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KILLER ACQUISITIONS AND OTHER FORMS OF ANTICOMPETITIVE COLLABORATIONS IN TIME OF CORONA

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In this two-part paper, we analyse so-called 'killer acquisitions' and other detrimental collaborations. We thus view an acquisition as a form of collaboration between the seller and the purchaser, and between management and owner. Today sellers may retain a minority post and management often are included as shareholders through share or option programmes as part of the acquisitions. Acquisitions today hence represent collaborations rather than clear cut change of control of businesses and assets. Moreover, We also present that other forms of collaborations, such as strategic R&D alliances, can create similar effects as these forms of collaborative acquisitions. They imply the joining and transfer of R&D assets often represented by the key employees and key R&D projects being merged. We will do this, firstly, by analysing economic doctrine, and secondly by looking at the practices in the pharmaceutical industry.

The above is included in the first paper (part I), where we conclude that society would benefit from a more intense competition law scrutiny of mergers and strategic R&D alliances, especially when these forms of collaboration originate from the pharmaceutical industry.

Key words: mergers, strategic alliances, competition law, killer acquisitions, pharmaceutical, BRICS

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1. Introduction

The label 'killer acquisitions', now universally recognized and commonly used both in academic literature and documents of international organizations,[1] was introduced by Yale School of Management's Song Ma and Florian Ederer and LBS's Colleen Cunningham in their paper "Killer Acquisitions" of 2018.[2] Cunningham et al describe a killer acquisition as a case in which the acquiring firm's strategy is "to discontinue the development of the targets' innovation projects and pre-empt future competition".[3] Their findings show that in the pharmaceutical industry, there are as many as 50 killer acquisitions every year in which incumbent firms acquire innovative start-ups solely to discontinue their research projects and to preempt future competition.

Start-ups, as a key source of new ideas and products, as well as disruptive innovation, play a vital role in the pharmaceutical markets. A number of recent empirical studies show that most of the innovative drugs registered on the horizon from 2009 to 2018 were invented not at all by pharmaceutical giants, but by small and medium (in terms of capitalization) biopharmaceutical companies. Moreover, the dynamics of such companies' shares in the R&D of innovative drugs shows a steady upward trend, which is especially illustrative in case of small biopharmaceutical companies and start-ups – if in 2009 they registered about 31% of new drugs (which is comparable to the share of Big Pharma for the same year), in 2018 already 63% of newly registered drugs came out of the laboratories of small biopharmaceutical companies, while Big Pharma registered only 16% of the total number of new drugs in the same year.[4]

[1] See, e.g.: OECD. Start-ups, Killer Acquisitions and Merger Control – Background Note; materials for the Meeting of the Competition Committee on 10-12 June 2020, available at: http:// www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/COMP(2020)5&docLanguage=En

[2] Cunningham, Colleen and Ederer, Florian and Ma, Song, Killer Acquisitions. The version revised as of April 22, 2020 is available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3241707

[3] Cunningham et al. Op. cit. P. 1.

[4] HIM. New Drug Approval Report Analysis of FDA. New Drug Approvals in 2018 (and Multi-Year Trends), P. 17, available at: https://www.hbmpartners.com/media/docs/industry-reports/Analysis-of-FDA-Approvals-2018-and-Previous-Years.pdf

Thus, start-ups, developing disruptive technologies are often purchased by larger firms providing the investment and knowledge to develop the promising R&D result into drugs. However, the start-ups might pose a competitive threat to Big Pharma's blockbusters and internally developed drugs, and hence may become targets for killer acquisitions. Indeed, the acquiring firm might find it more profitable to buy and shut down a start-up's innovative molecule, rather than suffering the loss of revenue that it expects to occur when this molecule matures, or buying and continuing to develop this molecule under the risk of affecting its own sales.

Alternatively, the acquirer might kill-off its own internal efforts to develop a competing product in order to remove a potential risk to the newly acquired product. Active M&A strategies of Big Pharma divert resources from their own R&D, as the companies spend millions of dollars annually on acquisition of competitive start-ups instead of investing them into development of innovative drugs.

It can be suggested that M&A activities in the pharma and biotech sector have several negative effects on innovation. Recent empirical research of M&A activities on the pharmaceutical markets lead to a conclusion that the concept of 'killer acquisition' might only be the tip of the iceberg, a small part of a larger problem. Big Pharma engages not only into share or asset deals on acquisition of biopharmaceutical start-ups' with the strategy to either of dismantling a future competitive threat or internally dismantle its own internal effort to the same effect, but that also larger pharma mergers and collaborations historically seem to lead to less innovation and to higher prizes and the lock-in of talents and entrepreneurs.

Though there is none direct evidence as of today that killer acquisitions have held back vaccines for COVID-19, there are some concerns that certain acquisitions have restraint the availability of certain important medical devices important in the treatment of COVID-19 patients. Certain News Outlets have claimed that the Covidien's $108 million acquisition of Newport in 2012 was a killer acquisition that reduced the availability of ventilators, the most effective treatment against some of the most severe COVID-19 symptoms, in the US.[5]

One merger that was terminated just days in the initial outbreak of Covid-19, was Illumina, a leading biotechnology firm active in sequencing technology proposed purchase of rival Pacific Biosciences (PacBio). The US FTC had only weeks before alleged that Illumina had sought to "unlawfully maintain its monopoly in the U.S. market for next-generation DNA sequencing (NGS) systems by extinguishing PacBio as a nascent competitive threat"[6]. The UK watchdog CMA considered the merger would result in a substantial lessening of competition in the supply of DNA sequencing systems before the Illumina offer was withdrawn. PacBio research focus is inter alia COVID-19 DNA sequencing.

[5] See NYTimes. https://www.nytimes.com/2020/03/29/business/coronavirus-us-ventilator-shortage.html. See also OECD. Start-ups, Killer Acquisitions and Merger Control – Background Note; materials for the Meeting of the Competition Committee on 10-12 June 2020, available at: http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=DAF/COMP(2020)5&docLanguage=En

[6] FTC Challenges Illumina's Proposed Acquisition of PacBio, December 17, 2019. See https://www.ftc.gov/news-events/press-releases/2019/12/ftc-challenges-illuminas-proposed-acquisition-pacbio

CMA noted that Illumina had approximately 80% market share of NGS systems worldwide and 90% in the UK. Through analysis of internal documents and customer feedback, the CMA found that the parties saw each other as competitive threat on a day-to-day level, but foremost on a strategic level. "There is also clear evidence that this market is dynamic and that the competitive overlap and closeness of competition between the Parties is likely to increase in the future as R&D is devoted to improving each Party's technology to address a wider range of use cases, applications and/or projects."[7] The CMA noted that in the highly concentrated market, other small players in the sector would not exert a competitive constraint on the merged entity.

