Volume Title: Mergers and Productivity

Volume Author/Editor: Steven N. Kaplan

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-42431-6

Volume URL: http://www.nber.org/books/kapl00-1

Conference Date: January 16-18, 1997

Publication Date: January 2000

Chapter Title: Paths to Creating Value in Pharmaceutical Mergers

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Chapter URL: http://www.nber.org/chapters/c8653

Chapter pages in book: (p. 287 - 326)

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Paths to Creating Value in Pharmaceutical Mergers

David J. Ravenscraft and William F. Long

6.1 Introduction

In the 1980s, the pharmaceutical industry underwent a period of tremendous growth and profitability. This growth was reflected in a 959 percent increase in a stock index of pharmaceutical firms from 1980 to 1992. During the same period, the S&P increased by 386 percent. Growth was driven by innovations resulting in part from the adoption of more rational, scientific approaches to drug discovery and by a market structure that allowed annual price increases in the 8 to 12 percent range. However, in

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The authors thank the following individuals for sharing their time and knowledge: David Barry, CEO, Triangle Pharmaceuticals (former director of worldwide research and executive director, Burroughs Wellcome plc); Rick Beleson, senior analyst, Capital Research; Paul Brooke, managing director, Morgan Stanley; Cliff Disbrow, senior vice president of technical operations, GlaxoWellcome Inc.; Stuart Essig, managing director, Goldman Sachs; Clint Gartin, managing director, Morgan Stanley; Henry Grabowski, pharmaceutical economist, Duke University; Tom Haber, chief executive, Hadley Investment (former CFO, Glaxo Inc.); Rebecca Henderson, pharmaceutical economist, MIT; Douglas Hurt, CFO, GlaxoWellcome Inc.; Robert Ingram, CEO, GlaxoWellcome Inc.; Greg Ireland, portfolio manager, Capital Research; Suzanne Nora Johnson, partner, Goldman Sachs; Robert Jones, head of strategic planning, GlaxoWellcome plc; Rick Kent, director of worldwide research, GlaxoWellcome plc; George Morrow, group VP commercial operations, GlaxoWellcome Inc.; Mike Overlock, managing director, Goldman Sachs; Bob Postlethwait, president of neuroscience division, Eli Lilly; Michael Pucci, director sales and training, GlaxoWellcome Inc.; Charles Sanders, former CEO, Glaxo Inc.; Phil Tracy, former CEO, Wellcome Inc.; and John Vernon, pharmaceutical economist, Duke University. The authors also received valuable research assistance from Stéphane Chrétien and Carl Ackermann and helpful comments from Rob Gertner and George Baker. The views expressed here are those of the authors and do not necessarily reflect the views of any of the above named individuals.

true Schumpeterian fashion, booms sow the seed of their own destruction (Schumpeter 1950). Enhanced buyer power, increased competition from generic and "me too" drugs, the rise of biotechs as an alternative research approach, increased government pressure, rising research cost, and a rash of major patent expirations dramatically changed the growth and profit outlook of pharmaceutical companies. Beginning in the early 1990s, pharmaceutical firms' stock prices dropped and average price increases nearly vanished.

To maintain profitability, pharmaceutical firms had to negate these new influences by limiting buyer power, improving research and development (R&D) productivity, or cutting costs. Mergers played an important role in helping pharmaceutical firms meet all three of these challenges. Pharmaceutical firms vertically integrated by purchasing pharmacy benefit managers (PBMs) to help counteract the rising buyer power.[1] They sought to improve their pipeline and research capabilities through the acquisition of biotech firms. However, the most dramatic approach—and the focus of this paper—involved growing through large horizontal acquisitions.

The pharmaceutical industry, therefore, provides a rich and active market for studying how recent mergers create value. Over the last decade, more than $250 billion of assets were acquired in over four hundred deals involving a pharmaceutical or biotech firm. In terms of value, over half of these deals occurred during the years 1994 to 1996 (fig. 6.1). These mergers dramatically increased firm size. The value of the transactions was over $1 billion in approximately fifty pharmaceutical mergers and these deals account for roughly 70 percent of the merger value. Most of the very largest deals involved the combination of two large pharmaceutical firms. Ten of the top fifteen pharmaceutical deals are horizontal. (Three of the remaining five are vertical acquisitions and two are diversifying.) The announcement of the top sixty-five drug acquisitions created $18.8 billion of value for the combined bidder and target. However, if we look at only the horizontal deals, those deals alone created even more value—$19.5 billion.

The largest of these pharmaceutical deals, Glaxo's 1995 hostile acquisition of Burroughs Wellcome, illustrates these trends, challenges, and value

1. There were two main motivations for purchasing PBMs. First, pharmaceutical firms thought that owning a PBM could help ensure that their products were on the formulary list—a list of drugs that determined if insurance companies, HMOs, and hospitals would reimburse the patient for the drug. Where comparable drugs existed, PBMs were using formularies to gain price concessions from drug companies. In particular, Medco demonstrated to the drug companies that it had the power to move market share. There is some evidence that Merck's acquisition of Medco did increase the number of Merck drugs on Medco's formulary list and increased Merck's market share. After the third PBM merger, the Federal Trade Commission (FTC) imposed constraints on the three PBM purchasers—Merck, SmithKline Beecham, and Eli Lilly—that limited this ability to influence PBM formulary decisions. The second motivation was to acquire the vast information that PBMs collected on pharmaceutical usage and the skills in analyzing these data.

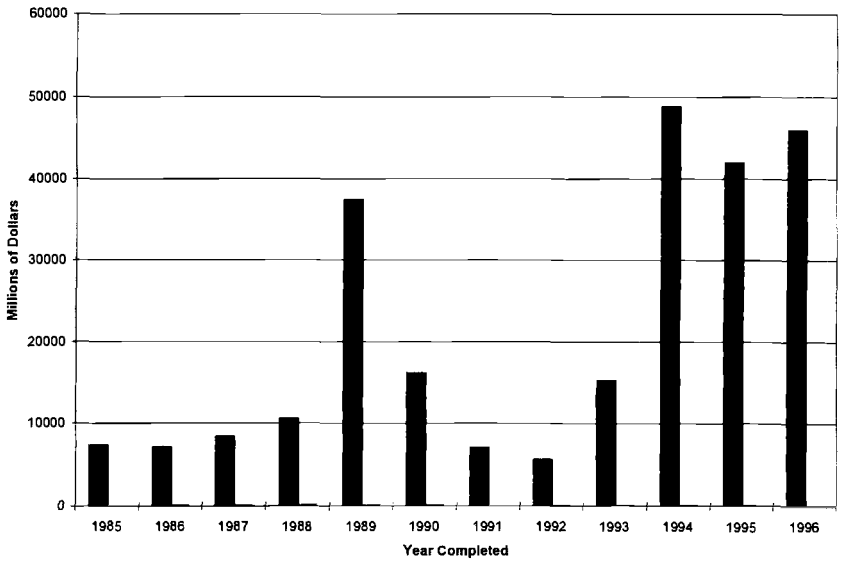

Fig. 6.1 Value of pharmaceutical mergers, 1985–96
Source: Security Data Corporation.

creation. Glaxo's sales increased from £618 million to £5,656 million between 1980 and 1994. This growth was led by the best selling prescription drug in history, Zantac (a peptic ulcer treatment that was launched in 1981). For much of this period, Zantac accounted for over 40 percent of Glaxo's sales. Wellcome's sales increased from £1,005 million to £2,662 million between 1986 (the first full year of public reporting) and 1994. Its leading product, Zovirax (a treatment for genital herpes and shingles first sold in 1982) also accounted for over 40 percent of Wellcome's sales and was the fourth best-selling drug in the industry for much of the 1990s. The U.S. patents on these two products expired in 1997. Thus, Glaxo and Wellcome faced the challenges of a changing industry environment and the decline of their major sources of growth. By combining two firms with similar problems, GlaxoWellcome created over $2 billion in stock market value upon the announcement of the merger.

How did GlaxoWellcome and other large horizontal pharmaceutical mergers create value? For research-intensive, global pharmaceutical firms the complete answer is complex. These acquisitions create value by reducing cost and enhancing revenue. Cost savings stem from economies of scale or scope, reduction of excess capacity, and elimination of inefficiencies. Revenue enhancement results from expanded global reach, broader product lines, expanded application of current and future technology, and sharing skill, information, and best practices. These mergers are also driven by the firms' desire to use a consistent flow of internal funding for

R&D in an industry where the discrete nature of blockbuster drugs makes many cash flow profiles volatile.

Because of the recent nature of these mergers, the cost savings are much more apparent at this time. Fortunately, these cost savings appear to be substantial. Despite these savings, creative approaches have been needed to keep bidders' shareholders from losing on the deal. Part of the problem is that the savings can be offset by the postintegration cost. For example, Glaxo estimates that it will cost $1.8 billion to cover the expenses of achieving the merger cost savings. This does not include the tremendous temporary disruption and loss of momentum from trying to combine two large organizations. Given that Glaxo paid a 40 percent premium (or $3.8 billion) for Wellcome, GlaxoWellcome must create $5.6 billion in 1995 discounted dollars plus the nonaccounting postmerger integration cost to earn a return for Glaxo shareholders.

In section 6.2 of this paper, we show the changes in the pharmaceutical industry and how they create incentives for mergers. Next, in section 6.3 we present evidence that value is created in pharmaceutical mergers, that targets and some bidders were underperforming the market before the merger, and that cost-cutting in large horizontal deals plays a critical role in value creation. In section 6.4, we demonstrate how an active market for corporate control in pharmaceuticals arose and the impact that corporate governance structure had on this market and the ability of bidders to capture value for their shareholders. Section 6.5 begins the focus on GlaxoWellcome with a brief history of the firms and a description of the events leading to the merger. Using GlaxoWellcome, we illustrate how and why horizontal mergers cut costs, the potential revenue gains from the merger, and the postmerger integration problems that must be overcome to capture this value. Section 6.6 discusses how these insights contribute to the academic debate surrounding mergers and pharmaceutical economics.

The paper's findings are based in part on extensive interviews with investment bankers, industry experts, and present and former pharmaceutical company executives. We interviewed five senior investment bankers responsible for pharmaceutical deals—Paul Brooke and Clinton Gartin of Morgan Stanley, and Stuart Essig, Suzanne Nora Johnson, and Michael Overlock of Goldman Sachs. We talked with five industry experts including two research analysts or portfolio managers—Rick Beleson and Greg Ireland of Capital Research—and three pharmaceutical economists—Henry Grabowski and John Vernon of Duke University and Rebecca Henderson of MIT. To gain the perspective of executives that left the firm after the merger, we interviewed two former Wellcome senior managers—David Barry, worldwide R&D director, and Phil Tracy, CEO Wellcome Inc.—and two former Glaxo senior managers—Tom Haber, CFO, and Charles Sanders, CEO Glaxo Inc. We spoke with one senior pharmaceutical executive outside of GlaxoWellcome, Bob Postlethwait, president of

neuroscience division, Eli Lilly. Finally, we interviewed seven current executives of GlaxoWellcome, covering finance, research, commercial, sales, operations, and strategy. The executives of the U.S. operations were Cliff Disbrow, senior vice president for technical operations; Douglas Hurt, CFO; Robert Ingram, CEO; George Morrow, group vice president for commercial operations; and Michael Pucci, director of sales and training. The worldwide operations executives included Robert Jones, director of strategic planning, and Rick Kent, director of worldwide research. All of these executives continued to play an important role in the combined organization often in even more senior positions in the worldwide organization. Where possible, we attempted to verify consensus views with data supplied by the interviewees and archival data on industry characteristics, merger and acquisitions information, and stock market evidence.

