc.gov.

Airline Woes- What To Do?

John Pisarkiewicz
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The financial picture for the major carriers continues to deteriorate. The nine major carriers lost \$7.4 billion in 2001 and are on track to lose \$7.0 billion this year.¹ To cope with the problem, some analysts have argued that the antitrust laws should be relaxed to permit the airlines to coordinate fares and schedules.² Others have gone further and stated that the carriers cannot be both competitive and healthy at the same time.³

But many believe that current public policy is on the right track.⁴ That policy takes the form of government guaranteed loans through the Air Transportation Stabilization Board (ATSB) and government review, including antitrust scrutiny, of code sharing arrangements. However, these policies may not be enough. The major carriers are attempting to cut costs in a variety of ways but are hampered by increased security costs, increased insurance costs and increased pension fund liabilities. These cost increases could trigger more bankruptcies leading to corporate reorganizations and mergers which could raise concentration levels significantly in the future. I summarize current policy considerations below and address the implication of increased costs.

ATSB

The ATSB was authorized by the Air Transportation Safety and System Stabilization Act which was signed into law on September 22, 2001 (Pub. L. No. 107-42, 115 Stat. 230). Its purpose was to establish

a federal loan guarantee program to assist carriers suffering from the impact of the attacks on September 11. It has three voting members: Ed Gramlich from the Federal Reserve Board (Governor), Peter Fisher from the Treasury Department (Under Secretary for Domestic Finance) and Kirk Van Tine from the Department of Transportation (General Counsel). The ATSB was given authority to issue up to \$10 billion in loan guarantees,⁵ but the deadline for submitting an application was June 28, 2002. Several applications are still pending but even if these are approved, the ATSB will not come close to its ceiling.

CURRENT STATUS OF ATSB APPLICATIONS

Approved

America West
US Airways (conditional)
American Trans Air (conditional)
Frontier
Aloha

Pending

United Air Lines
Great Plains
World Airways
MED Jet
Corporate
Gemini Air Cargo

Denied

Vanguard
National
Spirit

Of the three applications by major carriers, America West was approved for a \$380 million loan guarantee; US Airways has conditional approval of \$900 million in guarantees for a \$1 billion loan, and United seeks approval of \$1.8 billion in guarantees for a \$2 billion loan. All other approvals or applications are for amounts that are much smaller.⁶ Hence it is unlikely that the ATSB will issue aggregate loan guarantees in excess of \$4 billion or 40 percent of its statutory limit.

Under any measure, this program cannot be viewed as a success. The program window was very short; the program was directed at major carriers yet only a few applied. The ATSB has been slow to act as it sought to impose a host of financial and operating conditions on carriers to protect the government's position. This has delayed final approval and probably exacerbated the carriers' poor financial condition.

CODE Sharing

A proposed code sharing agreements must be submitted for review to the Department of Transportation under 49 USC 41720. The DOT has the power to review and extend the effective date of the proposed agreement. As part of its review, the DOT seeks input from the Antitrust Division of the DOJ. The purpose of the review is to determine whether the competitive issues presented by the proposed agreement require further investigation. If not, then the DOT issues a notice ending the waiting period permitting the carriers to begin to implement the agreement. The DOT can and does impose conditions on the terms of the agreement. The DOT also monitors the implementation of the agreement.

There are two major code sharing agreements that have been under review. The first, United/US Airways, was approved

on October 2, 2002. The carriers agreed to restrictions proposed by the DOJ. The second involves NW/Continental, which already operate under a code sharing agreement, and Delta. The DOT period of review for this three-way agreement has recently been extended another 30 days until November 21.

Code sharing agreements generally involve coordinating schedules in order to market a combined product that is virtually seamless to the traveler. The two recent agreements also involve combining frequent flyer programs and airport lounges. The parties to a code sharing agreement do not claim that the agreement will result in cost savings—only a merger would accomplish that end. But they do maintain that the agreements will generate additional revenue by either taking passengers away from other carriers or by generating new traffic.⁷ The unsubstantiated claims are that the UA/US Airways agreement will increase revenues by \$350 million and the Delta/NW/Continental agreement by \$800 million.