There are several firms and collaborations that are pursuing to obtain a vaccine to end the COVID-19 pandemic. A Russian vaccine is already on the market. A number of other firms are in advanced clinical (phase III) testing, yet it is likely that no vaccine will have general efficacy on COVID-19. It seems that we will have several vaccines, with various level of effectiveness vis-à-vis different segments in the market (i.e. various risk groups, general public, the younger population etc.). Certain groups of individuals might need to take several doses on a continuing basis to be able to withstand being infected by COVID-19. Possibly, we will have different sorts of vaccine originating from different sources be it unilateral research conducted by university connected research centres, biotech or pharmaceutical firms, and collaboration with such centres. This might open up also for killer acquisitions in reference to vaccine producers, and a more thorough research would perhaps reveal such cases in the pharmaceutical sector, where treatments may have been lost due to so-called "killer acquisitions" or where the research efforts have been shelved due to two or more firms have agreed to collaborate to pursue a unilateral research effort. Moreover, to protect a vibrant competition between COVID-19 vaccine producers, the under enforcement of competition law in reference to the human medicine industry needs to be addressed.

Historically, antitrust authorities have been rather reluctant to consider explicitly long-run effects of mergers on innovation, though the nascent practice of innovator acquisitions can affect the industry dramatically. Though there has been a significant amount of merger activity involving Big Pharma firms buying highly valued biopharmaceutical start-ups in recent years, such transactions commonly do not come under the radar of competition authorities. Start-ups, in the early stages of their development, tend to have low turnover, as their business models concentrate on carrying out R&D before seeking to register drug and launched its production and marketing. The result is that such acquisitions may not come to the attention of competition authorities that focus upon turnover, despite the potential for them to have anti-competitive effects.

The issue of (under-)enforcement of competition law in reference to killer acquisitions is however not unique. Collaborations between pharmaceutical companies where de-facto the control of the R&D result of the target is transferred to a larger Big Pharma firm can take several forms. In essence it can be conducted by the exclusive technology transfer (licensing) between

[7] CMA, Anticipated acquisition by Illumina, Inc (Illumina) of Pacific Biosciences of California, Inc. (PacBio) Summary of Provisional findings, para. 37 https://assets.publishing.service.gov.uk/media/5db1685940f0b609bdf449fc/Summary_of_the_provisional_findings.pdf

the firms, through an R&D collaboration or assignments of the patent and connected know-how. Such collaborations do not necessarily fall under the merger rules because they do not reflect a change of control of the start-up as such. Often, such collaborations should be self-regulated by the parties and are analysed under the prohibition against anticompetitive agreements or even under the abuse of dominance prohibition.

It should be acknowledged that also collaborations in the pharmaceutical industry not triggering the merger threshold have been treated leniently from the standpoint of antitrust regulation in certain jurisdictions (including, the US and the EU). These activities, due to practical difficulty to predict their successfulness and potential further anti-competitive effects, are not subject to notification and analysis of competition agencies, and are often even exempted under the antitrust rules. Introducing merger control over killer acquisitions could moreover lead to increase of the popularity of licensing and R&D collaborations which in some stances can be as anti-competitive as a killer acquisition because they also open up for the possibility for the larger firm to 'kill off' the potential competing alternative. Indeed, looser forms of collaboration, not reaching the threshold for merger control should benefit from a heighten antitrust scrutiny.

Within the discussed category of start-ups takeovers, the killer acquisition theory of harm is one that might apply, but it is only one among others. Alternative theories of harm might include vertical theories of harm in which the acquired product might grow into a key input that allows input foreclosure in downstream markets. They might also include conglomerate theories of harm in which the acquired product might grow into a complement that might be bundled or tied to the incumbent's product in order to exclude rivals. Finally, and closely related to the concern in a killer acquisition theory of harm, is the nascent potential competitor theory of harm. The concern here is that the acquired product might grow into a rival product, and hence that controlling that product (but not killing it), removes the competitive threat that it poses. [8]

The rapidly growing pharmaceutical markets of the BRICS countries are becoming increasingly attractive to Big Pharma companies. The dynamics of annual increase in the population of most BRICS countries, large public investments in health care and the annual increase in the number of chronic diseases in these countries stimulate a constant demand for medicines. Moreover, biopharmaceutical start-up firms with promising molecules or antidotes may very well originate from BRICS countries and gain the interest of Big Pharma. The wave-like nature of mergers and acquisitions in the pharmaceutical market is determined by the expiration of patents for blockbuster drugs, the evolvement of new illnesses, and the approximation of which encourages Big Pharma companies to acquire generic manufacturers.

At the same time, global pharmaceutical companies build their strategies around geographical regions, and certain reshaping of such regions (in economic sense) can be seen nowadays. This encourages countries to cooperate more with trade unions, for instance inside of the Eurasian Economic Union. On the other hand, it supports some doubtful marketing strategies of Big Pharma, such as pricing segmentation based on nominal classification of countries on developed and developing. Indeed, the market for pharmaceuticals is far from being global

[8] See: OECD. Op. cit. P. 7.

when taking into consideration there is now global exhaustion of patent rights, or intellectual property rights in general. When scrutinizing a merger between a promising start-up originating in a BRICS country and a large Big Pharma firm, also these parameters need to be taken into consideration.

The paper aims to address the problem of so-called killer acquisitions broadly in time of the Corona pandemic. It shall analyse the current trends of merger control and M&A transactions in the pharmaceutical industry and the effectiveness of the existing regime for considering the M&A transactions not only from the standpoint of economic concentration, but also from the view of their harm to innovation in the industry as a whole. Different theories of harm will be analysed on their applicability to support the merger regulation in the BRICS pharmaceutical markets. We plan to develop suggestions on policy response that might be required to address the issues that arise from killer acquisitions and other forms of collaboration that may trigger the same or similar anticompetitive effect on innovation.