6.2 The Changing Pharmaceutical Industry

The pharmaceutical industry displays several key characteristics that are critical to understanding its challenges. It is a highly risky business with long-term payoffs and lumpy outputs. On average, it takes fourteen to fifteen years to go from discovery of a drug to Federal Drug Administration (FDA) approval. The odds of a compound making it through this process are around 1 in 10,000, while the cost of getting it through is around $200 million. To cover this cost and risk, the drug companies depend on a few blockbuster drugs. Even for a large firm, it is not uncommon for one drug to account for almost half of its revenue. The result is often a very lumpy cash flow profile. Yet, the firms depend on internal funding of R&D because of well-known problems of asymmetric information (Myers and Majluf 1984) and moral hazard (Leland and Pyle 1977).[2]

Despite these challenges, pharmaceutical firms earned consistently high accounting profits and growth rates throughout the 1970s and 1980s. An important contributing factor was the way in which drugs were purchased. Unlike most products, the decisionmakers (doctors), the consumers (patients), and the payees (insurance companies) were all separate groups. This led to a relatively inelastic demand and annual price increases in the 8 to 12 percent range for much of the 1980s (see fig. 6.2 below).[3] Competition was also somewhat muted. Developing a generic drug was relatively expensive until after the 1984 Hatch Act. Pharmaceutical companies also appeared to develop fewer "me too" drugs in the 1970s. The primary research method was serendipity or random searches. This method led to

2. Hall (1992) summarizes the theoretical and empirical arguments for a positive relationship between internally generated cash flow and R&D expenditures.

3. These price increases were for the United States. Price increases vary greatly around the world. For example, over this same period pharmaceutical prices were declining in Japan.

less spillover across companies relative to the current rational, scientific-based drug research design (Henderson and Cockburn 1996).

The consequence of this inelastic demand and muted competition was impressive increases in drug company stock prices in the 1980s (see fig. 6.3 below). Between 1980 and 1992 pharmaceutical stocks rose 959 percent relative to a 386 percent increase in the S&P.[4] This long-run supranormal performance may also have led to some organizational slack and inefficiency.

Toward the late 1980s and early 1990s, the profit and growth environment began to change dramatically. On the demand side, strong new constraints on pharmaceutical prices arose. Bundled purchasing, managed care, hospital consolidation, and growing government intervention gave the buyer strong new powers to negotiate drug prices. The pharmaceutical companies also got hit with a group of three-letter acronyms—PBMs (pharmacy benefit managers), HMOs (health maintenance organizations), DURs (drug utilization reviews), and DRGs (diagnosis-related groups for Medicare). While the primary purpose of these organizations and reviews were different, they all served to dramatically strengthen buyer power. By the early 1990s, 82 percent of the pharmaceuticals in the United States were sold through PBMs, chain pharmacies, or hospitals. As a consequence, "the weighted average price discount to distributors grew from 4% in 1987 to 16% in 1992" (MacAvoy 1995, 8). The enhanced buyer power was also instrumental in aggravating two other demand side trends: generic drugs and competition between therapeutically similar patented drugs.

The rise of the generic drug industry dates back to the 1984 Hatch Act. This act greatly reduced the previously large cost of getting a generic drug approved (Grabowski and Vernon 1992). The full impact of the act was delayed by three factors. First, until the role of the buyer changed, doctors and pharmacists lacked strong incentives to encourage generic substitution. Second, it took time to overcome public distrust of generic drugs and this process was made worse by plant closings, bankruptcies, and FDA bribery charges involving generic firms in 1987. Third, strategies by drug companies forestalled generic substitution. These included improved formulation, distinct product appearance, production economies, and reformulation of dosages.[5] By 1992, cost-cutting incentives were increased and public trust in generics improved. Grabowski and Vernon (1996) show that between 1989 and 1992 generic market share had increased from 47 to 72 percent.

4. When calculating long-run price indexes it can be important to adjust for relative risks or β. However, for pharmaceutical firms the average β is very close to one.

5. See MacAvoy (1995) for a more detailed account of these demand side trends and the strategies used by pharmaceutical firms to forestall them.

Industry sources also suggest that there has been a rise in the number of "me too" drugs. This appears to be occurring despite the widespread belief that these drugs are often unprofitable. The cause of this rise is unclear. One possibility is that the rational, scientific research method has increased the ability of firms to learn from each other's announcements of successes and failures at each stage of the development process (Henderson and Cockburn 1996). Regardless of the cause, it is true that a substantial number of the drugs in development are targeting the same disease. The number of drugs in development in 1996 included more than 200 cancer medicines (48 for breast cancer), 132 drugs targeting aging-related illnesses (20 for arthritis and 22 for Alzheimer's), and 110 for AIDS and related diseases.[6] Perhaps even more important than trends in "me too" drugs is the ability of large buyers to leverage the competition between similar drugs through formularies. Formularies reduce transaction costs and increase buyer power by restricting the number of drugs that can be used to treat an illness. Pharmaceutical firms are forced into fierce competition to get their drug on a formulary. To make matters worse, McKinsey claims that they can design a formulary that can "meet 95% of the current drug needs . . . with only 247 drugs . . . 70% of these drugs are already generic, and this number will rise to almost 90% by 1998" (Pursche 1995, 20).

A final factor that negatively affected drug prices was politics. Because pharmaceutical products are priced well above marginal cost and because drug price increases throughout the 1980s had consistently exceeded the consumer price index, pharmaceutical companies became an easy target for Hillary and Bill Clinton's 1992 health care reforms. Although these reforms were substantially scaled back, they did put enormous political pressure on pharmaceutical firms to restrain price increases.

The consequence of these demand side trends is clearly illustrated in the Bureau of Labor Statistics (BLS) Drug Producer Price Index shown in figure 6.2. Sometime in 1991, the ability of pharmaceutical firms to consistently increase prices ended. While this BLS series has some known biases, they cannot explain the sudden drop in price increases in 1991. With the exception of one small blip, the inability to raise drug prices has continued into 1996.

Drug companies were also getting squeezed on the cost side. A pharmaceutical industry association estimates that the average 1995 constant dollar cost of internally discovering and developing drugs has risen from $125 in 1986 to $400 in 1995. Despite this cost increase (or maybe because of it), the amount that pharmaceutical companies invest in R&D rose

6. The statistics come from the pharmaceutical organization *PhRMA's Facts and Figures* 1996.

Fig. 6.2 BLS drug producer price index, 1976–96

continuously. Total pharmaceutical R&D has increased from $4.1 billion in 1985 to $8.4 billion in 1990 and to $15.8 billion in 1996. A similar increase is observed in R&D expressed as a percentage of sales. This number rose from 14.8 percent in 1984 to 15.9 percent in 1990 to 19.0 percent in 1996.[7] Henderson and Cockburn (1996, 43) also observe this dilemma, "Perhaps the most dramatic effect visible in the time-series aggregates is the continuing increase in research spending despite the fact that the mean cost per important patent rose dramatically from 1975 onwards."

Competition on the research side also arose in the form of small entrepreneurial pharmaceutical companies that are most commonly identified as "biotechs." The number of these companies in the United States increased from 333 in 1980 to 1,072 in 1990. The number of biotech products in clinical development almost doubled in the five-year period 1989 to 1993.

A final challenge facing pharmaceutical firms in the early 1990s was the forthcoming patent expiration of a large number of blockbuster drugs without clear indication of replacements. There were twenty-one "billion-dollar-a-year" products in 1993. Many of these were slated to go off patent by the year 2000. Yet not a single new drug was expected to reach this blockbuster status during that same time period. As a consequence, many

7. PhRMA (1996).

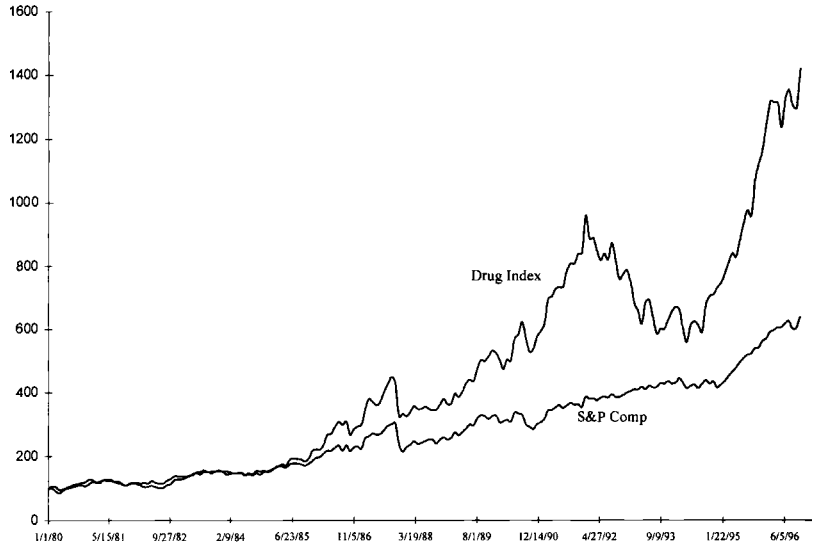

Fig. 6.3 S&P drug index versus S&P composite index, 1980–96
Source: Datastream International.

drug companies were flush with cash but short on the critical steady cash flow profile needed to continuously fund R&D.[8]

The critical nature of these challenges became apparent to the stock market at the end of 1991. As figure 6.3 demonstrates, collectively pharmaceutical companies experienced their first sharp long-term decline in over a decade. Drug firms began to underperform and buying drugs on Wall Street rather than in the research lab began to look attractive.[9]

These facts concerning the state of the pharmaceutical industry make it clear that pharmaceutical firms were at a critical turning point in the early 1990s. If they were going to sustain the growth rates that were driving their pre-1991 stock prices, they would have to do so through one or more of three basic approaches—counteract buyer power, develop unique drugs quicker, or cut costs.

The industry used mergers and acquisitions to address all three approaches. The three large vertical mergers, Merck-Medco, SmithKline Beecham–Diversified, and Eli Lilly–PCS, were attempts to address buyer

8. The information in this paragraph comes from the article "A Dry Period," *Forbes*, 24 April 1995, which also explains that this lack of research productivity arises more from the nature of scientific breakthroughs than from incompetence on the part of pharmaceutical firms.

9. Note that the drug stock index does begin to rise sharply again in late 1994, but only after the industry began to address some of these problems through mergers.

power by either co-opting that power or managing it through information. If they were successful, they would have increased the challenges faced by the rest of the industry who lacked access to PBMs and their information capabilities.[10]

Since the rise of biotechs, large pharmaceutical companies have accepted the value of acquisitions and alliances with these firms. The concept of a virtual corporation—what Eli Lilly calls "research without walls"—has been developing steam in this industry. The number of strategic alliances, which averaged around 150 per year during the years 1986 to 1989, rose to almost 400 per year in 1992–94 (PhRMA 1996). However, this trend raises questions about the optimal level of R&D inside large pharmaceutical firms.