The UA/US Airways agreement may be competitively neutral given the DOJ restrictions. But the principal complaint of many observers is that the details of the agreements are secret, and the review process conducted by the DOT is secret as well. There is no public forum, record or docket. In the case of UA/US Airways, there is only a three page statement from the DOT ending the waiting period and summarizing the terms of the agreement which includes a one paragraph description of the restrictions proposed by the DOJ.⁸ The restrictions are quite technical. Most involve prohibitions on code-sharing on certain non-stop service, on certain hub routes and on certain traffic at selected airports. Fares are restricted to be the same on certain routes and other restrictions on frequent flyer programs and bidding on

corporate contracts apply. Except for some broad conclusions, the DOT notice does not set forth the basis for these restrictions or their adequacy in addressing the competitive problems the DOJ foresaw.

Seven carriers, including Southwest and Jet Blue, have recently petitioned the DOT to provide evidence on the public record about the alleged benefits of the proposed Delta/NW/Continental code sharing agreement. ASTA—The American Society of Travel Agents—has filed separately in support of that petition. The seven carriers note that even alliances with very small *foreign* carriers go through the public docket.⁹

Public policy appears to be falling short of the ideal and for no apparent good reason. The benefits of a transparent review process seem obvious and should be easy to put in place administratively.

Costs—Security, Insurance and Pensions

The major carriers have severe cost problems compared to low-cost carriers like Southwest and Jet Blue. A recent study by Unisys R2A concludes that the majors would have to cut their costs by 29 percent to match Southwest's costs.¹⁰ Most of these high costs are in labor and in network/hub operations.

These differences in costs likely reflect poor decisions by management of the major carriers in the past compared to good decisions by Southwest. Southwest does not have a costly hub and spoke operation and seems better able to survive in a post 9–11 world. These cost differences do not appear to be a public policy issue.

However there are additional costs, which apply to all airlines, which arise because of

government mandated security programs. These costs, in whole or in part, are directly attributable to 9–11 and its aftermath. To the extent that security and combating terrorism are public goods, then these additional costs should not be borne entirely by the carriers. The country as a whole has an interest in maintaining a safe, secure air transportation system suitable to needs of our economy.

Leo F. Mullin, Chairman and CEO of Delta, estimates in Congressional testimony that the additional costs of federally mandated security programs in 2002 to Delta alone are \$660 million, pretax.¹¹ According to Mr. Mullin, since Delta represents one-sixth of the industry, these cost extrapolate to \$4 billion on an industry-wide basis. To put this figure into perspective, the major carriers expect to lose \$7 billion or more this year.

A new security tax of \$2.50 per segment constitutes 40 percent of the \$4 billion in additional security costs. When the government imposed this tax, it was intended to be passed on to passengers. But Mr. Mullin claims that due to the high oversupply of seats and the availability of internet shopping, the airlines are unable to pass it on, and it directly reduces the bottom line.

The next largest component of security costs is insurance, which is now almost 23 percent of the \$4 billion total. In 2001, aggregate industry insurance costs were \$20 million. These increased to \$900 million in 2002 and the airlines seek relief.¹²

The remaining security costs cover a variety of factors including cockpit door fortifications, losses due to restrictions on freight and postal service and the opportunity cost of having an air marshal on board in a first class seat.

Finally, the dark cloud hanging over many major carriers is increased pension fund liabilities due to the decline in interest rates and the fall in the stock market. To the extent that airline pension funds are invested in their own stock, the losses have been very substantial. Much of this decline can be attributed to 9–11. Southwest, which does not have a pension fund, has a capitalized market value that is twice as much as all the other major carriers combined.¹³ In a recent filing with the SEC, UAL indicated that it may have to take a charge of \$1.5 billion this year due to the decline in pension plan assets and make further contributions of \$5 billion by the end of 2008.¹⁴

The burden of federally mandated security costs is clearly a public policy issue which needs to be addressed promptly. In addition, the large under-funded pension liabilities could easily become a very big public policy issue as it has in the steel industry.