Several proposals have already been put forward in different jurisdictions in order to change the merger notification regime. One of them would be to lower the existing notification thresholds. However, doing so in the context of a mandatory notification system would inevitably result in large numbers of low turnover transactions being notified. This option has therefore not been adopted, but several jurisdictions have introduced, or propose to introduce, additional or complementary thresholds or criteria, notably value-based thresholds or a system where the Competition Authority may require certain parties to notify the merger irrespectively of whether the merger meet the thresholds, or not. The propositions would enable high value low turnover transactions that might pose a threat to potential competition to be investigated. As an example, Germany in 2017 amended its Competition Act (GWB), specifically, Section 35 (Scope of Application of the Control of Concentrations), introducing a size of transaction threshold alongside its turnover threshold.[9]

Another option is to single out a specific industry to whom a special regime should apply. An approach that is also discussed is to acknowledge the uncertainty of killer acquisitions, take a cautious and permissive ex-ante approach and then to intervene ex-post if necessary. A number of countries have some sort of ex-post review powers, including Hungary, Ireland, Sweden and Lithuania.

Both threshold requirements and substantive tests that need to be developed will be discussed and presented. The papers will address threshold requirements and substantive tests and their relevance for the BRICS countries. We also plan to consider other possible solutions, including those that are provided not by legal instruments but rather by providing alternative source of investment and service to provide the necessary development work including the clinical tests. It could be imagined that if the competition authority would find a risk for a killer acquisition, a right to first refusal in certain situations will be triggered. That a biotech and pharma venture capital fund/investor would be available and be given a right to invest in the target (R&D start-up) on the same terms as the larger pharma firm, so to eliminate risk of allowing for a killer acquisition.

[9] OECD. Op. cit. p. 40.

Part I starts with an analysis of the pharmaceutical industry from both an innovation economics and empirical perspective. Thereafter, the competition law challenges in reference to killer acquisition and other forms of collaborations are presented in part II. Both threshold requirements and the substantial tests that are needed to be developed will be discussed and presented. A BRICS or developing country perspective will also be taken, where indeed, a new methodology for 'killer acquisitions' and 'shelving collaborations' is presented. Finally, we conclude.

2. 'Killer acquisitions' and other detrimental mergers and collaborations

a. Innovation economics

It seems that there is a general consensus that unfettered innovation far exceeds the potential gain of making markets more competitive by driving prices closer to marginal costs.[10] In light of this, it seems that an obvious issue to contemplate would be whether practitioners of competition law should take innovation as the ultimate goal of competition law.

It is von Hayek that is normally considered as being the source of the notion that competition is a procedure or process to find out new knowledge.[11] Even though it is somewhat obvious, innovation as a process is based on the method of 'trial and error', with often several errors before a short period of success. Starting with the assumption that the best products, competitive tools and solutions to the problem of gaining wealth are often not known, competition is viewed as an evolutionary trial and error process, in which the firms try out different problem solutions and can learn from the feedback of the market which of their specific products and technological solutions are the superior ones.

Several conclusions can be drawn from this. Firstly, that industrial economic models based on the notion of perfect information, i.e. that all market participants know everything, do not correlate von Hayek's notion of competition as a discovery procedure. Secondly, the multiplicity and diversity of the (parallel trials of the) firms might be crucial for the effectiveness of competition as a discovery procedure.[12] Thirdly, von Hayek admitted that his notion of competition was expensive. He stated "If anyone actually knew everything that [industrial] economic theory designated as "data," competition would indeed be a highly wasteful method of securing adjustment to these facts."[13]

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[10] Phillip Areeda & Herbert Hovenkamp, Antitrust Law – An Analysis of Antitrust Principles and Their Application (Aspen Publishers 2005), 113 with many references. See also Monopolkommission, Huaptgutachten: Wettbewerbspolitik vor neuen Herausforderungen (Nomos Baden-Baden, 1990), 342 et seq.

[11] Friedrich A. von Hayek, 'The Meaning of Competition', in Friedrich A. v. Hayek (ed.), Individualism and Economic Order, (University of Chicago Press, 1948), 92.

[12] Friedrich A. von Hayek, 'The Meaning of Competition', in Friedrich A. v. Hayek (ed.), Individualism and Economic Order, (University of Chicago Press, 1948), 92.

[13] Marcellus S. Snow is professor emeritus at the University of Hawaii at Manoa; snow@hawaii.edu. This is a translation from German of F.A. Hayek's "Der Wettbewerb als Entdeckungsverfahren," a 1968 lecture sponsored

Notwithstanding this, von Hayek did not purport totally unfettered competition. He still values regulations so to establish an orderly work and markets and general rules for the game.[14]

Interestingly, von Hayek's ideas and theories are extremely well known and widespread, while little economic research seems to be devoted to pursuing his ideas.[15] In addition, von Hayek seemed to have been a supporter of the (earlier) Schumpeterian notion of competition as an innovation-imitation process. Schumpeter's view of competition as an innovation-imitation process has been very influential under the concept of dynamic competition in innovation economics and seems to have had an influence on the EU competition law concept of effective competition.[16] However, even though the Schumpeterian notion of dynamic competition has lost some of its value in competition economics, his (earlier) ideas are still very influential in innovation economics regarding disruptive innovations.

It is 'the later' Schumpeter, displayed in *Capitalism, Socialism, and Democracy*, that has a profound impact on the current state of mind of several researchers. The later Schumpeter conceived technological progress as emanating from the large industrial research laboratories. In the laboratories of the large firms, creativity, invention and innovation, in a linear fashion, were conducted. Large firms created wealth and innovation because they enjoyed positions of static market power. He argued that such firms would use their economic profits to finance risky, large-scale R&D activity that would simultaneously leave society better off, in a dynamic sense, and allow the firms to maintain positions of static product-market dominance.[17] R&D for Schumpeter seems to have been based on trial and error:

> "As soon as we go into details and inquire into the individual items in which progress was most conspicuous, the trail leads not to the doors of those firms that work under conditions of comparatively free competition but precisely to the doors of the large concerns... and a shocking suspicion dawns upon us that big business may have had more to do with creating that standard of life than with keeping it down."[18]

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by the Institut für Weltwirtschaft at the University of Kiel. It was published as No. 56 in the series Kieler Vorträge. The Quarterly Journal of Austrian Economics (FALL 2002): 9–23.