The conditions faced by the pharmaceutical industry in the early 1990s are best described by the concept of "free cash flow" (Jensen 1986).[11] The culmination of demand constraints, cost increases, alternative research mechanisms, and declining pipelines strongly indicates that research productivity was declining. When firms failed to address these changes through cost cutting, their stock prices fell. Pharmaceutical firms flush with cash from past R&D successes could purchase products by taking over other companies cheaper and faster than they could through internal R&D. This action was even more important for firms whose blockbuster products were coming off patent and who did not have a sufficient pipeline to replace them. By using mergers to consolidate operations and cut out the excess industry capacity, the bidder could pay for the premium needed to acquire another firm's pipeline.

Recently, two articles have strongly demonstrated the potential advantages and impact of these cost-cutting mergers. McKinsey estimates that the changes in the pharmaceutical industry have led to sufficient excess capacity that a total of $60 to $90 billion in net present value could be cut from the U.S. pharmaceutical industry alone. "To put this number in perspective, the total value of fulfilling all disease-based unmet medical needs in the U.S. (through drug usage) is on the order of $120 billion

10. However, a 1995 study by the General Accounting Office (GAO) suggested the PBM acquisitions did not substantially help the pharmaceutical acquirers. The fact that two of the three PBM acquisitions were undone within five years after the merger suggests they did not produce the anticipated gains.

11. Jensen used the characteristics of the oil industry in the early 1980s to illustrate the concept of free cash flow. It is interesting to note that the pharmaceutical industry in the 1990s shares many of these same characteristics. Both industries have projects with substantial uncertainty, high upfront costs, and long payout periods. They both experienced a period of substantial price increases that led to some false expectations of this continuing. However, there are also important differences between these industries. In particular, it is very difficult for raiders to take over R&D firms using debt financing. The consolidation in the pharmaceutical industry had to be done by other large pharmaceutical firms.

NPV" (Pursche 1995, 19). After interviewing senior human resource managers at six U.K. pharmaceutical companies, Jones (1996, 30) concludes that "the views expressed by the six respondents indicate that leading pharmaceutical companies no longer see R&D as a core activity. This change represents an attempt to reduce R&D spending and improve efficiency in response to the many external pressures which face the industry." While both of these statements seem a little extreme, they illustrate how the changing pharmaceutical environment has created potential gains from consolidating through large horizontal mergers.

6.3 Characteristics of Value Creation

Measuring the value creation from pharmaceutical mergers is challenging for two reasons. First, the majority of mergers took place in the period 1994–96. For this paper, the postmerger time series is too brief for ex post measures such as changes in accounting profits or patent counts. Second, the pharmaceutical industry is very dynamic. The business press is filled with a constant stream of news about the industry and individual firms. Announcements concerning new drug discoveries, regulatory changes, legal matters, alliances, and individual drug cash flow projections are common. This makes it difficult to assign long-term changes to any one event without a large sample to reduce the noise. Given these constraints the best measure is the stock market reaction using fairly narrow windows.[12]

The average abnormal stock market reactions to the announcement of sixty-five pharmaceutical deals occurring between 1985 and 1996 are 13.31, −2.12, and 0.59 percent for the target, bidder, and combined firms, respectively. The target and bidder abnormal returns are statistically significant, but the combined returns are not. These acquisitions include all deals over $500 million for which the bidder and the target have stock market data.[13] A merger or acquisition was considered a pharmaceutical transaction if Security Data Corporation listed either the bidder or target as a pharmaceutical or biotech company. The market's reaction was calculated using standard event study methodology with a three-day event

12. Even the narrow window can be somewhat problematic. For example, Glaxo announced a decline in sales of its leading drug Zantac on the same day that it announced the Wellcome merger. Three days later, Glaxo announced the acquisition of Affymax, a leader in combinatorial chemistry, for $592 million. In the same month of the merger announcement, Glaxo received U.K. approval for an over-the-counter (OTC) version of Zantac, while the FDA rejected an OTC version of Wellcome's Zovirax. Both of these events significantly influenced the firms' stock prices.

13. The bidder or the target were non-U.S. companies in 45 percent of these deals. Because of the broad worldwide coverage of Datastream International, there were only fourteen deals in the over $500 million category for which we could not find data.

window centered around the first announcement of the winning bid.[14] The market model was estimated for 240 days to 40 days before the announcement of the transaction. Consistent with the findings from the general population of mergers occurring since 1980 (e.g., Bradley, Desai, and Kim 1988), the target shareholders gain and the bidder shareholders lose in the typical pharmaceutical deal.[15]

The combined firm abnormal return was calculated as the weighted average of the bidder and target abnormal returns with the weights being the market value of the firm forty days before the merger announcement. The 0.59 percent return value is the simple average of the combined firm value for all sixty-five firms. Thus, on average pharmaceutical mergers create a small amount of value for the combined shareholders. A more accurate way of computing total value created is to compute the dollar value created for each merger (target abnormal return times target market value plus bidder abnormal return times bidder market value). The sum of the dollar value created for all sixty-five mergers is $18.76 billion (U.S.).

Pharmaceutical acquisitions differ across a number of key characteristics. In table 6.1, the impact of these characteristics on the abnormal return to the target, bidder, and combined firm is explored. With respect to shareholder value creation, two characteristics stand out—large horizontal mergers and cross-border transactions. Large horizontal mergers are defined as the combination of two of the top thirty firms whose primary industry is pharmaceuticals. A listing of these top firms and mergers is given in figure 6.4. These mergers generate statistically significant (at the 10 percent level) abnormal return of 9.84, 4.97, and 7.60 percent for the target, bidder, and combined shareholders relative to other pharmaceutical deals. To put this in perspective, the sum of the combined shareholder dollar value created for the ten large horizontal drug mergers is $19.47 billion. This is more than the total value creation of the entire sample of sixty-five pharmaceutical acquisitions.

Deals that cross national boundaries also earn impressive returns for all shareholders. The target, bidder, and combined returns are 6.40, 4.25, and 3.53 percent relative to other drug acquisitions with all but the target re-

14. We also used an eleven-day window centered around the announcement day. The target firm returns were slightly higher and the bidder firm returns were slightly lower. A disadvantage of narrow windows around the first announcement date is that we do not capture leaks, rumors, or prior announcements with other bidders. Hoechst's acquisition of Marion Merrell Dow illustrates this point. Marion Merrell Dow was thought to be a target for over six months before a final deal with Hoechst was announced. There was little reaction in Dow's stock price when the deal was finally announced (see table 6.2). Thus, we have probably underestimated the return to targets and the total value created in the deal. A sensitivity test, which eliminated any deal that does not display a significant positive reaction to the target, does not affect the results.

15. These bidder losses occur despite the fact that we arbitrarily assigned bidder status to one of the two partners in the mergers of equals. As table 6.2 shows, the shareholders of these merger of equals "bidders" earned over 13 percent in above market returns.

Table 6.1 **Regressions of Abnormal Stock Market Returns on Deal Characteristics for Sixty-Five Top Pharmaceutical Transactions, 1985–96**

	Target Return	Bidder Return	Combined
Intercept (%)	17.05	−4.04	−1.13
	(4.75)	(−2.51)	(−0.78)
Horizontal (%)	9.84	4.97	7.60
	(1.79)	(2.01)	(3.47)
Partial acquisition (%)	−16.98	1.06	−1.74
	(−4.26)	(0.59)	(−1.10)
Cross border (%)	6.40	4.25	3.53
	(1.62)	(2.39)	(2.24)
Hostile (%)	18.97	−0.98	0.74
	(2.54)	(−0.29)	(0.25)
Vertical (%)	14.58	−2.96	−0.29
	(1.66)	(−0.75)	(−0.08)
Relative size (%)	−10.91	−3.39	−1.09
	(−1.69)	(−1.25)	(−0.45)
R^2	0.43	0.20	0.28

Note: The parentheses contain *t*-statistics. Partial acquisition equals one if the target was a subsidiary of a publicly traded company or the target was a divested unit of a publicly traded company. Cross border equals one if the bidder and target home country were not the same. Hostile equals one if the target was put into play through a hostile acquisition. Vertical equals one if the target was a PBM. Relative size is the target market value divided by the bidder market value.

turn statistically significant. This positive impact of cross-border acquisitions supports the general theoretical and empirical work on international acquisitions (Harris and Ravenscraft 1993). Cross-border deals like SmithKline Beecham and Pharmacia Upjohn expand global marketing by pushing one firm's products through the other firm's sales force.

Hostile takeovers and vertical integration deals pay significantly higher target premiums and partial acquisitions and smaller deals pay significantly lower premiums. However, these differences are not sufficient to statistically affect the bidder or combined return.

A closer look at the stock market's reaction to individual deals provides additional insight into the impact of deal characteristics. The individual returns for the top fifteen deals are given in table 6.2. Eleven of the fifteen deals created value for the combined shareholders. However, three of the losses were large—over $1.4 billion. Two of the three big losers were vertical, pharmacy benefit managers deals (Merck-Medco and Lilly-PCS).[16] The other deal that created large losses for shareholders was Kodak's di-

16. Analysts suggest that the remaining large vertical deal created value because of the way it was structured. The SmithKline Beecham–Diversified acquisition was not dilutive for SmithKline, in part because U.K. firms can immediately deduct the massive goodwill that

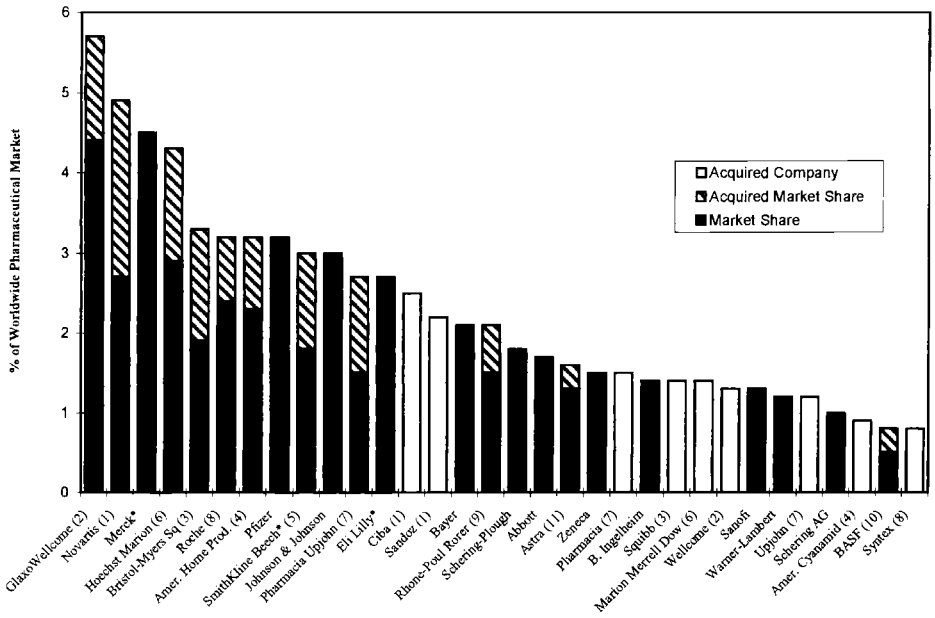

Fig. 6.4 Pharmaceutical market share of top companies (excluding Japanese firms), 1995

Source: Goldman Sachs and IMS.