If the government continues to fail to address these problems adequately, more bankruptcies will occur. National Airlines, which was in bankruptcy and was denied a loan guarantee by the ATSB, has recently ceased operations. Further financial deterioration by the industry will bring cries for more consolidations which will raise a host of sticky antitrust questions. It could very well be better to provide a short-term bail-out rather than permit consolidations which could lead to a non-competitive structure and poor market performance when demand returns to more normal levels.

Summary

What to do? Strong, quick decisive government policy is required in several areas to help the airlines cope with the aftermath of 9–11. So far, government policy has been too slow, cumbersome and miserly (ATSB), too opaque (code sharing

approval), or non-existent (security, costs, etc.). If we want a secure air transportation system and a higher level of demand,¹⁵ the government will have to act in a positive manner soon.¹⁶ The cost of delaying will be more bankruptcy reorganizations, and perhaps much higher concentration through mergers of failing firms. The economy cannot stay down forever, and it is not clear that further increases in concentration will be beneficial in the long run.

¹ Air Transport Assn. The nine carriers are American Airlines, United Airlines, Delta, Northwest, Continental, US Airways, Southwest, Alaska and America West. Losses in 2001 would have been \$9.8 but for federal compensation after 9/11. See Congressional testimony of Leo F. Mullin, CEO of Delta, September 24, 2002.

² Holman Jenkins, *Business World*, Wall Street Journal, August 21, 2002.

³ Bob Crandall testimony 1993, quoted by Holman Jenkins. Mr. Crandall's recent views were expressed in "What Next for Airlines," *Washington Post*, August 15, 2002, p. A25. There he reiterates essentially the same view. "The administration and Congress should give careful thought to the questions of how an industry that is forbidden to consolidate but whose failures are consistently resuscitated by the bankruptcy laws can ever achieve success."

⁴ Stephen M. Wolf, Chairman, US Airways, "Competition is Good for Consumers", *Washington Post*, August 24, 2002.

⁵ The federal guarantee is at most 90 percent of face amount of the loan.

⁶ Frontier received a guarantee for \$63 million after appealing an earlier rejection, and Aloha received a guarantee of \$40.5 million. See "Frontier Airlines, Aloha Receive Approval for Loan Guarantees, *The Wall Street Journal*, November 6, 2002.

⁷ Oral statement by James Denvir, counsel for Northwest on October 8, at ABA Air & Space Forum and the Transportation Industry Committee of the Section of Antitrust Law jointly sponsored brown bag luncheon at Covington & Burling, Washington, DC.

⁸ See www.dot.gov/affairs/US-UAL.htm

⁹ See Andrew Compart, "Airlines, ASTA press DOT on Alliance Bid," *Travel Weekly*, October 28, 2002. Also, the American Antitrust Institute supports the provision of more public information. See Letter from Albert A. Foer, AAF, to Randall Bennett,

Director, Office of Aviation Analysis, DOT,
September 10, 2002.

¹⁰ Reported by Scott McCartney, “Southwest Sets Standard on Costs for Airlines,” *Wall Street Journal*, October 9, 2002.

¹¹ Essentially the same testimony was delivered on September 24, 2002 before the Aviation Subcommittee of the House of Transportation & Infrastructure Committee and on October 2 before the Senate Commerce Committee. Mr. Mullin was accompanied by Don Carty, Chairman and CEO of American Airlines, and Richard Anderson, CEO of Northwest Airlines.

¹² “Another Airline Bailout?” *Wall Street Journal*, editorial, September 30, 2002. The datum for 2002 is

consistent with Delta’s own insurance costs and its estimate for the industry as a whole.

¹³ Martha Branningan, “Airlines to Lobby Government for More Aid as Losses Mount,” *The Wall Street Journal*, September 23, 2002.