[14] Ibid, p. 14.

[15] Kerber, Wolfgang, Competition, Innovation and Maintaining Diversity Through Competition Law (October 10, 2009) in J. Drexl, W. Kerber, R. Podszun, eds, Economic Approaches to Competition Law: Foundation and Limitations, (Edward Elgar, 2010), 7 Available at SSRN: https://ssrn.com/abstract=1543725

[16] Ibid, 5.

[17] Stephen Martin & John T. Scott, 'The nature of innovation market failure and the design of public support for private innovation', (1999) 29 Research Policy, 437, 437 et seq.

[18] Joseph Schumpeter, Capitalism, Socialism and Democracy (George Allen & Unwin, 1976 (first published in 1943)), 82. It is clear that Schumpeter in this section of his book discussed the downfall of capitalism as such, as an intermediate stop to a wholly foreclosed society for entrepreneurs and where freedom is lost; nonetheless, he purports that large firms are able to innovate more efficiently than smaller firms. Such firms be would more capable of financing investment in innovation, could take advantage of such economies of scale as might exist in the R&D process, and, because they typically produce a diversified range of products, would be more likely to find commercially viable applications for new technological developments. He also viewed risk as an inherent aspect of research, development and commercialisation, and saw market power as a way of providing 'insurance' against such risk. Cf. Stephen Martin & John T. Scott, 'The nature of innovation market failure and the design of public support for private innovation', (1999) 29 Research Policy, 437, 437 et seq.

Today, the opposing view to Schumpeter is normally attributed to Kenneth Arrow. Arrow famously argued that a monopolist's incentive to innovate is less than that of a competing firm, due to the monopolist's disincentive to cannibalize on his pre-existing monopoly. An *a contrario* interpretation of Arrow's viewpoint would be that firms not holding market power would have higher incentive to innovate so to acquire market power, thus, competition spurs innovation since the firms that innovate hope to obtain appropriability by gaining market power.[19]

While these two viewpoints are not necessarily in disharmony,[20] a large strain of the innovation economic debate seems to have focused on proving who of these two 'heavyweights' were right. In fact, as Peritz points out,[21] later researchers use Arrow's and Schumpeter's findings and views without showing that they did not wholeheartedly commit to either competition or monopoly. Instead, they made both of these researchers into caricatures and patron saints of two different strands in the academic debate.

Several economists have theorised about whether innovation is promoted or restricted by dominant innovators or when collaborators are dominant enough to find that the diminishing competitive pressure would reduce their incentive to innovate.[22] Recently, economists closely connected to the US and EU Competition agencies have published a paper claiming that effective rivalry spurs firms to introduce new and innovative products, as they seek to capture profitable sales from their competitors and to protect their existing sales from future challengers. In this fundamental way, competition promotes innovation. They apply this basic insight to the antitrust treatment of horizontal mergers and of exclusionary conduct by dominant firms, and conclude that a merger between rivals internalizes business-stealing effects arising from their parallel innovation efforts and thus tends to depress innovation incentives.[23]

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[19] Kenneth Arrow, 'Economic Welfare and the Allocation of Resources for Invention', in R. Nelson (ed.), The Rate and Direction of Inventive Activity: Economic and Social Factors (National Bureau of Economic Research, 1962), 620 et seq.

[20] Carl Shapiro, 'Competition and Innovation: Did Arrow Hit the Bull's Eye?', in Josh Lerner and Scott Stern (eds), The Rate & Direction of Economic Activity Revisited (University of Chicago Press 2012), 363 et seq.

[21] Rudolph J.R. Peritz, 'Thinking about economic progress: Arrow and Schumpeter in time and space' in Josef Drexl, (ed.), Technologie et Concurrence – Liber Amicorum Hanns Ullrich (Bruxelles: Larcier Pub., 2009), 627.

[22] Cf, e.g., Josh Lerner & Robert Merges, 'The Control of Technology Alliances: An Empirical Analysis of the Biotechnology Industry', (1998) 46 Journal of Industrial Economics, 125; Michael Katz, 'An Analysis of Cooperative Research and Development', (1986) 17 Rand Journal of Economics, 527; Thomas Jorde & David Teece, 'Innovation and Cooperation: Implications for Competition and Antitrust', (1990) 4 Journal of Economic Perspectives, 75; Thomas Jorde & David Teece, 'Rule of Reason Analysis of Horizontal Arrangements: Agreements Designed to Advance Innovation and Commercialize Technology', (1993) Winter Antitrust Law Journal, 579; Thomas Jorde & David Teece, 'Acceptable Cooperation among Competitors in the Face of Growing International Competition', (1989) Antitrust Law Journal, 529; and generally Gene Grossman & Carl Shapiro, 'Research joint Ventures: An Antitrust Analysis', (1986) 2 J. L. Econ. & Org., 315.

[23] Antitrust and Innovation: Welcoming and Protecting Disruption, Giulio Federico, Fiona Scott Morton and Carl Shapiro,, Innovation Policy and the Economy, National Bureau of Economic Research.

On the contrary, some economist state that as long as the technical development is fast, joint R&D promotes social welfare irrespective of market power.[24] Other economists are more careful.[25] Part of their research indicates that collaborations among product market competitors, at least in the old economy, under certain strict circumstances are beneficial. They are beneficial when (i) the degree of product market competition is low, when (ii) there is a large R&D spillover in the absence of the cooperation, when (iii) a high degree of sharing is technologically feasible, and when (iv) the agreement concerns basic research rather than development activities.[26] These criteria are not generally used when analysing large pharma firms purchasing small start-ups. Nor are the exemptions for R&D collaborations under US and EU antitrust law narrow enough to carve out these industries only.