Note: When company is not present in 1994, market shares at the acquisition date are used. The numbers in parentheses link the acquired and acquiring firms. Acquired firms 10 (Boots) and 11 (Fisons) are not shown.

*Company was engaged in a large vertical pharmacy benefit manager acquisition.

sastrous diversification attempt into pharmaceuticals through the purchase of Sterling Drugs.[17]

On the more positive side, six of the fifteen deals created over $1 billion in stock value during the three days surrounding the announcement. All of these were large horizontal acquisitions and five of the six occurred after 1993. The one early deal was Beecham's merger with SmithKline. This was a cross-border deal that also benefited from U.K. accounting rules. Two of the other large value-creating horizontal deals also benefited from the global reach that comes from a cross-border deal. As the regressions in table 6.1 reveal, however, large horizontal mergers generate substantial value even after controlling for cross-border advantages.

The industry pressures discussed in section 6.2 applied to all firms in

gets created in these deals. While this deduction does make earnings numbers look better, it would be surprising if this explained the market reaction. The goodwill deduction is an accounting change that does not carry with it a real side impact such as increased tax deductions.

17. Interestingly, the purchase of Gerber by Sandoz, which represented a diversification out of pharmaceuticals, was well received by the market, creating almost $1 billion in value.

Table 6.2 **Market-Adjusted Returns to the Top Fifteen Pharmaceutical Mergers (1985–96) with Stock Market Data**

Target Name	Target Nation[a]	Acquirer Name	Acquirer Nation[a]	Type[b]	Date Announced	Date Effective	Value of Transaction ($millions)	Percentage of Target Stock Return	Percentage of Acquirer Stock Return	Percentage of Weighted Stock Return	Total Stock Value Created ($millions)
Ciba-Geigy AG	SW	Sandoz AG	SW	H, ME	03/07/96	12/17/96	32,641	19.12	13.74	16.80	9,636
Wellcome PLC	UK	Glaxo Holdings PLC	UK	H	01/20/95	05/01/95	14,285	43.55	−8.18	3.93	1,520
Squibb Corp	US	Bristol-Myers Co.	US	H	07/27/89	10/04/89	12,094	27.46	−9.46	3.60	796
American Cyanamid Co.	US	American Home Products Corp.	US	H	08/02/94	12/21/94	9,561	48.40	−0.51	9.72	2,213
SmithKline Beckman Corp.	US	Beecham Group PLC	UK	H, CB	03/31/89	07/26/89	7,922	17.63	3.62	9.99	1,356
Marion Merrell Dow Inc.	US	Hoechst AG	GR	H, CB	02/28/95	07/18/95	7,121	0.38	−3.26	−2.08	−381
Pharmacia AB	SW	Upjohn Co.	US	H, CB, ME	08/21/95	11/02/95	6,989	14.22	17.36	16.27	1,620
Medco Containment Services Inc.	US	Merck & Co. Inc.	US	V	07/28/93	11/18/93	6,226	15.02	−4.99	−3.23	−1,511
Syntex Corp.	US	Roche Holding AG	SZ	H, CB	05/02/94	11/03/94	5,307	61.82	1.69	13.24	2,247

(*continued*)

Table 6.2 (continued)

Target Name	Target Nation[a]	Acquirer Name	Acquirer Nation[a]	Type[b]	Date Announced	Date Effective	Value of Transaction ($millions)	Percentage of Target Stock Return	Percentage of Acquirer Stock Return	Percentage of Weighted Stock Return	Total Stock Value Created ($millions)
Sterling Drug	US	Eastman Kodak Co. Inc.	US	D	01/25/88	02/29/88	5,100	7.41	−15.27	−11.93	−2,146
Wellcome PLC-OTC Products	UK	Warner-Lambert Co.-OTC Products	US	H, CB	07/28/93	06/30/94	4,397	6.69	2.39	3.53	467
PCS Health Systems (McKesson)	US	Eli Lilly & Co.	US	V	07/11/94	11/21/94	4,000	33.49	−16.05	−7.80	−1,494
Gerber Products Co.	US	Sandoz AG	SZ	D	05/23/94	12/19/94	3,686	47.52	−0.70	6.92	999
AH Robins Co. Inc.	US	American Home Products Corp.	US	H	12/23/87	12/15/89	3,194	21.45	−0.24	4.04	523
Diversified Pharmaceutical	US	SmithKline Beecham Corp.	US	V	05/03/94	05/27/94	2,300	13.50	4.62	6.26	622

Source: Security Data Corporation Mergers and Acquisitions Data Base and Datastream International

[a]SW = Sweden, UK = United Kingdom, US = United States, GR = Germany, SZ = Switzerland.

[b]H = horizontal, V = vertical, ME = merger of equals, CB = cross border, D = diversifying.

Table 6.3 **Industry-Adjusted Long-Run Premerger and Postmerger Performance of the Bidder and Target in Large Horizontal Mergers**

	Cumulative Stock Return between 87 Weeks and 9 Weeks *before* the Merger	Cumulative Stock Return between 9 Weeks and 87 Weeks *after* the Merger
Targets		
American Cyanamid	−12.92	
Syntex	−47.64	
Wellcome	−27.52	
Marion Merrell Dow	−1.23	
Targets average	−22.33	
Bidders		
American Home Products	−20.40	
Roche	120.80	
Glaxo	−19.61	
Hoechst	4.42	
Bidders average	21.30	
Merged Firms		
American Home Products		13.01
Roche-Syntex		−19.21
GlaxoWellcome		−8.21
Hoechst Marion		20.31
Merged average		1.48

the industry. What factors led some firms to pursue or to be the target of large horizontal acquisitions? The stock market evidence in table 6.3 can provide a partial answer. This table gives the market performance of firms involved in a large horizontal merger for a period of one and one-half years before and after the merger. (In a few cases, we only had one year of postmerger data.) Target and bidder performance is measured relative to an index of pharmaceutical firms that did not engage in horizontal or vertical pharmaceutical mergers. Because we are interested in explaining why firms become bidders or targets, we want to eliminate any change in stock values associated with rumors of the merger. Thus, we eliminate the eight weeks immediately preceding the merger announcement. Similarly, we eliminate the eight postmerger weeks to focus on only postmerger events that are not associated with the deal announcement.

To construct this table, we began with the complete list of major pharmaceutical firms given in figure 6.4. This figure shows the market shares before and after mergers for the leading firms. We wanted a list of horizontal merger firms and a control group of firms that did not engage in pharmaceutical mergers. From that list, we eliminated firms with incomplete weekly stock data from 1990 to the middle of 1996. To focus on only recent, horizontal mergers with clear bidders and targets, we also eliminated firms engaged in vertical mergers, pharmaceutical mergers before 1990, or mergers of equals. This left us with a sample of four large

pharmaceutical mergers (American Home Products' acquisition of American Cyanamid in 1994, Roche's acquisition of Syntex in 1994, Glaxo's acquisition of Wellcome in 1995, and Hoechst's acquisition of Marion Merrell Dow in 1995) and six control firms (Pfizer, Johnson and Johnson, Bayer, Abbott, Sanofi, and Schering). We created an equal-weighted index of the control firms and subtracted it from the target, bidder, or merged firm's return. Finally, we cumulated the adjusted return over the premerger and postmerger period.

The returns to the target firms are very consistent. All of the target firms were underperforming their peer group in the eighteen months before they became a target. On average, the targets lost 22 percent of their value during this period. Target firms were either failing to address the challenges of this changing industry or they had additional difficulties (such as the impending patent expiration of Wellcome's Zovirax). The evidence on the bidder returns is less clear. Two of the firms, Glaxo and American Home Products, displayed stock losses similar to the targets. One firm, Roche, dramatically outperformed its industry in the premerger period. The postmerger findings for the combined firms is equally mixed. This suggests that there is no systematic reevaluation of the merger announcement stock returns discussed above.

6.4 The Market for Corporate Control in the Pharmaceutical Industry

A wave of pharmaceutical mergers was feasible because this market is so unconcentrated. The dispersed nature of this industry is clear from figure 6.4. Before the recent wave began, the top ten firms controlled only 29 percent of the worldwide market. Even after substantial merger activity, the top ten firms control only 38 percent of the market. There are still a substantial number of firms that have not participated in the large horizontal consolidation. One industry expert indicated that there are probably forty companies for which consolidation still makes sense.

A significant amount of research in finance has shown a link between ownership and performance.[18] The difficulty is that the relationship is complicated. A large shareholder can provide important monitoring of corporate activity including the decision to acquire or be acquired (Fama and Jensen 1983). When the large shareholder is management or is aligned with management, entrenchment can harm performance and block changes in corporate control (Stulz 1988). Many firms in the pharmaceutical industry have a single shareholder or shareholder group with over 5 percent ownership. This concentrated ownership structure stems from three sources. First, many of the pharmaceutical companies began as family-owned businesses and the family or related endowment maintained a significant stake (e.g., G. D. Searle, Richardson-Vicks, Eli Lilly, Johnson

18. See Servaes and Zenner (1994) for a review of this literature.

and Johnson, Upjohn, Roche, Merck AG, Wellcome plc). Second, large global pharmaceutical companies often reside in countries where significant ownership is a common form of corporate governance (e.g., Astra, Novo Nordisk, Sandoz, Rhone-Poulenc, Schering, Synthelabo, and almost all of the Japanese pharmaceutical companies). Third, the pecking order hypothesis suggests that if internal funds are unavailable then the next best solution to the R&D-related information asymmetry and moral hazard problems is large block equity ownership (e.g., SmithKline Beecham, Syntex, and Zeneca).[19] Corporate theory suggests that this concentrated ownership structure should both facilitate and block merger activity. Both outcomes are evident in pharmaceuticals. A number of firms on the above lists have been acquired, while a similar number of small- to medium-size players have remained independent. It is also clear that some pharmaceutical firms are willing to use hostile acquisitions to overcome managerial entrenchment. The support of the Wellcome Trust for Glaxo's hostile takeover of Burroughs Wellcome illustrates the important role of these corporate governance issues.

From our discussions with industry experts, it is clear that an active industry merger market creates unique opportunities and challenges for bidders. These include increased strategic focus, a time trade-off between reduced uncertainty and scarcity, and the ability to adapt the acquisition method to escalating premiums.

Two pioneering mergers led firms to more actively focus on acquisitions as the potential solution to the challenges they faced. Merck's acquisition of Medco in 1993 encouraged other firms to look carefully at the vertical integration option. American Home Products' hostile takeover of American Cyanamid demonstrated that horizontal combinations could be used to dramatically cut costs. These deals escalated the intensity with which firms, consultants, and investment banking consider mergers, acquisitions, and takeovers. For example, it is not uncommon for major subsidiaries and their parents to independently consider alternative merger candidates. This increased scrutiny probably increases deal efficiency if it allows firms to become proactive rather than reactive. However, a fear is that this environment will encourage entrenched managers to seek acquisitions to avoid becoming a target. Surprisingly, we did not find evidence from our interviews of this acquire-or-be-acquired attitude.