¹⁴ Caroline Daniel, “Troubled UAL May Take \$1.5 billion charge,” *Financial Times*, October 28, 2002.

¹⁵ Federal ticket taxes today are triple what they were in 1991 (accounting for about 44% of a \$100 round trip ticket with a connection each way). “Another Airline Bailout,” editorial, *The Wall Street Journal*, September 30, 2002.

¹⁶ “United They Fall,” editorial, *The Wall Street Journal*, October 21, 2002.

Competition Policy after the Telecom Meltdown: The Case of the Wireless Service Markets

Larry F. Darby*
Darby Associates

Capital market values in the telecom and IT sector peaked in the first quarter of 2000 after five years of unprecedented expansion. Since then, they have been in a free fall. Sharply declining capital expenditures, jobs, output, market capitalization, number of firms, earnings, quality of balance sheets and negative growth all measure the distress. The run-up and reversal have brought with them serious problems now being addressed by the Congress, the SEC, the FCC, DOJ, various state enforcement or prosecutorial officials and others as details of accounting irregularities, conflicts of interest, financial failures and outright fraud come to light.

The telecom boom and bust has created more fundamental economic and structural problems. Several "competition policy" and regulatory issues have emerged but have not yet fully matured. There are clear indications that questions about sustainable industry structure, short term structural adjustments and long term market performance will have to be addressed as firms and markets attempt to rationalize and correct the current dismal situation.

The telecom sector has several important and distinguishable submarkets. And while they share common distresses, the reasons for and way out of the current mess are different for local wire-line markets, cable markets, long distance markets, equipment markets and markets for wireless services. This discussion focuses on markets for wireless services, which have been and engine for telecommunications growth. However, many of the pressures and issues are also present in other sectors.

Structural Change in Wireless Telecommunications Markets

The mobile wireless sector has evolved from simple tone-only paging devices and citizens' band radio used in highly specialized circumstances to become a driving force in the telecom sector, the broader information technology sector and the overall macroeconomy. The availability of broadband wireless technologies propel so-called "3-G" market prospects and kindle hopes that there will be in the not-too-distant future a wireless path, a satellite path and two wire-line (cable and telco) paths for providing broadband services to U.S. homes. Some analysts and seers anticipate mobile wireless devices winning the battle in "last mile" telecom markets with broadband capabilities and gradually displacing their wire-line competitors.

The wireless sector is made up of a group of companies that vary widely according to time in the market, technology platform, geographic markets addressed, depth of financial pockets, scale, corporate structure, financial structure, and market strategy. There are old firms, new firms, and very new firms; some with strong financial credentials and others simply on the brink; some have enormous scope and others are focused geographically and strategically. These firms have settled on different technology models, using different wireless frequencies and have subsequently bet differently on the best "new" technology. They range from very small to the largest with over 30 million subscribers.

When licensing wireless companies, the Federal Communications Commission (FCC) used administrative proceedings, then lotteries, and finally auctions to distribute wireless licenses geographically and diversify ownership. Now,

through acquisitions and consolidation, six wireless companies can be regarded as national players. None covers the entire U.S. land area, but each offers service to the nation's populated areas and major highways in all regions.

These national companies and their market shares are: Verizon Wireless, LLC (22%), Cingular Wireless, LLC (16%), AT&T Wireless Services, Inc. (15%), Sprint PCS (11%), Nextel (7%) and T-Mobile (formerly VoiceStream Wireless Corp.) (6%).¹ Cingular is a joint venture of BellSouth and SBC; Verizon is a joint venture of Verizon and Vodafone; while T-Mobile is wholly owned subsidiary of Deutsche Telecom. Sprint PCS is a division of Sprint Corp a major long distance telephone and Internet backbone company.

Large regional players include ALLTEL Corp., Western Wireless Corp., United States Cellular Corp. and Dobson Communications Corp. These firms, other smaller regional players and affiliates of the national players account for about 22% of the market.

