Drug Industry Mergers Won’t Necessarily Benefit R&D

The pharmaceutical industry is merging. Within the last year there has been an unprecedented sequence of mergers, including that between Glaxo Wellcome and SmithKline Beecham to form Glaxo SmithKline; Parke-Davis is now a division of Pfizer, and Pharmacia dropped the “Upjohn” name after it merged with the Monsanto Co. to become Pharmacia Corp. Several observers have interpreted these mergers as attempts to gain critical mass in R&D. For example, writing in Science, Bruce Agnew suggested that “The idea that bigger is better in R&D has become an article of faith in the pharmaceutical industry” (1).

Are there economies of scale in pharmaceutical R&D? Can the recent mergers be interpreted as evidence of their existence? I believe the answers to these questions to be “possibly” and “probably not,” respectively. Below, I outline some of my thinking.

Economies of Scale and Scope

Economies of scale exist when increasing the scale of an activity increases its productivity. If ten researchers working in a lab produce more than two groups of five researchers working in two different labs, then we can be sure that there are economies of scale. Economies of scope exist when there are benefits from combining multiple groups of researchers under the same roof: if five researchers focusing on cancer produce more when another group of five researchers studying heart disease works across the hall, then the firm benefits from economies of scope.

Economies of scale have, broadly, two sources. The first is the ability to move to new techniques as the size of the enterprise increases. It is very inefficient, for example, to make cement in small batches. If one can make a great deal of cement at once, then one can make it much more efficiently because one can use special-purpose production equipment. Within research, one might expect economies of scale to come from the ability to specialize as the size of the group increases. If there are only three of us, then I may have to be an expert in both chemistry and genetics; if there are 20 of us, then I can specialize in genetics and you can specialize in chemistry.

The second important source of economies of scale is the ability to share fixed costs. If research requires expensive equipment, for example, or a staff of patent lawyers, larger firms may benefit from being able to spread their costs out over multiple efforts.

The ability to share fixed costs is also a primary source of economies of scope. Within research, economies of scope may also be present if there are benefits to sharing information across groups and if information sharing is more efficient and effective within a firm than across firm boundaries.

Diseconomies, Too

In 1994, Professor Iain Cockburn and I published the results of a quantitative study designed to explore the degree to which pharmaceutical research was subject to these kinds of economies of scope and scale (2). Using 20 years of detailed quantitative data at the research program level from ten major pharmaceutical firms, we showed that there was some evidence for the presence of scale and scope economies in pharmaceutical research, but that these economies of scale were exhausted as firms approached the size of the three largest firms in our data set, and that economies of scope were exhausted once the firm had more than six to seven major research programs—that indeed, beyond that level there were diseconomies of scope.

Since these thresholds have now been reached by even medium-sized pharmaceutical firms, these results would suggest that if the dynamics of research productivity have remained unchanged since we conducted the study, it is unlikely that the “mega mergers” that we are seeing in the industry today reflect the desire to obtain economies of scale or scope in research.

These results were obtained using data from 1970–1990. It might well be that the world has changed—that
the new techniques of pharmaceutical research are such that they give rise to the opportunity for new economies of scale or scope. It is certainly true that the science required to discover new drugs has become immeasurably more complex: modern drug discovery draws on a breathtaking array of scientific subspecialties, including genetics, combinatorial chemistry, crystallography, physiology and so on. Such diversity might be increasing the returns to specialization. Similarly, it is expensive to stay abreast of the latest techniques, and firms that can afford specialized centers—and that can spread their costs out over multiple efforts—might benefit from economies of scale.

However, a number of factors lead me to doubt that these trends are important enough to have changed the returns to scale sufficiently dramatically to be behind the recent mergers. In the first place, the firms that are merging already employ many thousands of Ph.D.-level researchers. Surely these firms already sustain the critical mass required to sustain enough scientific specialties, and to spread the costs of a small specialized research group out over enough programs? Certainly a rough and ready comparison of figures such as papers or patents generated per research dollar would suggest that the major biotechnology firms are at least as productive, in “raw” terms, as the larger pharmaceutical firms, and their recent impressive market valuations would seem to suggest that investors, at least, expect these relatively small firms to be more productive indeed. Is it not more plausible that such larger mergers might in fact give rise to diseconomies of scale, imposed by the costs attendant on managing an enormous and often geographically highly decentralized research group?

**Other Reasons to Merge?**

If the recent mergers are not driven by economies of scale or scope in discovery research, what might be driving them? There are a number of possible candidates. The first is economies of scale in drug development. As the diseases targeted by new therapies have become more complex, and as regulatory stringency has increased, so has the size and complexity of clinical trials increased. Yet even here it is hard to identify the possible source of any economies. What fixed cost might one be able to amortize over many trials? Large information technology investments, perhaps? Moreover, many firms outsource much of their development activity to relatively small firms; this would suggest that there are only minimal economies of scale or scope available.

A more plausible candidate, in my view, is the desire to benefit from economies of scale and scope in marketing or distribution. Effective pharmaceutical marketing and distribution requires, in general, incurring very substantial fixed costs. These costs must be incurred whether one is selling one drug or ten, and are a classic source of scale economies. Larger firms may have more access to the market through their ability to exploit these kinds of benefits, and this may be a motive for some recent mergers. Glaxo SmithKline, for example, will have a worldwide sales and marketing presence of 40,000 representatives and a 7.3-percent share of the global pharmaceutical market (3).

An even more plausible motive, in my mind, is the desire to compensate for serious “market failures” in the market for the discovery and development of new drugs. Some of the firms that have recently merged have not been able to maintain the kinds of levels of research productivity currently required of the industry, yet they continue to own some valuable assets (particularly promising new drugs or unique distribution channels, for example). In principle, these firms could “simply” either buy promising drug candidates to fill their pipelines or close down, selling their assets on the open market. However, in a world in which the valuation of potential drug candidates is very difficult and in which closing down a firm incurs serious human costs, entering a merger allows these firms to downsize those parts of the organization that have been less productive while retaining those assets that are still valuable. In my view, many of the recent mergers are thus most plausibly interpreted as moves away from weakness, rather than as moves toward strength.

This analysis, if correct, implies that R&D managers should be very careful how they interpret the recent pharmaceutical mergers. No one wishes to announce that they are merging with another firm because they have a weak pipeline and wish to combine assets; neither analysts nor employees are likely to welcome the news. Announcing that one is merging to “gain economies of scale and scope in R&D” has a positive, empowering, forward-sounding note to it. Unfortunately, the announcement alone is not conclusive proof that such economies exist.

**References**