This active merger market also creates a critical trade-off between reduced uncertainty and scarcity. Pioneering mergers face greater risk.[20] The potential success of the strategy is unknown. Therefore, investors are likely to discount the estimated synergies. Subsequent mergers can learn from

19. Information on ownership was taken from Worldscope and Compact Disclosure.

20. For example, even the CEO of Glaxo, Sir Richard Sykes, expressed skepticism about American Home Products' bid for American Cyanamid. According to the *Wall Street Journal,* "Sir Richard scoffed at claims that drug giants could easily boost profits by gobbling up weak rivals like American Cyanamid and slashing cost" (9 September 1994, p. B2).

the successes and failures of the pioneers. However, since there is often a limited number of good targets, competitive pressures may force firms to pay the full value of the synergies.

A mechanism used to avoid escalating premiums is a merger of equals. In these deals, the stocks of both firms are exchanged for the newly created stock of the merged company. No premium is paid. The merger gains are shared between the two firms. A merger of equals, however, faces what is known as "interloper risk," in which another firm is encouraged to bid for one of the two firms. Shareholders might prefer the certainty of receiving a target premium over the promised future synergies of the merger of equals. Thus, for a merger of equals to avoid interloper risk, it is critical that the future synergies be quickly incorporated into the stock value on the announcement of the merger. Because American Home Products had demonstrated the potential cost-cutting savings from horizontal mergers, horizontal merger efficiency claims were credible. Thus, subsequent announcements of mergers of equals resulted in immediate and dramatic increases in both parties' stock value (e.g., Pharmacia and Upjohn and Sandoz and Ciba-Geigy).

6.5 GlaxoWellcome Case

Glaxo and Wellcome have a long and distinguished history dating back over one hundred years. Glaxo's history can be traced back to the late 1800s and the Nathan family trade and dairy business in New Zealand. Their first manufactured product was a dried milk that was trademarked as Glaxo (which was derived from *lacto*). In the 1920s it expanded into vitamins by licensing a vitamin D extraction process, using it to reinforce baby food and produce its first pharmaceutical, a drop-dose version of vitamin D. During the Second World War, Glaxo scientists developed a new method for the mass production of penicillin that proved to be critical for Britain's war effort and led to a leading position in antibiotics. Prior to Wellcome, Glaxo's most important acquisition was of a U.K. firm, Allen & Hanburys, which brought them not only a leading manufacturer of infant foods and insulin, but more importantly a brilliant scientist, Dr. David Jack. For twenty-six years he directed Glaxo's R&D, developing a leading position in respiratory and gastrointestinal ailments. (Jack retired in 1987 and was replaced by Dr. Richard Sykes, Glaxo's current CEO.) Glaxo also displayed its marketing prowess by beating out Tagamet in the peptic ulcer market, even though its product Zantac was developed six years after Tagamet. "Me too" drugs are not supposed to be blockbusters. Glaxo's international roots expanded in the 1970s and 1980s, including a 1978 entry into the United States.

In 1880, Silas Burroughs and Henry Wellcome, two American pharmacists, formed Burroughs Wellcome & Co. in London. Their purpose was

to supply Britain with U.S. compounded medicines. After Burroughs's death in 1895, Wellcome became the sole owner of the company. When Wellcome died in 1936, he willed the company to the Wellcome Trust to ensure that the company's profits went to medical research and education. Wellcome became a public company in 1986 when Wellcome Trust sold 25 percent of its ownership to the public. It sold another 35 percent in 1992. Henry Wellcome gave Wellcome a firm foundation in research, global outlook, and marketing. He established the first in-house pharmaceutical research facilities in 1894, starting a tradition of research that led to four Nobel Prizes for Wellcome scientists, including a 1988 prize for pioneering the rational drug approach. This academic-like research tradition helped give Wellcome the premier position in antivirals. In the early 1970s, Wellcome scientists did what many thought was impossible. They found a way to destroy a virus without harming its host cell. This led to Wellcome's two leading products, Zovirax and AZT. Henry Wellcome also established an early tradition in globalization by forming a U.S. subsidiary in 1906 and a floating laboratory on the Nile in the early 1900s that helped Wellcome become a leader in tropical diseases.

6.5.1 Premerger Challenges

Glaxo and Wellcome's phenomenal successes with Zantac and Zovirax turned out to be a double-edged sword. Their successes helped fuel the growth of large organizations. However, with half of their sales in the United States and U.S. patents set to expire in 1997, replacing that fuel was proving difficult. Glaxo and Wellcome were employing the classic defenses of these products including improved formulation, litigation to delay early entry, and moving to OTC status before expiration (although Zovirax was denied FDA approval for OTC). Despite these efforts, analysts estimated that both products would lose two-thirds or more of sales by the year 2000.

Replacing blockbusters is especially difficult given the changes in the pharmaceutical industry. Generic drug firms were ready to move as soon as Zantac and Zovirax patents expired. By the end of 1996, three firms had production facilities with tentative FDA approval ready to produce a generic Zantac. Valtrex, Wellcome's improved formulation of Zovirax, already faced competition from a similar SmithKline Beecham drug, Famvir. Multiple sources of competition for new unique successful drugs developed by Glaxo, like the migraine drug Imitrex, were just on the horizon (including one developed by Wellcome). While Wellcome retained its premier position in antivirals, competition in this area was increasing. The U.S. government continued to put pressure on Wellcome to keep AZT prices down and the French government has complained about the high price of Imitrex. Hospitals, HMOs, and PBMs have been successful in obtaining rebates on Wellcome and Glaxo products even before patent

expiration and the new competition. As with all pharmaceutical companies, the cost of doing research continued to rise. Zantac and Zovirax were generating enough money to cover these costs and still build up cash reserves, but time was running out. If action was not taken, downsizing and layoffs would be necessary. (In fact, Glaxo was starting to shrink through attrition.) Furthermore, their declining stock price relative to other pharmaceutical firms (table 6.3) and cash reserves could make them an attractive takeover target.

While each firm faced similar challenges, how they reacted to them was somewhat different, perhaps because Glaxo, being three times the size of Wellcome, could pursue more and larger options. Glaxo pursued all three merger-related approaches. Concerns about growing buyer power, Merck's acquisition of Medco, and the informational requirements of new disease management programs led Glaxo to consider vertical integration through a joint venture with Johnson and Johnson and McKesson to run McKesson's pharmacy benefit manager division, PCS Health Systems. However, when McKesson saw SmithKline Beecham follow Merck by purchasing the PBM Diversified Pharmaceutical, McKesson decided to shop PCS around before joining in a joint venture. That strategy worked and Eli Lilly bid $4 billion for PCS. Johnson and Johnson and Glaxo's decisions not to join in the bidding suggest that they did not see the same value in PCS that Lilly saw. Glaxo decided to pursue more modest alliances with downstream firms.

Glaxo also was active in biotech joint ventures, licenses, and acquisitions. The most dramatic of these was Glaxo's 1995 acquisition of Affymax, the leader in combinatorial chemistry, for over $500 million. Using high throughput screening and robotics, combinatorial chemistry allows compounds to be evaluated in a fraction of the time used by more established techniques. In the race to be the first drug in a class to market and to increase the time distance with "me too" drugs, increased research productivity is critical. Still, the payback from this acquisition is long (possibly ten years) and uncertain. These types of acquisitions would not address the Zantac problem. Licensing could help, especially because it directly addresses the potential excess capacity problems Zantac would create. Since Glaxo's inception, when it licensed the process to create dried milk, it has had success in licensing. A recent example is Glaxo's license of the HIV drug, 3TC, from Biochem Pharma in 1991. This was Glaxo's first product in the antiviral area. However, competition for licenses is intense and it would be difficult to replace Zantac with licensed products.

Wellcome was considering many of the same options, but at smaller levels. However, they also were relying on their strong research tradition. They felt optimistic that their pipeline had the potential to replace Zovirax with Valtrex, an improved formulation. They predicted that combination therapies including AZT and 3TC would show great promise in fighting

AIDS. They even tried to license 3TC from Glaxo. While competitors had closed the gap, Wellcome still led in antivirals and thought they had the size and a number of promising new products (including 1592, Vertex Protease, FTC, and Wellferon) to maintain their leadership position. They were working on strengthening some other areas, like central nervous system (CNS), to gain economies of scope. But even these areas contained some promising products including a competitor to Glaxo's migraine drug Imitrex, called 311C. (The FTC felt that 311C showed enough promise as a unique competitor to Imitrex that it required 311C's divestiture.) Also, preliminary tests revealed that their antidepression product Wellbutrin showed promise in helping patients to stop smoking. Their declining stock price, however, suggested that the market disagreed with these optimistic projections. Some disappointments in prior Wellcome management claims, particularly in the cardiovascular area, had hurt Wellcome's credibility in the market. This put Wellcome in a difficult position. If they were correct in their forecasts, their undervalued stock price just made them a more attractive target. If they were wrong, a sharp downsizing would be needed.

6.5.2 Glaxo-Wellcome Merger

On 20 January 1995, Glaxo announced its boldest and most direct approach to dealing with the changing pharmaceutical industry and the Zantac problem—the acquisition of Wellcome. A shocked Wellcome management quickly rejected the offer and began seeking a white knight. In part because of a pledge by Wellcome Trust to sell their 40 percent to Glaxo, no white knight materialized. On 7 March 1995, Wellcome agreed to the merger.

Using just the announcement-day stock returns, an event study analysis of the merger reveals that Glaxo paid a 40.7 percent premium for Wellcome, increasing Wellcome shareholder value by $3.8 billion. On the day of the announcement, Glaxo shareholders earned an abnormal return of −5.5 percent for a loss in shareholder value of $1.9 billion. Thus, based on the day of the announcement (which was truly a surprise to the market and even some senior managers at Glaxo), the merger created $1.9 billion. This is probably a lower bound. On the same day of the merger, Glaxo announced a decline in Zantac sales of 4 percent. Thus, some of the loss in market value may be due to this new forecast. Prior announcements concerning declines in Zantac had reduced Glaxo's shares by as much as 2 percent. In addition, the market may have been concerned that Glaxo would get in a bidding war. Glaxo's shareholders did earn a positive abnormal return of 3.8 percent when Wellcome finally agreed to the original offer. Thus, it might be reasonable to assume that Glaxo shareholders were unaffected by the merger announcement. Under this assumption, the merger created $3.8 billion in net shareholder value.

There are two clear corporate governance issues in the Glaxo-Wellcome merger. First, the role of the blockholders in facilitating mergers is demonstrated by the Wellcome Trust. They made it possible for Wellcome to become a target and helped Glaxo avoid a bidding war.[21] Second, mergers sometimes require a change in top management. Sir Richard Sykes replaced Sir Paul Girolami as CEO just six months before the Wellcome acquisition. Girolami strongly favored organic growth over large acquisitions that would add debt and take funds away from R&D.

In an interview with *Management Today,* Glaxo's CEO Sir Richard Sykes explained why they merged with Wellcome. "Why merger? Two reasons, he says. First, the squeeze on health-care costs caused by recession. Drug companies with what is perceived as their arbitrary pricing of products, are easy targets for governments trying to cut costs. And second, Zantac. You cannot continue to grow organically if you have got a 2.4 billion pound product that is going on the decline, however clever you are. . . . Why Wellcome? Because says Sykes, it is the right size to be managed, the right shape to be easily integrated, and it had a weakness that made it an easier prey than others: it was 40%-owned by the Wellcome Trust, a charitable foundation which had a fiduciary duty to maximize its income" (*Management Today,* December 1995, p. 58).