There has been significant structural change in the sector in the past two years and reflected in several combinations, a handful of joint ventures and a major spin-off. AT&T Wireless acquired its former network affiliate TeleCorp PCS, Inc in February 2002. Verizon Wireless announced in November 2000 its intention to acquire Price Communications Wireless, but instead formed a limited partnership under Verizon's control when conditions of the agreement were not met. A number of Sprint PCS network affiliates have acquired, or announced plans to acquire, other affiliates. In August 2001, UbiquiTel, Inc. acquired privately held VIA Wireless an affiliate serving the central valley of California. AirGate PCS, Inc. acquired iPCS Inc., while US Unwired Inc. has completed acquisitions of two other affiliates, Georgia PCS Management, LLC and Independent Wireless One holdings, Inc.

In March 2002, ALLTEL announced an agreement to purchase the wireless properties of CenturyTel Inc. In May 2002, US Cellular announced that it was acquiring PrimeCo Wireless Communications LLC's licenses. In

July 2001, Pacific Wireless Technologies, Inc. and Nextel filed an application with the FCC seeking consent to transfer Pacific's 800 MHz SMR licenses to Nextel. There have been joint ventures involving Cingular Wireless and T-Mobile, as well as one involving Cingular Wireless and AT&T Wireless. In the other direction, in July 2001, AT&T Wireless was spun-off from AT&T and became an independently-traded company.²

The point of this recitation of structural change is to indicate how market forces have been already been correcting the initial, unsustainable market structure of the industry and to provide context for examining forces for further consolidation and the challenges they pose for antitrust enforcement.

Current Market Snapshot

Penetration of US wireless firms has surpassed 50%; average minutes of use per subscriber have grown from 171 in 1999 to around 450 currently; and, total revenues have doubled since 1998 to \$66 billion at year end 2001.

The prettiest economic pictures are visible in the rear view mirror. The road ahead looks rocky. Annual subscriber growth has fallen from 50% to single digits. It is likely that subscriber counts for some carriers will be down when third quarter results are posted later this year. Service providers have yet to show positive earnings. While the most fortunate may do so in the coming months, most will not. As measured by the Philadelphia Wireless Telecom Index, market capitalization of wireless-service providers and equipment makers has declined by nearly 75% in the first three quarters of 2002.

The leveling off or decline in the number of subscribers is being offset in part by usage—number and average length of calls—fueled by bundling in free long distance. Some see a brighter side in higher take up rates in parts of Asia and Europe which suggest that the US market may not be saturated. Some anticipate further growth in penetration, but clearly we have reached the point of inflection. Future growth will come more slowly.

All said and done, the increase in the take up rate and continued growth in usage per sub and average revenue per subscriber (ARPU) will very likely not be sufficient to get all the contenders into the black. This is true in large part because of the very substantial price pressure being reflected in declining average revenue per minute which some analysts place in the range of negative six to seven percent per quarter in recent quarters. It takes lots of call and usage volume to make up slowing or declining subscriptions and declining per minute rates. In view of the rapid downward trend in rates, the industry may well be approaching the neighborhood of unit elasticity on the demand curve where further rate reductions will have modest or negligible impacts on total revenue.

For 2002, the industry will generate zero free cash flow. It has about a \$1.25 of debt for each dollar of revenue—an acceptable ratio in a high growth environment, but a scary one to current investors. Our back of the envelope analysis suggests that for the industry, as currently structured, to earn returns approaching its weighted average cost of capital, firms would have to increase the number of subscribers more than twofold – without reducing rates or increasing investment. That is a tall order; too tall in fact.

Policy Implications

Some will see in these data signs of a maturing industry hampered by a sour economy. Others will see more fundamental structural problems and argue that some combination of changed market structures, changed cost structures and changed financial structures must take place. Both views will be elaborated in the wave of further consolidation that most investors and financial analysts believe is sure to begin almost immediately.