Apart from theoretical work, there has been much empirical research. It seems almost, generally stated, as if theories of industrial organization typically predict that innovation should decline with competition; empirical work finds that it increases.[27] Actually, the early stages of the modern economic innovation literature on R&D were largely devoted to sorting out the implications of these two divergent positions purported by, on the one side, theorists and, on the other, empirical researchers, respectively. The debate remains a lively one.[28]

Some researchers (using both arguments based on theory and empirical findings) argue the existence of an inverted U between competition and innovation.[29] Thus, the innovation rate is low when there is 'too much' competition or 'too much' monopoly power, while the golden middle way generates most innovation and wealth.

It seems that Frederic M. Scherer was the first, in the 1950s, to launch the idea that the interplay between competition and innovation could be compared with an inverted U.[30] Scherer introduced the idea that competitive pressure forces firms to invest more in R&D until the point

[24] See, e.g., Thomas Jorde & David Teece, 'Innovation and Cooperation: Implications for Competition and Antitrust', (1990) 4 Journal of Economic Perspectives, 75, 85 et seq.; Thomas Jorde & David Teece, 'Rule of Reason Analysis of Horizontal Arrangements: Agreements Designed to Advance Innovation and Commercialize Technology', (1993) Winter Antitrust Law Journal, 579, 600 et seq.; Thomas Jorde & David Teece, 'Acceptable Cooperation among Competitors in the Face of Growing International Competition', (1989) Antitrust Law Journal, 529, 543 et seq.

[25] See, e.g., Josh Lerner & Robert Merges, 'The Control of Technology Alliances: An Empirical Analysis of the Biotechnology Industry', (1998) 46 Journal of Industrial Economics, 125, 132 et seq.; Michael Katz, 'An Analysis of Cooperative Research and Development', (1986) 17 Rand Journal of Economics, 527, 537 et seq.

[26] Michael Katz, 'An Analysis of Cooperative Research and Development', (1986) 17 Rand Journal of Economics, 527, 527, 542 et seq.

[27] Philippe Aghion, et al., 'Competition and Innovation: An Inverted-U relationship', (2005) May The Quarterly Journal of Economics 701, 701, with many references.

[28] Stephen Martin & John T. Scott, 'The nature of innovation market failure and the design of public support for private innovation', (1999) 29 Research Policy, 437, 437 et seq. with references.

[29] Philippe Aghion, et al., 'Competition and Innovation: An Inverted-U relationship', (2005) May The Quarterly Journal of Economics 701, 701, with many references.

[30] Frederic M. Scherer, 'Firm Size, Market Structure, Opportunity, and the Output of Patented Inventions', (1965) 55 AM. ECON. REV. 1097; Frederic M. Scherer, 'Market Structure and the Employment of Scientists and Engineers', (1967) 57 AM. ECON. REV. 524; Frederic M. Scherer, 'Research and Development Resource Allocation under Rivalry', (1967) 81 The Quarterly Journal of Economics, 359.

where the competition is so intense that the anticipated post-innovation profit is so unlikely that it causes the firms to stop innovating altogether.

In fact, by using the inverted U, both Schumpeter's and Arrow's underlying ideas seem to be able to fit in the same model. Schumpeter argues that if there is (almost or close to perfect) competition in a market the firms will not possess the opportunity to innovate because they will not make any form of (supra competitive) profit to be able to break the permanent condition of perfect allocation of resources. Only if that condition is breached will the firms at least have an incentive to innovate. In case the situation of perfect competition is breached and there is incentive to innovate, the rate of innovation will increase with opportunity and appropriability, the rate of market power held by the firm on the market, until the point that the market tilts to a monopoly. Even though the monopolist will have the opportunity to innovate because of obtaining competitive profits, the incentive will not exist because any new innovation would cannibalize on the monopolist's current sales. Of course, if there were potential entrants, that is, a contestable market, perhaps the monopolist would continue to innovate, otherwise the literature seems to suggest that the innovation rate would tumble when there is a monopolist in the market.

In addition, perhaps there could also be a difference in what sort of innovations the firms breaking out of a situation of perfect competition, on the one hand, and, on the other hand, a monopolist, would market. In fact, the literature seems to suggest that monopolistic and even oligopolistic conduct supports incremental innovations. Large firms have a high degree of employees that are specialized in parts of the innovation process, while that may not be inductive for radical innovation, but rather incremental innovations. Furthermore, incremental innovations will not cannibalize on current sales to the same degree as radical innovations, and the monopolist may also use its current market presence to defend market positions and gain shares. Start-ups on the other hand would prefer a radical or disruptive innovation based perhaps on a new invention to gain large market share quick or even create a new market.

So, should the idea of the inverted U be accepted as a basis for developing a regulation of R&D collaborations under antitrust law? Carl Shapiro has recently dissected in detail the innovation literature in an article regarding competition policy in merger regulation.[31] Thus, Shapiro is not writing about looser forms of collaboration. Nonetheless, Shapiro raises some noteworthy aspects. Interestingly, Shapiro points to the fact that many industrial economists define competition or competitive pressure as *inter alia* 'less product differentiation'. According to Shapiro, a model. Looking for less product differentiation was never designed to study rivalry or competition to develop new and improved products and processes. They may help us to understand why we have many brands of toothpaste, but not innovation in the definition preferred by Shapiro.[32] Shapiro rejects not only a definition of competition as 'more imitation',

[31] Carl Shapiro, 'Competition and Innovation: Did Arrow Hit the Bull's Eye?', in Josh Lerner and Scott Stern (eds), The Rate & Direction of Economic Activity Revisited (University of Chicago Press 2012).
[32] Ibid., 371.

but also more specifically the work based on the existence of an inverted U relationship between 'competition' and innovation.

Shapiro states that increased imitation implies reduced appropriability for the inventor. Likewise, 'less product differentiation' implies less appropriability. He concludes that if imitation is allowed under a judicial system, it reduces incentive to innovate. That is no surprise. But that is not equivalent to or comparable with the statement that increased competition would reduce innovation. Increased competition is not the same as or equivalent to an increase in imitation of products or services or 'less product differentiation'.

The result of the research of several of these industrial economists (including Aghion), which Shapiro criticizes, in fact argues for the implementation of regulation protecting intellectual property, while it does not 'hit the bull's eye' according to Shapiro when it comes to creating a competition policy that increases innovation.[33]

Shapiro seems to give the compelling argument that antitrust law should primarily protect competition by substitute products or innovations, while competition through imitation should be regulated under intellectual property law.