Not everyone agreed with Sykes's motive or selection. William Steere, CEO of Pfizer, echoed a common skepticism. "I don't know what you get out of consolidation, frankly. Just being bigger is not particularly better" (*Business Week,* 13 January 1997, p. 110). Others thought that Glaxo had only traded a single "Z" problem (Zantac) for a "double Z" problem (Zantac and Zovirax). We now turn to how consolidating these two problems might improve GlaxoWellcome by $2 billion to $5 billion.

6.5.3 Sources of Value Creation—Cost Savings

As discussed above, the simplest answer is through an estimated $1 billion a year cost savings. GlaxoWellcome expected to achieve these annual savings by the end of 1998. The savings in 1995–97 appear to just about cover (on a discounted basis) the $1.8 billion integration cost, which primarily includes severance and early retirement pay and costs in closing sites. Using a discount rate of 13 percent, we can discount the post-1997 savings back to beginning of 1995 and compare them to our estimates of value creation and the premium paid for Wellcome.[22] These cost savings would need to be sustained through the year 2000 to cover the stock mar-

21. On the other hand, Wellcome management felt betrayed by the Wellcome Trust. Wellcome management had a written agreement with the Wellcome Trust that management would be informed and have a voice in any change in control. The Trust overruled this agreement because of their perceived fiduciary responsibility to effectively manage the Trust.

22. The 13 percent was the median discount value reported in the merger filings of a contemporaneous merger, Pharmacia Upjohn.

ket's lower bound estimate of value creation, and through 2006 to cover the premium paid for Wellcome and the stock market's upper bound estimate.

This exercise is somewhat academic for several reasons. First, three sets of projections must be accurate for the cost-savings estimate to be correct. The cost savings are calculated as the difference between the sum of Glaxo's and Wellcome's independent projections prior to the merger and the projections of the newly formed GlaxoWellcome. Second, these savings ignore other costs and benefits. They do not include the revenue-enhancing merger gains, nor do they include the nonaccounting post-merger integration costs. They also assume that the tax impacts of the cost savings are offset by the tax savings from the increased debt.[23] Finally, this exercise assumes that the cost cutting does not lower revenue. These are a lot of assumptions even for an economist. However, the estimates reveal how difficult it is to create value in mergers, especially for the bidder. To break even Glaxo must grow and then sustain a $1 billion annual cost savings over a substantial length of time.

How reasonable are GlaxoWellcome's assumed cost savings? Table 6.4 compares GlaxoWellcome's estimates of the projected cost savings and headcount reductions to seven other large horizontal mergers. All of these mergers project substantial cost savings of between 11 and 29 percent of the target's sales and 8 to 20 percent of the combined firm's workforce. Furthermore, most of these deals have achieved or are well on their way to achieving the estimated savings. For example, Roche-Syntex reached their estimated cut of five thousand jobs in the first eighteen months after the acquisition. Further rationalizations are also possible. On the basis of target sales, GlaxoWellcome's cost-saving estimates are higher than any of the other horizontal mergers. On the other hand, GlaxoWellcome's estimated headcount reduction relative to combined headcount is about average. Investment banking estimates and press reports put the estimate at as high as fifteen thousand. This would push headcount reduction to 23 percent of combined value, which would also be at the top of the list.[24] In any

23. If we were to assume that there were no tax benefits from the merger, then the cost savings would be reduced by around 30 percent (Glaxo's worldwide tax rate). With this adjustment, the cost saving would need to be sustained through the year 2002 to achieve the stock market's estimated lower bound merger synergies. The cost savings would need to be sustained forever to cover the premium paid for Wellcome. While even a crude estimate of the merger-related tax savings is difficult for a multinational R&D company like GlaxoWellcome, the potential tax savings are sufficiently large (the merger was financed with almost $9 billion in debt) that assuming the tax liabilities from the cost savings are covered by the tax saving from the merger seems more reasonable than no merger tax savings.

24. It is not surprising that GlaxoWellcome's estimated savings are higher than other companies'. They have closer geographic overlap than any of the other mergers. Each firm had 40 to 45 percent of their sales in the United States and 30 to 35 percent in Europe. Both had worldwide headquarters in the United Kingdom and U.S. headquarters in the same state. Both were also facing substantial declines in their leading products.

Table 6.4 **Synergy Estimates and Headcount Reduction for Large Horizontal Pharmaceutical Mergers**

	Merger Date	Estimated Annual Cost Saving at Maturity ($millions)	Combined Sales at Time of Merger ($millions)	Cost Saving as a Percentage of Smaller Co. Sales	Estimated Headcount Reduction	Combined Headcount at Time of Merger	Headcount Reduction as a Percentage of Total Headcount
Novartis[a]	1996	1,500	29,247	12	10,200	102,500	10
Pharmacia and Upjohn[a,b]	1995	800	6,949	15	4,100	34,500	13
Glaxo-Wellcome[c]	1995	1,000	11,960	29	7,500	64,400	12
Roche-Syntex[a]	1994	450	15,645	21	5,000	65,000	8
AHP-Cyanamid[d]	1994	700	12,500	17	7,630	77,950	10
Bristol-Myers Squibb[e]	1989	420	9,190	16	5,000	54,100	9
SmithKline Beecham[f]	1989	320	6,840	11	5,500	55,000	10
Marion Merrell Dow[e]	1989	170	2,350	16	1,970	9,844	20

Source: Data from Goldman Sachs, the Monitor Company, annual reports, and "Major Mergers in the Pharmaceutical Industry."

[a] Management estimates of cost synergies only.

[b] Originally $500 million in synergies was announced.

[c] GlaxoWellcome 1995 Annual Report.

[d] Company progress report on cost/headcount reduction, and Morgan Stanley extrapolation of these to maturity.

[e] Inferred from actual operating profit improvements and sales-adjusted headcount two to three years after merger.

[f] Actual number of headcount reduction offered by company.

event, table 6.4 shows that cost savings are an important part of large horizontal pharmaceutical mergers and that the insights gained from GlaxoWellcome should generalize.

To demonstrate how the cost cutting works, the typical cost structure of a pharmaceutical firm—before and after a merger—is illustrated in figure 6.5. The cost as a percentage of sales for the average U.S. and European firms in 1996 can be divided into administration (5 percent), marketing and sales (30 percent), R&D (15 percent), and cost of goods sold (30 percent) for an operating profit of 20 percent. Cost savings may come from the acquired or acquiring company, but for illustrative purposes we will assume that all of the savings come out of the target firm expenditures. Experts estimate that much of the target's overhead can be eliminated in the merger. R&D in the target company can be cut by several percentage points, and R&D laboratories may be combined and marginal R&D projects can be cut. Substantial saving can come from combining sales forces and eliminating redundancy. Excess capacity exists in the manufacturing operations of most pharmaceutical companies. By consolidating production into fewer plants, those plants can be operated more efficiently and other plants can be sold. A 5 percentage point reduction in the target's commercial operation and a 10 percentage point reduction in manufacturing operation are obtainable. These reductions total 20 percent of the target's sales, which is the average reduction in table 6.4. This improves the

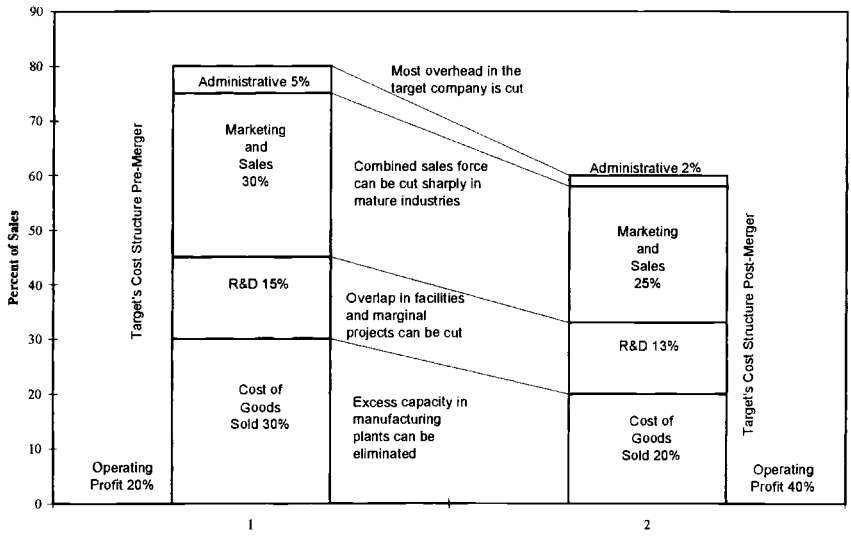

Fig. 6.5 Cost savings from horizontal pharmaceutical mergers

Source: Morgan Stanley presentation on average operating statistics for U.S. and European pharmaceutical companies. Size of cuts comes from authors' discussions with industry experts.

target's operating profit to 40 percent with a total cost savings of $800 million on the average target's sales of $4 billion.

Initial evidence from the Glaxo-Wellcome merger demonstrates that these cost savings are feasible. Administrative cost savings are clear. Glaxo and Wellcome were both research-oriented firms with 100 percent of sales in pharmaceuticals and extensive geographic overlap in all of their primary markets. They had similar organizational structures revolving around geography and function. Thus, most of the major administrative positions were redundant. Once the decision was made as to which individual got the comparable position in the new organization, human nature generally drove the other individual to accept early retirement or a severance. Similarly, the staff associated with these administrative positions and functions could also be reduced.

The combined firm inherited more than sixty production sites. Wellcome had key manufacturing plants in Dartford (U.K.), Greenville (N.C.), and Kobe (Japan). Glaxo had three plants in the United Kingdom and key sites in Zebulon (N.C.), Verona (Italy), and Singapore. The other sites consisted of numerous secondary plants in many countries. This extensive system of secondary production sites was driven in part by local content requirements and by a belief that local production helps sales. There is substantial potential for savings by consolidating these plants. Many of the secondary production sites can be combined. However, this will take time because most of the countries that encourage local production also discourage plant closings and layoffs. Most of the large cost savings will come from selling the main plants. Wellcome's Greenville, North Carolina, plant was sold. This plant makes primary chemicals, packaged chemicals (tablets, creams, and ointments), and steriles. The primary chemicals were transferred to Singapore, the packaged chemicals to Glaxo's Zebulon, North Carolina, plant. The large state-of-the-art steriles facility at Greenville was built in anticipation of growth that had not yet materialized and therefore was not needed by GlaxoWellcome. The Singapore and Zebulon plants had sufficient excess capacity that Greenville's production could be added without major changes in facilities or staff. The Greenville plant employed nineteen hundred workers. By 1997, Greenville was the only major plant to be sold. However, a team was carefully evaluating worldwide production. Expectations were that this effort could easily equal the Greenville savings. If realized, manufacturing could account for a significant amount of the total cost savings.

An analysis of the savings on the commercial side is more complex. Until recently, the industrywide trend was to reduce the sales force. Better information allowed firms to be more selective in targeting which doctors could affect sales and corporate executives held the belief that the concentration of power into HMOs, PBMs, and large hospital chains had dimin-

ished the role of the doctor in determining prescriptions. New studies indicate that the doctor's role is still critical and firms have been reinstating sales forces. Glaxo's plans had been to reduce the sales force through attrition in anticipation of Zantac's decline. However, GlaxoWellcome is also trying to counteract the decline with new product introductions. Demands on the sales force are at a peak for new product introduction. All of these factors were changing around the merger, making premerger forecasts (which are the foundation of cost-savings estimates) obsolete.