Switching costs are low, churn rates are high (and going higher with mandatory number portability) and there is substantial idle capacity in many systems. Fixed charges as a share of current income indicate enormous operating leverage, which is beneficial when markets expand, but is potentially fatal on the downside

of market cycles. Financial markets and managers in the sector believe there are too many competitors, too much capacity and too many undifferentiated services chasing too few dollars—in short *too much competition*. That will be the major issue to be debated in the coming months as efforts to consolidate, now being pondered, become public.

Consolidation proponents will argue, as one former banker (Michael J. Price of Evercore Partners) recently testified before the Senate Committee on Commerce, Science and Transportation: "Six, seven or eight competitors are too many for [this] maturing, capital-intensive industry."³ They will cite consolidation of the railroad industry, the airline industry, the early telephone industry, as well as the shakeout and rollup in the long distance telephone industry two decades ago. They will also cite the healthy competition, and higher penetration, in Europe and other foreign markets among half as many, or fewer, competitors than now populate most U.S. markets. Consolidation advocates will insist and adduce data showing that excess supply is reflected in both market data (prices, growth, etc.) and firm financials (both income statement and balance sheets).

They will argue that growth will not be sufficient to resolve in the near term the core problem of overcapacity and that total industry costs (summed over all firms) are far too high to be recovered under even exaggerated market growth rates. Recognizing that long term equilibrium can be restored by a combination of increased demand (which will take several years) and supply adjustments, proponents of consolidation will assert that waiting for demand growth to squeeze out excess capacity is a recipe for destructive short term pricing and secular decay of the sector as investors, unable to get paid for this generation, will refuse to underwrite the next generation (3G) of plant and wireless services.

The dispute will highlight issues about sustainable market structure in the long term (minimum efficient scale questions), synergies (which have generally been more imagined than real in this and other sectors), the economic

welfare costs of alternatives (just let the market work and dissipate excess supply with demand increases), the contagion of debt restructuring (competition from chapter 11 emergent firms with little or no debt service costs) and the economic implications of secular decay of capacity. The question of minimum efficient scale will surely come up. How many firms of efficient scale and scope can the sector support in the long run? The FCC's spectrum caps, which limit the radio bandwidth that a single company can own in a local-market will surely be contested and the relation of long run costs relative to the size of the market will become critical.

Consolidation proponents will argue that the industry materialized in not all together natural ways when measured against historic standards and precedents. Much of the available capacity and most of the firms were borne of FCC processes in which the number of sellers and the rate of capacity formation and expansion were more or less prescribed by the regulators themselves. Some will also argue that the seeds of current distress were nurtured by FCC licensing processes which took enormous amounts of capital out of the sector through auction payments before a single radio tower or cellular switch was installed.

The other side has plenty of firepower as well. Investors always cry "cutthroat competition" when capacity pressures coalesce with economic downturns. Investors should have known the risks. The market malaise may only be temporary. Why rush to judgment and allow increased concentration just as consumers are reaping the benefits of market competition?

The real kicker for opponents to consolidation may be in the unimpressive track record of past mergers and acquisitions in creating either consumer welfare or *shareholder value*. The case for M&A on economic efficiency grounds will draw little if any support from recent merger history in the telecommunications industry or the economy more generally. Indeed, recent surveys indicate that corporate consolidations seldom deliver the synergies, cost savings and other sources of consumer welfare

and shareholder value promised by their sponsors.⁴ And, while we may not be surprised to learn that managers are overly optimistic and oversell the value of consolidation to owners, it is another matter to find that most in fact destroy shareholder value.⁵

There will no doubt be a high stakes debate over just how and how far the sector should be rolled up. While elements of telecom policy and FCC views of the public interest will come into play, the real test will be posed by application of the Merger Guidelines. Resolution of the issues in wireless will set the course for the pace and direction of the industry to the next generation of (broadband) service.

