ICLE International Center for Law & Economics

Antitrust review of ag-biotech mergers: Appropriability versus cannibalization [Ag-Biotech Symposium]
March 31, 2017
Nicolas Petit

Nicolas Petit is Professor of Law at the University of Liege (Belgium) and Research Professor at the University of South Australia (UniSA)

This symposium offers a good opportunity to look again into the complex relation between concentration and innovation in antitrust policy. Whilst the details of the EC decision in *Dow/Dupont* remain unknown, the press release suggests that the issue of "*incentives to innovate*" was central to the review. Contrary to what had leaked in the antitrust press, the decision has apparently backed off from the introduction of a new "*model*", and instead followed a more cautious approach. After a quick reminder of the conventional "*appropriability v cannibalization*" framework that drives merger analysis in innovation markets (1), I make two sets of hopefully innovative remarks on appropriability and IP rights (2) and on cannibalization in the ag-biotech sector (3).

Appropriability versus cannibalization

Antitrust economics 101 teach that mergers affect innovation incentives in two polar ways. A merger may increase innovation incentives. This occurs when the increment in power over price or output achieved through merger enhances the appropriability of the social returns to R&D. The *appropriability effect* of mergers is often tied to Joseph Schumpeter, who observed that the use of "*protecting devices*" for past investments like patent protection or trade secrecy constituted a "*normal elemen[t] of rational management*". The appropriability effect can in principle be observed at firm – specific incentives – and industry – general incentives – levels, because actual or potential competitors can also use the M&A market to appropriate the payoffs of R&D investments.

But a merger may decrease innovation incentives. This happens when the increased industry position achieved through merger discourages the introduction of new products, processes or services. This is because an invention will *cannibalize* the merged entity profits in proportions larger as would be the case in a more competitive market structure. This idea is often tied to Kenneth Arrow who famously observed that a "*preinvention monopoly power acts as a strong disincentive to further innovation*".

Schumpeter's appropriability hypothesis and Arrow's cannibalization theory continue to drive much of the discussion on concentration and innovation in antitrust economics. True, many efforts have been made to overcome, reconcile or bypass both views of the world.

Recent studies by Carl Shapiro or Jon Baker are worth mentioning. But Schumpeter and Arrow remain sticky references in any discussion of the issue. Perhaps more than anything, the persistence of their ideas denotes that both touched a bottom point when they made their seminal contribution, laying down two systems of belief on the workings of innovation-driven markets.

Now beyond the theory, the appropriability v cannibalization gravitational models provide from the outset an appealing framework for the examination of mergers in R&D driven industries in general. From an operational perspective, the antitrust agency will attempt to understand if the transaction increases appropriability – which leans in favour of clearance – or cannibalization – which leans in favour of remediation. At the same time, however, the downside of the appropriability v cannibalization framework (and of any framework more generally) may be to oversimplify our understanding of complex phenomena. This, in turn, prompts two important observations on each branch of the framework.

Appropriability and IP rights

Any antitrust agency committed to promoting competition and innovation should consider mergers in light of the degree of appropriability afforded by existing protecting devices (essentially contracts and entitlements). This is where Intellectual Property ("IP") rights become relevant to the discussion. In an industry with strong IP rights, the merging parties (and its rivals) may be able to appropriate the social returns to R&D without further corporate concentration. Put differently, the stronger the IP rights, the lower the incremental contribution of a merger transaction to innovation, and the higher the case for remediation.

This latter proposition, however, rests on a heavy assumption: that IP rights confer perfect appropriability. The point is, however, far from obvious. Most of us know that – and our antitrust agencies' misgivings with other sectors confirm it – IP rights are *probabilistic* in nature. There is (i) no certainty that R&D investments will lead to commercially successful applications; (ii) no guarantee that IP rights will resist to invalidity proceedings in court; (iii) little safety to competition by other product applications which do not practice the IP but provide substitute functionality; and (iv) no inevitability that the environmental, toxicological and regulatory authorization rights that (often) accompany IP rights will not be cancelled when legal requirements change. Arrow himself called for caution, noting that "*Patent laws would have to be unimaginably complex and subtle to permit [such] appropriation on a large scale*". A thorough inquiry into the specific industry-strength of IP rights that goes beyond patent data and statistics thus constitutes a *necessary* step in merger review.