Adding to this complication is the discrete nature of the sales force production function. Doctors tend to limit the sales discussion to a maximum of two to three drugs. Thus, a sales representative will generally handle a maximum of four to five drugs. Since most of Glaxo's products were sold to general practitioners, some of Glaxo's sales force could add Wellcome drugs to their portfolio, but others could not. For products that were sold to specialists, the economies were clearer. For example, Glaxo's sales force were calling on neurologists with one product, Imitrex. Wellcome had a co-promotion agreement with Dupont to sell Wellcome's Lamictal to neurologists. With only training costs, Glaxo's neurologist sales force could combine Lamictal and Imitrex, saving on the co-promotion agreement. The combination would also improve the sales force's ability to gain access to more doctors.

After a complex analysis that included accounting for the industry trends and the decline in Zantac and Zovirax, GlaxoWellcome's best estimate is that the merger will allow the U.S. sales force (including contract workers) to be reduced. These estimates suggest that the percentage of headcount reductions in the commercial area is similar in magnitude to the percentage of headcount reductions for the whole company.

GlaxoWellcome's mission statement begins with "GlaxoWellcome, a research-based company. . . ." Survival in the pharmaceutical industry depends on top-line growth through innovative products. Toward this end, Glaxo recently built a billion-dollar research complex in the United Kingdom at Stevenage, and acquired the leading firm in combinatorial chemistry, Affymax, for over $500 million. Developing new products and improving research productivity remain the firm's primary focus.

Nevertheless, GlaxoWellcome did use the merger to reduce research costs in two ways. First, they took a new look at each research project. Starting from a clean slate, they eliminated or put on hold marginal research projects. (They also identified some underfunded projects.) Second, they closed Wellcome's main U.K. research facility in Beckenham, which housed fifteen hundred scientists and staff. Some of the scientists and projects at Beckenham were transferred to Stevenage, but a significant number were cut. Stevenage was designed before the merger with enough capacity to combine two of Glaxo's older labs in Ware and Greenford. Therefore,

it was a challenge to accommodate the added research from Beckenham. These two forms of cost savings are, of course, related. Given the difficulty in estimating the net present value of a research project in its early stages, projects are often decided on the basis of opportunity costs. Reducing the space increases the opportunity cost of any one project.

6.5.4 Sources of Cost Savings

What mechanism allows GlaxoWellcome to cut costs without jeopardizing net present value projects? Economists discuss two fundamental paths to true cost savings—economies of scale or scope and elimination of inefficiencies. In theory, these concepts are distinct. Economies of scale and scope refer to the shape of the cost curves for efficiently operated firms. Inefficiency is defined as a firm operating inside of its production possibility curve. In practice, these curves can be estimated with sufficiently detailed data. However, for the time period and cost factors that we are investigating, such detailed data do not exist.[25]

The source of cost savings can be inferred from our discussion of the ways costs were cut. Given that economies of scale are size-based cost advantages assuming firms are operating efficiently, these types of savings would need to meet three conditions. First, they would need to be savings that Glaxo and Wellcome could not have achieved on their own. Second, they would have to be savings that another efficiently operated firm that is smaller than premerger Glaxo is not achieving. Third, they would need to be savings that do not stem from excess capacity, that is, savings that result from the decline in Zantac or from the changing industry conditions discussed in section 6.2 (with the exceptions of conditions that would increase scale economies).

Some of the cost savings clearly meet these conditions. The cuts in administrative costs could not have occurred without the added size brought on by the merger. On the surface, it would appear that any merger can achieve these economies because you do not need two CEOs, accounting departments, legal departments, and so forth. However, the less related the two organizational structures, the less overlap there is to cut and the more likely bureaucracy and bonded rationality will offset any cuts. The similarity in focus, organizational structure, and location makes the administrative economies of scale feasible for GlaxoWellcome.

On the other hand, the main manufacturing cost savings do not stem

25. The only reports in the literature with sufficiently detailed pharmaceutical data to estimate production functions are Cockburn and Henderson (1995) and Henderson and Cockburn (1996). Their data contain confidential internal records of ten pharmaceutical firms between 1961 and 1988. Their production function relates one input research on new compounds to various outputs, most notably important patents. Thus, even if these data were available and updated to include the 1990s, it would cover only R&D cost savings.

from economies of scale but from a reduction in excess capacity, which is achieved by closing the plants with the greatest excess capacity and operating the remaining plants more efficiently.[26] An exception may be a regulatory advantage to size caused by local content requirements. Individually, even a highly efficient firm would have to operate a production facility in a country with these requirements if it wanted to sell there. Combining these firms would allow firms to close one of these facilities.

The R&D cost savings do not fit either the economies of scale or reduced excess capacity explanations. Like manufacturing, Glaxo closed one of Wellcome's large R&D facilities. But it was not because Glaxo's new Stevenage facility had excess capacity. Sharing expensive indivisible laboratory equipment is a classic economies of scale example. Some of this may be occurring at Stevenage. However, the indicated source of R&D savings stemmed from reducing their scientific workforce and canceling, postponing, or delaying projects. These cuts appear to be a recognition of the new economics in the pharmaceutical industry and a substitution of internal for external R&D. In economic terms, the allocations of resources in premerger R&D were inefficient.

A problem with this source of cost savings, it may be argued, is that it could have been achieved without the mergers.[27] While this is true, the interviews we undertook made it clear that this argument ignores the organizational behavior realities of business. A merger allows firms to "start with a clean slate" and "take a fresh look at the organization." In R&D and most other areas, GlaxoWellcome used the merger to stimulate the organization into considering change.[28] If done properly, this change can be very positive for an organization.[29] By combining their problems and creating a discrete event, the firms could justify the disruption costs of solving their problems through downsizing rather than following their premerger strategy of reduction through attrition.

An alternative approach to addressing the question of the source of cost cutting is to focus on the timing. Why did GlaxoWellcome merge in 1995 and why was there a concentration of pharmaceutical mergers in the 1994–96 period? The evidence using this approach falls strongly in favor of

26. In theory, this excess capacity could be reduced without the merger through coproduction agreements, for example, GlaxoWellcome could have sold some of their production capacity to another firm. These agreements are rare in the pharmaceutical industry (and in many others). Even contract manufacturing to independent organizations is not fully utilized because of concern about the longevity and reputation of these firms.

27. There is an indirect excess capacity explanation. If both firms had cut back on R&D independently, these cuts would not have been enough to close major facilities.

28. For example, worldwide technical director Joe Blaker asked managers from each manufacturing site to justify their existence (*Financial Times*, 9 April 1996, p. 10).

29. One interviewee even paraphrased Napoleon, stating that "to motivate your troops you need to shoot a few."

inefficiencies and excess capacity created by the changing pharmaceutical economics and the decline of the firms' major products. There is little evidence that the economies of scale and scope have changed with respect to administrative, manufacturing, or commercial costs.

There are some significant new developments in R&D that could substantially change the economies of scale and scope and greatly stimulate the productivity of R&D. Two significant (and related) developments are mapping the genes of organisms—from microbes to human beings—and combinatorial chemistry. The cost and potential spillovers of the complete genomic sequencing are enormous. These projects will dramatically increase the number of new drug targets. Combinatorial chemistry automates the search process, increasing the speed by which compounds can be tested when new targets are found. The issue is to what extent are these going to be the domain of large firms. Smaller firms will still play an important innovative role. Affymax, the leader in combinatorial chemistry, was a start-up in 1989. Small, focused, genetic research companies are increasing in number. In addition, joint ventures and government-sponsored research offer an alternative approach to large size in obtaining these economies. The human genomic sequencing project is being led by the National Institutes of Health (NIH). GlaxoWellcome has formed a joint venture with SmithKline Beecham for genomic sequencing of disease-causing microbes. Still, large organizations will be able to participate in a greater array of these ventures and they will be able to cover the fixed cost of development with a larger number of projects. For example, the benefits of Affymax technology apply equally well to Wellcome's research. Thus, the $539 million acquisition cost of Affymax can be spread over a larger research base.

6.5.5 Asset Restructuring

Glaxo and Wellcome were highly focused organizations. Thus, the opportunities for asset restructuring were limited. However, there were two areas where Glaxo thought the assets' usage was higher in another organization. Glaxo did not have an interest in marketing OTC products. They sold Wellcome's OTC business to Warner-Lambert, a company with more experience in the OTC business, for $1.05 billion. Warner-Lambert was a natural buyer, because both Glaxo and Wellcome had joint venture agreements to help switch prescription drugs to OTC status near the end of their patent life. This reallocation of assets created significant value for both parties. GlaxoWellcome's abnormal return from the announced acquisition was 6.7 percent and Warner-Lambert gained 2.4 percent for a total value creation of almost $500 million. GlaxoWellcome also sold off Wellcome's Singapore-based cosmetics business for approximately $140 million. Finally, GlaxoWellcome received an estimated $225 million

for the FTC-ordered divestiture of Wellcome's migraine drug 311C to Zeneca.[30]

6.5.6 Revenue

GlaxoWellcome believes there is significant potential for revenue growth from the merger. Top-line growth can come from a broader product line, the incorporation of each organization's best practices, scientific and technical gains, expanded global reach, and building a new corporate culture. The broader product line can increase access to doctors and help counteract buyer power. Through a careful selection of best practices, GlaxoWellcome can take advantage of each other's strengths. By leveraging modern technology and each organization's research skills, the merger can enhance the productivity of R&D. Also, combining Glaxo and Wellcome research at Stevenage will increase the exchange of ideas between projects (i.e., economies of scope). As the abnormal returns regressions indicate, the gains from expanding cross-border deals are substantial. Although there is a substantial overlap in Glaxo and Wellcome's vast global organizations, the combined organizations nevertheless have a stronger global presence and reach allowing them to capture some of the advantages of cross-border deals. Different corporate cultures can destroy value. However, GlaxoWellcome emphasizes the desire to build a new and better culture by combining the academic freedom of the Wellcome organization with Glaxo's business focus.

GlaxoWellcome admits, however, that articulating to outside parties these intangible benefits relative to the more certain and quantifiable cost savings is challenging. As noted, the cost savings are potentially large enough to create value for both Glaxo and Wellcome shareholders. Revenue gains are more important the faster cost savings are dissipated and the larger the intangible postmerger integration cost.

6.5.7 Postmerger

Many mergers fail because of postmerger integration problems (Smith and Quella 1995). Research has identified several key issues to assessing postmerger success. These include the extent of organizational autonomy, the speed of integration, the ability to maintain top management and key

30. The final divestiture agreement took a long time to hammer out, partly because strategies for divesting these types of intangible assets are at the forefront of antitrust. The FTC is asking the firm to help it create a competitor. FTC experience suggests that when the divestiture is not a separate entity with its own assets, the divesting firm has the potential and incentive to inhibit its future competitor. In this case, the FTC appointed a trustee to oversee the progress of the drug while the parties negotiated for the right buyer and a fair price. This issued played a major role in the 1997 Ciba-Geigy and Sandoz merger, in which the FTC ordered the licensing of dozens of gene therapies (see *Business Week*, 20 January 1997).

employees, and the communication of merger goals and procedures (Haspeslagh and Jemison 1991). How these issues are addressed depends on the nature of the acquisition synergies, the relative size of the two firms, and the culture of the two organizations. To achieve the cost and revenue savings in the Glaxo-Wellcome merger, organizational autonomy for Wellcome was impossible. Given Glaxo's inexperience with acquisitions, the other integration issues were addressed with the help of the Boston Consulting Group.