It should be acknowledged that Shapiro discusses merger regulation (and not collaborative R&D), and should be read as criticism of a rather recent US merger case, *Genzyme/Novazyme*.[34] In this case, it seems that the FTC ended the experiment with the use of 'innovation market' in merger cases. This case may moreover be viewed as an acknowledgement of a Schumpeterian view of how innovation is best promoted, that is, by creating firms with market power, while neither synergy effects nor even efficiencies seem to have compelled the Justice Department to reach its decisions in this case.[35] Clearly, Shapiro is critical of the Justice Department's conclusions and of the general trend of not acknowledging that competition spurs innovation.[36]

In light of the above, it seems that the economists are not in agreement about what market structures foster the greatest innovations. Even though Shapiro is quite critical of the idea of an inverted U regarding the interaction between innovation and competition, neither supporters of the inverted U relationship nor, obviously, Shapiro argue that competition or rivalry should be protected under antitrust law. Few economists, not even Schumpeter, seem to imply that the total elimination of competitive pressure from substitute innovations would increase the incentive to innovate. However, some findings by the theoretical economists seem can be used to create some kind of platform for a general consensus.

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[33] Ibid, 373 et seq.

[34] Referring to FTC review of the merger between Genzyme and Novazyme. Ibid. 368. The case is discussed infra section 3.2.3.

[35] Also see the US Horizontal Merger Guidelines that stipulate that the antitrust authorities may accept a merger even though it is clear that prices will increase in the short term if innovation is promoted long term. Justice Department and FTC, Horizontal Merger Guidelines (DOJ, FTC, 2010), sections 6; 6.4; and 10.

[36] Criticising Massimo Motta for doubting that competition spurs innovation. See Carl Shapiro, 'Competition and Innovation: Did Arrow Hit the Bull's Eye?', in Josh Lerner and Scott Stern (eds), The Rate & Direction of Economic Activity Revisited (University of Chicago Press 2012), 366.

- According to the economists referred to above, competition may be promoted when innovators get something in return for these innovations, and that innovators should be able to, at least, have a possibility to try to prevent spill-overs, i.e. imitation or copying of innovations. Thus, imitation of innovation should under certain requirements be in violation of property laws, i.e. patent law.
- Rivalry and business-stealing before markets are established spurs innovation and should be taken into consideration and current market share on existing markets may not work as a proxy to identify restriction of competition in the procedure to create new knowledge / innovations and products, i.e. pre-market.
- Market shares in current markets may, however, be a good proxy when establishing whether to allow R&D collaborations for incremental innovations of current existing products on current markets; while here joint development programs that enhance the efficient development of new goods or create synergies should be considered procompetitive.[37]
- Competition law must have a forward looking perception, i.e. what will happen *ex post* the merger or R&D Collaboration. For example, the competitive consequences of when two firms collaborate in R&D, and while not being competitors when entering the R&D collaborations, will be competitors when the collaboration ends should be taken inot consideration.

In reference to the pharmaceutical industry, as will be discussed below, the empirical research shows a clearer picture of the anticompetitive effects originating from mergers, and indeed, also theoretical research in reference to mergers in this industry seem to concur, which will be discussed under the following chapters.

[37] It should be mentioned that Jorde and Teece, by arguing that research is not done in a linear sequence anymore but instead in dynamic fashion with interaction between research, application, manufacturing and even commercialization, gave the principal reasons for why the NCRPA should not differentiate between basic science and applied research. According to Jorde and Teece, the old NCRA was not sufficiently permissive. The NCRA implicitly accepted the serial model and not the dynamic or simultaneous model of innovation, paying no attention to the special characteristics of the innovation process in quickly changing industries. Accordingly, Jorde and Teece argued that the basic notion should instead be that collaboration in industries with rapid technology change is unlikely to injure competition at all. Cf., e.g., Thomas Jorde & David Teece, 'Innovation, Cooperation and Antitrust', (1989) 4 High Tech Law Journal, 1, 13 et seq.; Thomas Jorde & David Teece, 'Innovation and Cooperation: Implications for Competition and Antitrust', (1990) 4 Journal of Economic Perspectives, 75, 86. See also Thomas Jorde & David Teece, 'Innovation, Cooperation and Antitrust', (1989) 4 High Tech Law Journal, 1, 4 et seq. See Joseph Broadly, commenting on Jorde and Teece article and proposition by stating he can find no economic or legal academic consensus supporting the conclusion that high technology markets are immune to anticompetitive risk, see Joseph Brodley, 'Antitrust Law and Innovation Cooperation', (1990) 4 Journal of Economic Perspective, 97, 98.

b. Analysis of the structure and the principles of functioning of the global pharmaceutical industry

An enduring and relevant trend in the pharmaceutical sector is that R&D-intensive start-up firms, often clustered around universities and medical schools, conduct much research that they later patent and license, trade or co-develop with larger pharmaceutical firms. Normally, the smaller R&D-intensive start-up firms seek partners or purchasers when they have conducted successful pre-clinical or even clinical tests of the relevant substance or molecule. The larger pharma companies are mainly focused on the development of drugs and the administration of the lengthy and costly regulator process (Phase I, II and III) and on the distribution and marketing of the drug. Indeed, it seems that the procedure to create and develop the drugs for the future is in a state of change. The increase of the number of R&D-intensive start-up firms seems to continue, while larger pharma companies to some extent scale down their in-house R&D, while purchasing access to new research results in the form of substances, molecules, compounds, and know-how through license agreements.[38]

One of the results of this specialisation by firms in the pharma and biotech sector is the great increase in the amount of technology transfer, collaborations and mergers entered into in the Pharma and Biotech sectors by independent parties.[39] Generally, not even the largest pharma firms today conduct all stages of the value chain for developing all products in their portfolio. For large firms mergers are often the response to expected access capacity due to patent expiration and gaps in a firms productive pipeline due to failure of their own in-house R&D.[40] For small firms, on the other hand, merger is primarily an exit strategy in response to financial incentives. However, as will be developed below, transfer of a pharma or a biotech innovation does not need to be transferred through a merger. On the contrary, transfer of knowledge and patents are presumably primarily conducted under technology transfer agreements, joint R&D collaborations or other forms collaborations, depending on the level of integration sought by the parties.[41] Notwithstanding this, the merger of pharma firms, and the notion of killer acquisitions, will be analysed primarily.