But, the results of the resolution of the competition and consolidation issues in wireless will echo in the broader telecom sector, where problems of the same kind—excess capacity, too many firms, financial distress, very aggressive pricing conduct—are creating the same grounds and arguments for consolidation. Similar, but by no means identical, distress is apparent among long distance companies (AT&T, Worldcom and Sprint) and backbone providers who may very well find advantage in joining with local Bell companies. Many of those issues have surfaced and been considered earlier, but the current financial and economic distress in the sector will provide new context for the old debate.

Current industry structure in several telecom and IT submarkets is not sustainable. Implementation of the Telecom Act of 1996 by the FCC has been very successful in creating competition by creating competitors. It will be left to antitrust standards and enforcement to answer questions not important economic policy questions not considered by the FCC. It remains to judge whether creating competitors has created healthy competition—that is market rivalry consistent with underlying cost and technology constraints and robust in the absence of regulatory management. Most interesting, and imperative, will be the application of tests for the impact of structural alternatives on consumer welfare.

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¹ Market shares and indicators of changing structure summarized in this section are treated more comprehensively in the Federal Communications Commission's Seventh Annual Report to Congress on markets for mobile services. See, Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, (Seventh Report); Adopted: June 13, 2002.

² Seventh Report at p. 17. There has also been substantial partial consolidation of interest through affiliations. Three national operators also have extended their coverage through contractual affiliations with smaller, regional carriers. These affiliations create a "family" of operating companies with much closer relationships than those formed by traditional roaming agreements. The affiliations were established to accelerate the build-out of the larger companies' networks by granting smaller affiliates the exclusive right to offer mobile telephony for those companies, in some cases under the larger companies' brand names, in selected mid-sized and smaller markets. The AT&T Wireless family consists of AT&T Wireless, as well as the affiliation it has with two companies: Triton PCS Holdings, Inc. ("Triton PCS") and Edge Wireless, LLC ("Edge") In the case of Triton PCS, AT&T Wireless sold portions of some of its broadband PCS licenses to the company in exchange for a minority ownership interest. While Triton PCS is marketed under the brand name SunCom and Edge is marketed under its

own name, both companies provide service as a "Member of the AT&T Wireless Network." These affiliates have been deploying TDMA technology throughout their networks.

The Sprint PCS family consists of Sprint PCS and 12 affiliates. Sprint PCS performs back-office tasks at cost for most affiliates and thereby provides the benefits of economies of scale for billing and customer service. The Nextel family consists of Nextel and Nextel Partners, Inc. In an arrangement similar to that of AT&T with its affiliates, Nextel sold some of its SMR licenses to Nextel Partners in exchange for a minority ownership interest in the company.

³ Testimony of Michael J. Price, "The Telecom Mess: How Did We Get Here and How Are We Going to Get Out of It?" before the Senate Committee on Commerce, Science and Transportation Hearing on The Government's Role in Promoting the Future of the Telecommunications Industry and Broadband Deployment", October 1, 2002 (p. 6).

⁴ Business Week recently reported the results of a survey it conducted jointly with the Boston Consulting Group of 300 plus major mergers in the July Summer 1995 to August 2001 timeframe. The survey of 302 major mergers in the July 1995 to August 2001 timeframe indicated that "Fully 61% of buyers destroyed their own shareholders' wealth...The gains of the winning minority could not make up for the buyers' losses. The average return for all buyers was 4.3% below their peers and 9.2% below the A&P 500." "The Merger Hangover, Business Week, October 14, 2002, p. 63.

⁵ Ibid.

Vertical Merger in a High Tech Industry: Synopsys, Avant!, and the FTC

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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.

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 under-price 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.

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 non-recoverable in secondary after-markets. 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 the hands of competitors within 18 months of the decision.⁷ The recent Supreme Court decision on *Festo Corporation v. Shoketsu Kinzoku Kogyo Kabushiki 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 firms¹⁰ 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.

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 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.

*The expressed views do not necessarily represent the opinions of other experts at LECG. The author can be reached at (973) 618-1212.

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.

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.

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).

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

⁸ At <http://laws.findlaw.com/us/000/00-1543.html>.

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).

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).

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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