GlaxoWellcome decided that integration had to be achieved quickly. Prior horizontal mergers had been criticized for dragging out the merger integration process (especially Bristol-Myers Squibb and SmithKline Beecham). Speed was critical because serious work delays occur as employees worry about their jobs and morale suffers during the process even for the survivors. The task of integration involved twenty principal task forces that were then subdivided into numerous committees and subcommittees. It took only nine months for these task forces and committees to complete the main integration plans and to lay out the strategic direction for each functional and geographic area in the new organization. A special magazine devoted to the integration process was developed to communicate critical issues (e.g., "When will I know if I have a job?") to the employees. While there were complaints about some decisions being made too fast and, with hindsight, the task forces could have better identified and focused on the critical paths, the integration in general, appears to have handled the speed and communication issue well.

Retaining top management and key employees was more of a challenge. As discussed, almost nothing can prevent the loss of managers who do not get the equivalent of their old position in the new company. In some cases, this process creates an opportunity to prune marginal managers. However, talented managers are often lost and sometimes key employees whom they have mentored go with them. The net impact of these changes is difficult to assess. Several interviewees suggested that GlaxoWellcome lost more talent than they expected. In part, this was due to the generous nature of the retirement and severance pay.[31]

Perhaps the most controversial postmerger issue does not appear in the standard list given above. Often the terms *merger* and *acquisition* are used interchangeably. In this case, the words carried great meaning. Senior management decided that the Glaxo-Wellcome deal should be called a "merger" for the purposes of postmerger integration. For research- and marketing-driven pharmaceutical organizations, knowledge resides in the scientists and sales force. Glaxo needed to keep these employees if the merger was to succeed. They were also serious about creating value by

31. Even former managers gave GlaxoWellcome high praise for the way they treated departing employees. The retirement and severance packages were felt to be generous.

developing a new culture and employing the best practices of each organization. They felt that these objectives could not be met if Glaxo was "acquiring" Wellcome. Accomplishing this goal has proved to be difficult. Given that the merger began as a hostile transaction, many Wellcome employees remained skeptical. This skepticism increased as Glaxo's managers began obtaining a large number of senior positions, even though some of this imbalance was expected. Glaxo was three times Wellcome's size and many Wellcome managers were older and more likely to take early retirement (especially in countries like the United States where Wellcome had been since 1906 and Glaxo only since 1978). The downside of this strategy was that it also put Glaxo employees at risk. "Under US law, severance terms had to be offered to all employees of the combined company there" (*Financial Times,* 9 April, 1996). As a consequence, they lost valuable employees on both sides. Gains from applying the best practices of both organizations also came up against some roadblocks. There were cases in which Wellcome's procedure or equipment was superior but, because of Glaxo's size, it was cheaper and more expedient to adopt Glaxo's version.

In sum, integration leads to inevitable disruption and significant temporal losses. There is a period where the organization is more focused on the integration than on productivity. In general, GlaxoWellcome handled the postmerger integration issues extremely well. Still, managers admit to significant temporal losses from the integration process. The best concrete example is in sales. GlaxoWellcome had to totally reconfigure and retrain their sales force. Employees did not know what their job was or if they had a job. Although GlaxoWellcome resolved these issues extremely quickly, they still had to pull the sales force from their territories and stopped shipping samples for two months. During this time, they lost momentum, market share, and some key employees. What makes mergers so challenging from the bidder's perspective is that the synergies must be large enough to cover the premium paid and these postmerger disruption costs.

6.6 Discussion and Conclusion

This paper demonstrates the changing nature of the pharmaceutical industry and how these changes have led to value-creating horizontal mergers. By focusing on the Glaxo-Wellcome merger, we can illustrate how value is created and the roadblocks to achieving value creation. This detailed industry and firm case study yields insights into a number of issues debated in the academic literature. We find evidence that rapidly changing industry conditions do generate overcapacity (Jensen 1993) and free cash flow (Jensen 1986) that can be reduced through mergers. However, we find pharmaceutical managers engaged in restructuring without the need for

high debt, raiders, or dramatic changes in compensation. In pharmaceuticals, industry and stock market pressures were sufficient to induce bidders to change, although target manager compensation was insufficient in some cases to convince them to give up without hostile actions. We find evidence for economies of scale and scope, but we also find that the primary motive for increased size stems from the elimination of excess capacity and inefficiencies induced by the changing industry structure and firm product portfolio. This is consistent with work by Henderson and Cockburn (1996) and Dimasi, Grabowski, and Vernon (1995), who show that economies of scale and scope exist in pharmaceuticals, but that they are exhausted at the size of the largest firm prior to these horizontal combinations.

With respect to the debate concerning how mergers affect R&D (Hall 1990; and Hitt et al. 1996), we find that neither captures the relationship in pharmaceuticals. Hall argues that R&D is not affected by mergers. However, R&D is cut in large pharmaceutical mergers. Hitt et al. argue that R&D is cut in mergers because of increased debt, managerial distraction, and the imposition of financial controls. However, R&D remains the cornerstone of the merged pharmaceutical firms. Cutbacks are a result of changing pharmaceutical economics making marginal internal projects less attractive and some external alliance projects more promising.

Finally, we provide insights into why bidders often experience declines in stock market value upon the announcement of a merger. The challenge for bidders is not only to create value in the merger, but to create enough value to cover a competitive premium and substantial postmerger integration costs. Creative bidding solutions, like negotiating with blockholders and exchanging shares through a merger of equals, help avoid overpayment. An early focus on postmerger integration issues, like integration speed, retaining new employees, and building a new culture, are also critical to the bidder's success.

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Comment Robert Gertner

A good clinical paper shifts our prior assumptions by providing a detailed interpretative account of an industry or an event that the reader finds sufficiently compelling to merit some generalization. It also suggests areas that deserve more careful, systematic analysis. David Ravenscraft and William Long's analysis of the Glaxo-Wellcome merger achieves these goals from my perspective. A nice feature of a clinical paper is that different readers can reach very different conclusions. I am afraid that my conclusions may be quite different from those of the authors.

The papers in this volume fall into two categories: bad acquisitions and good acquisitions. The goal of the bad acquisition papers is to understand why managers make bad acquisitions, while the goal of the good acquisition papers is to understand the sources of value in mergers. This is so despite the fact that it may be difficult to categorize a merger without the benefit of 20/20 hindsight, and sometimes even with it. In any event, this paper falls into the good acquisitions category and focuses on value creation in the merger of Glaxo and Wellcome. Certainly, the stock market thought the merger was good news.

There are four broad reasons why a horizontal merger may enhance stock market value: (1) cost savings; (2) revenue enhancement unrelated to market power; (3) acquisition of market power; and (4) the market's expecting the companies to do something worse. This paper focuses on cost savings and, to some extent, revenue enhancement, but I wish to explore the last two explanations as well.

As Ravenscraft and Long point out, the pharmaceutical companies were prime candidates to make acquisitions in the 1990s, with torrents of free cash flow and reduced investment opportunities in their core business. A number of companies did make bad or at least questionable acquisitions, such as the vertical mergers into PBMs by Merck and Eli Lilly.

In such an environment, a horizontal merger that has little or no negative profit implications could raise stock market values. Incorrect expectations of very bad decisions can be a source of shareholder gains, but it would be a mistake to conclude that such a merger creates value.

The authors do not give much weight to the possibility that the merger increases market power. They base this conclusion on relatively low concentration in the pharmaceutical industry that is not greatly increased by the Glaxo-Wellcome merger. I do not think we can write off the market power story so easily. The new "rational" approach to research and development in the pharmaceutical industry is characterized by companies' fo-

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cusing on particular diseases. A merger could lead to a significant reduction in R&D competition within a particular class. I have no knowledge whether this is the case in the Glaxo-Wellcome merger nor do I know anything about entry barriers into R&D niches, but the potential concerns seem real. Further exploration, perhaps just to eliminate any concern, is merited.

Revenue enhancement is another possible source of value. The idea is that the merger may lead to an increase in competitive rents through mechanisms like brand-name extension. The authors do not seem to believe that revenue enhancement was an important motivation for the merger and I agree.

Cost savings from a merger can be divided into three types. First, there can be cost savings from exploiting economies of scale and scope. This is pushing out the production possibility frontier. Second, a merger may improve efficiency, thereby moving from the interior of the production possibility set toward the frontier. Third, a merger can lead to cost savings through capacity reduction, or more broadly, a reduction in scale. This last cost saving may not be an efficiency improvement at all. Costs go down but revenues may decline by as much or more. It may be difficult to know whether a reduction in capacity is an efficiency-enhancing elimination of excess capacity or simply a reduction in scale.

One advantage of a clinical paper is that it improves our chances of distinguishing among these possibilities; Ravenscraft and Long try to do just that. Unfortunately, the pharmaceutical industry is sufficiently complex that this is quite difficult even with detailed knowledge of the merger plans. Much of the anticipated cost savings derived from consolidation of production, reductions in R&D, and reductions in sales forces. It is very difficult to know if this is a reduction in scale, elimination of excess capacity, or scale economies. This is especially difficult for R&D reductions and sales force consolidation. A smaller sales force may result in reduced sales in the not-so-immediate future and reductions in R&D may show up in output reductions in only the very distant future. Accounting data will not help. The authors suggest that senior management itself would not know how to categorize sales force reduction among the three categories. The authors believe that reduction is a small part of the cost savings, but I do not see sufficient evidence to reach this conclusion.

I find the most interesting issue in the paper is the discussion of whether the cost savings could be achieved without the merger. The authors argue that enhanced efficiency of R&D could in theory. I would add that much of the reductions in production capacity and sales force probably could as well, given the large size of the two companies. The authors' interviews suggest that the merger provided an opportunity to "take a fresh look at the organization" in a way that we are to infer would be impossible without the merger. I wish the authors had pushed the managers to explain

why. I understand why it is necessary to "take a fresh look at the organization" with the merger, but do not understand why it is impossible to do so without a merger. A $3.8 billion premium is a very high price to pay for a commitment by management to increase value through capacity reductions. A new cost-cutting CEO should be able to do this for a lot less. A cost-cutting CEO may be expensive, but not this expensive.

I can think of two sets of reasons why a merger may facilitate efficient capacity reductions. One is that the disruptions and costs associated with the reductions are lower as part of a merger implementation. Everyone can see the logic and necessity of consolidation with the merger. It may be easier to keep good employees and maintain morale and productivity. The second set of explanations are managerial agency problems. Maybe managers do not like their companies to shrink and it may be very unpleasant for management to reduce capacity because of a lack of growth opportunities. Perhaps the target's employees bear most of the burden and therefore it is less unpleasant for the acquirer's management. Of course, this is all idle speculation, which is exactly what a good clinical paper like this one should generate.