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[38] A number of recent empirical studies show that most of the innovative drugs registered on the horizon from 2009 to 2018 were invented not at all by pharmaceutical giants, but by small and medium (in terms of capitalization) biopharmaceutical companies. Moreover, the dynamics of such companies' shares in the R&D of innovative drugs shows a steady upward trend, which is especially illustrative in case of small biopharmaceutical companies and start-ups – if in 2009 they registered about 31% of new drugs (which is comparable to the share of Big Pharma for the same year), in 2018 already 63% of newly registered drugs came out of the laboratories of small biopharmaceutical companies, while Big Pharma registered only 16% of the total number of new drugs in the same year. See HIM. New Drug Approval Report Analysis of FDA. New Drug Approvals in 2018 (and Multi-Year Trends), P. 17, available at: https://www.hbmpartners.com/media/docs/industry-reports/Analysis-of-FDA-Approvals-2018-and-Previous-Years.pdf

[39] Robinson, D. T. & Stuart E. T., 'Financial Contracting in Biotech Strategic Alliances', (2007) 50 Journal of Law and Economics, 559-596. See also Gjalt de Jong, Rosalinde JA Klein Woolthuis, 'The Content and role of formal contracts in high-tech alliances', (2009) 11 Innovation: Management, Policy & Practice, 44-59.

[40] John Kwoka, The effects of mergers on innovation: economic framework and empirical evidence, in. Nihoul, P., & Van, C. P. (Eds.). (2018). The roles of innovation in competition law analysis

[41] For example, a Deloitte report from 2015 shows that of the volume of alliances reported between January 2011 to May 2012, 751 consisted of licensing, while 498 where M&A. Cf.

From a economists perspective, the now standard method of evaluating the effects of a merger is a technique known as difference-in-differences (DID). The difference-in-difference (DID) technique originated in the field of econometrics was developed in the competition policy doctrine primarily using price to analyse whether a merger should be considered pro- or anticompetitive. Yet, the method can also be used using innovation as the determining factor, i.e. focusing on changes in R&D investments, output (patents) and research productivity (patents/R&D investments). Supposing that the focus of attention is on these innovation effects of a particular merger; data on R&D investments and patents before and after the merger can be collected and correctly capture that change. This may only come out correct if no other relevant factor also changes. In general, of course, that is unlikely to be the case and certainly cannot be assumed. The DID methodology however controls for those other factors by examining the change of an otherwise similar firms over the same period of time.[42]

DID methodology has become the preferred technique for ex post merger analysis and, over the past 30 years, dozens of merger retrospective papers have been published. While most of these have focused on price, while several have examined the nonprice effects of mergers. Those nonprice effects include quality, costs and (especially in pharmaceuticals) R&D. Interestingly, they show that mergers in the pharmaceutical sector seem to have an adverse effect on innovation regardless if the merger were among larger firms, merging as equals, or when Big Pharma firm purchase an R&D start-up through a so-called killer acquisition. Indeed, the research seem to suggest that mergers, generally, is not the solution neither for larger nor smaller firms for promoting innovation in the human medicine industry.[43]

Below we proceed to examine some major studies of the R&D effects of mergers in the pharmaceutical industry where the key strategic variable has been innovation rather than price. Four merger retrospectives in particular merit further description, where the famous Cunningham et al (2019) 'killer acquisition' research is the last to be discussed.

The mergers that have been researched in the two first studies where all transformative or significant mergers in the pharmaceutical industry. Both Danzon et al (2007) and Ornaghi (2009) restricted their analysis to mergers that were large and required post-merger efforts for integration and reorganization of the post merger entity. They, respectively created a database consisting of pharmaceutical and biotech firms from various sources – some of them 'control'

Ralph Marcello, Glenn Carroll, Gaurav Vadnerkar, and Adam Volini, *Executing an open innovation model: Cooperation is key to competition for biopharmaceutical companies*, Deloitte, 2015, It also shows that Open Innovation is more successful than Closed Innovation.[There are several sources revealing the trend towards inlicensing of R&D to Big Pharma in more popular that acquisitions We need better sources here] See also Alex K PavlouMark J Belsey, BioPharma licensing and M&A trends May 2005, Nature Reviews Drug Discovery 4(4): 273-4. See also for example McKinsey, https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/whats-behind-the-pharmaceutical-sectors-m-and-a-push#].

[42] John Kwoka, The effects of mergers on innovation: economic framework and empirical evidence, in. Nihoul, P., & Van, C. P. (Eds.). (2018). The roles of innovation in competition law analysis

[43] Patricia Danzon, Andrew Epstein, and Sean Nicholson, 'Mergers and Acquisitions in the Pharmaceutical and Biotech Industries' (2007) 28 Managerial and Decision Economics 307.

observations. Ornaghi research include the high-profile mergers between Pfizer and Warner Lambert, Glaxo Wellcome and Smithkline Beecham, and Sanofi and Aventis.[44]

Danzon *et al*[45] analysed the determinants and effects on R&D of 165 significant mergers and acquisitions across the pharmaceutical and biotech industry over the period 1988 to 2000.

According to Danzon et al, large merging firms were not significantly different from non-merging firms in terms of growth in enterprise value, sales, employees, and R&D expenses in the three years after a merger. The mergers did not cause less innovation, yet also not more innovative firms. However, for smaller merging firms, there is a lower rate of growth in R&D and in employees regardless of whether the firms merged, but controlling for that propensity leads to the finding that merger reduces the growth rate of R&D as well as sales and employees, by approximately 29, 10, and 11 percent, respectively, in the first year after merger compared to similar non-merging firms. So, for smaller firms, merging with a larger firm lessened rate of innovation.