But it is not a *sufficient* one. The proposition that strong IP rights provide appropriability is essentially valid if the observed pre-merger market situation is one where several IP owners compete on differentiated products and as a result wield a degree of market power. In contrast, the proposition is essentially invalid if the observed pre-merger market situation leans more towards the competitive equilibrium and IP owners compete at prices closer to

costs. In both variants, the agency should thus look carefully at the level and evolution of prices and costs, including R&D ones, in the pre-merger industry. Moreover, in the second variant, the agency ought to consider as a favourable appropriability factor any increase of the merging entity's *power over price*, but also any improvement of its *power over cost*. By this, I have in mind efficiency benefits, which can arise as the result of economies of scale (in manufacturing but also in R&D), but also when the transaction combines complementary technological and marketing assets. In *Dow/Dupont*, no efficiency argument has apparently been made by the parties, so it is difficult to understand if and how such issues have played a role in the Commission's assessment.

Cannibalization, technological change, and drastic innovation

Arrow's cannibalization theory – namely that a pre-invention monopoly acts as a strong disincentive to further innovation – fails to capture that successful inventions create new technology frontiers, and with them entirely novel needs that even a monopolist has an incentive to serve. This can be understood with an example taken from the ag-biotech field. It is undisputed that progress in crop protection science has led to an expanding range of resistant insects, weeds, and pathogens. This, in turn, is one (if not the main) key drivers of ag-tech research. In a 2017 paper published in *Pest Management Science*, Sparks and Lorsbach observe that:

> resistance to agrochemicals is an ongoing driver for the development of new chemical control options, along with an increased emphasis on resistance management and how these new tools can fit into resistance management programs. Because resistance is such a key driver for the development of new agrochemicals, a highly prized attribute for a new agrochemical is a new MoA [method of action] that is ideally a new molecular target either in an existing target site (e.g., an unexploited binding site in the voltage-gated sodium channel), or new/under-utilized target site such as calcium channels.

This, and other factors, leads them to conclude that:

> even with fewer companies overall involved in agrochemical discovery, innovation continues, as demonstrated by the continued introduction of new classes of agrochemicals with new MoAs.

Sparks, Hahn, and Garizi make a similar point. They stress in particular that the discovery of natural products (NPs) which are the "*output of nature's chemical laboratory*" is today a main driver of crop protection research. According to them:

> NPs provide very significant value in identifying new MoAs, with 60% of all

> agrochemical MoAs being, or could have been, defined by a NP. This information again points to the importance of NPs in agrochemical discovery, since new MoAs remain a top priority for new agrochemicals.

More generally, the point is not that Arrow's cannibalization theory is wrong. Arrow's work convincingly explains monopolists' low incentives to invest in substitute invention. Instead, the point is that Arrow's cannibalization theory is narrower than often assumed in the antitrust policy literature. Admittedly, Arrow's cannibalization theory is relevant in industries primarily driven by a process of cumulative innovation. But it is much less helpful to understand the incentives of a monopolist in industries subject to technological change. As a result of this, the first question that should guide an antitrust agency investigation is empirical in nature: is the industry under consideration one driven by cumulative innovation, or one where technology disruption, shocks, and serendipity incentivize drastic innovation?

Note that exogenous factors beyond technological frontiers also promote drastic innovation. This point ought not to be overlooked. A sizeable amount of the specialist scientific literature stresses the powerful innovation incentives created by changing dietary habits, new diseases (e.g. the Zika virus), global population growth, and environmental challenges like climate change and weather extremes. In 2015, Jeschke noted:

> In spite of the significant consolidation of the agrochemical companies, modern agricultural chemistry is vital and will have the opportunity to shape the future of agriculture by continuing to deliver further innovative integrated solutions.

Words of ~~wisdom~~ caution for antitrust agencies tasked with the complex mission of reviewing mergers in the ag-biotech industry?

Filed under: ag-biotech symposium, agriculture, agtech/biotech, anticompetitive market distortions, antitrust, european commission, intellectual property, law and economics, mergers & acquisitions, monopolization, patent, Patents, technology Tagged: ag-biotech, appropriability, Arrow, cannibalization, dow, dupont, innovation, IP, mergers, Patents, Schumpeter

View Article