Ornaghi[46] studied the effects of 27 significant mergers between 1988 to 2004, and found that mergers have a statistically significant and negative impact on the growth of R&D inputs (dollars), output (patents), and research productivity (patents/R&D). The effects on output and productivity are especially noteworthy since even if R&D dollars were appropriately reduced because of redundancy, merger-related further reduction in productivity or output would unambiguously represent adverse effects of the merger. In the cases studied by Ornaghi, by the third post-merger year the growth of R&D inputs, output, and productivity fall by 6.3 percent, 26.8 percent, and 1.46 percent, respectively – the first two of these statistically significant. Ornaghi concludes that his 'findings contradict the idea that mergers in the pharma sector can deliver relevant economies of scope and knowledge synergies' in the innovation function. Rather, his results suggest that factors such as human capital dissipation reduce post-merger performance, and those adverse effects persist even if the merged parties' technologies are correlated.

Kwoka discussing the two studies conclude that both using state-of-the-art methodologies and analysing nearly 200 pharmaceutical mergers – come to broadly similar conclusions. Neither offers support for the proposition that mergers, at least in the pharmaceutical sector, result in increases in R&D expenditures or innovation output, rather than on average innovation decline by several percentage points in the first few years after the merger.[47]

[44] Carmine Ornaghi, 'Mergers and Innovation in Big Pharma' (2009) 27 International Journal of Industrial Organization 70.
[45] Patricia Danzon, Andrew Epstein, and Sean Nicholson, 'Mergers and Acquisitions in the Pharmaceutical and Biotech Industries' (2007) 28 Managerial and Decision Economics 307.
[46] Carmine Ornaghi, 'Mergers and Innovation in Big Pharma' (2009) 27 International Journal of Industrial Organization 70.
[47] John Kwoka, The effects of mergers on innovation: economic framework and empirical evidence, in. Nihoul, P., & Van, C. P. (Eds.). (2018). The roles of innovation in competition law analysis.

A third study was made by Grabowski and Kyle[48]. They examined the speed with which drugs in various stages of development progress after pharmaceutical firms engage in merger, as a method of focusing on outcomes rather than simply R&D expenditures, with a data base of 4500 firms between 1990 and 2007. They found that innovation rate was higher when merging firms have complementary technologies, but otherwise they fall. This latter effect – the fall in R&D and R&D efficiency – is especially pronounced in cases where the merging firms were rivals in their product market.

Cunningham et al[49], in their article 'Killer Acquisitions' looking at more than 16,000 project and 4,000 companies find smaller R&D driven firms with projects acquired by an incumbent with an overlapping drug are 28.6% less likely to be continued in the development process compared to drugs that are not acquired. Cunningham et al moreover provide a conservative estimate that almost 6% of all acquisitions of firms with drug projects in development are killer acquisitions. This would amount to approximately 50 killer acquisitions every year. Importantly, out of the mergers analysed in the paper, those whose value was 5% below the US FTC's turnover threshold were 11.3% more likely to be killer acquisitions than those that were 5% above the threshold.

Noteworthy, Cunningham *et al*, also shows that talent purchasing is rare. Only 22% of pre-acquisition inventors move to the acquirer after the acquisition, while 78% move to other firms. Second, while those who stay and those who leave are statistically comparable before the acquisition event, patenting roughly 4.5 times for the target within the 5 years leading up to the acquisition, post-acquisition, we have little evidence that the retained inventors become more productive in the combined firm. In fact, their average patenting quantity drops by 30% from 4.57 to 3.16 patents in some years. In contrast, inventors who move to other firms have a smaller productivity drop

From the above, it seems that neither theoretical nor empirical economic research shows that mergers in the pharmaceutical sector is generally the solution for creating more innovation to a faster rate, while the killer acquisitions is only the tip of the iceberg. Indeed, mergers between large firms and mergers between large firms and smaller R&D start-ups in the pharma sector seem not, generally, to have been beneficial for innovation, drug development, or, generally, for society.

Notwithstanding this, Cunningham et al research shows also with clarity that anticompetitive mergers may be identified when start-up firms with no or very little turnover are being purchased. However, an additional problem with these transactions is that these mergers often are falling short of the merger regulations, and that the parties are not obliged to file for merger clearance, something which will be addressed below.

[48] Henry Grabowski and Margaret Kyle, 'Mergers and Alliances in Pharmaceuticals: Effects on Innovation and R&D Productivity' in Klaus Gugler and B. Burchin Yurtoglu (eds), The Economics of Corporate Governance and Mergers (Edward Elgar Publishing 2008).
[49] Cunningham, Colleen and Ederer, Florian and Ma, Song, Killer Acquisitions (March 22, 2019). Available at SSRN: https://ssrn.com/abstract=3241707 or http://dx.doi.org/10.2139/ssrn.3241707.

c. Ancillary agreements to mergers

In reference to situation in the early Covid-19 outbreak, some national states were allegedly trying to pursued some vaccine producing firms or individual vaccine researchers to move their practice to the country in question. Several news outlets for example reported on 15 March 2020 that "an unidentified German government source as saying Trump was trying to secure the scientists' work exclusively, and would do anything to get a vaccine for the United States, "but only for the United States.""[50] One question that may be raised in reference to this is, can a purchaser lock-in a promising research result or projects, and its researchers when merging with a smaller R&D intensive firm.

A seldomly research issue in reference to merger regulation is the efforts imposed, not on the vendor, but on the target's management including leading researchers of a target, when a larger pharma or biotech firm is acquiring a controlling stake in often a smaller R&D focused firm, or for that matter when a Big Pharma firm is entering into an exclusive license arrangement with a smaller start-up.

Notwithstanding Cunningham *et al*: findings, it seems that a reoccurring practice when the big pharma firm has identified some key employees (often including, but not always, the inventor) in a target that such individuals are pursued with both a "carrot and stick" to keep on working for the target after the merger or in the collaboration. Often the purchaser would like the key individuals that are retained to enter into option programmes or to purchase options or shares in the firm. The investement should be perceived as substantial by the key individuals, without these individuals should be gaining any such of control over the firm. When entering such agreements, the individuals can be encompassed with non-compete and confidentiality covenants, and even agreeing to stay on for a period of time the firm, or otherwise risk the personal investment made in the share and option programme. The idea is that the individual should be offered a lucrative programme that will be paid out after a certain period of time (or even in miles stones) when the molecule or drug is proven successful, while still the individual also makes a substantial personal investment for this result.

These two ingredients can work very effectively to keep key individuals with the target, when it is purchased by larger firms. Moreover, these individuals who often will be included in the management will also take part in the shareholders agreement that may include non-compete obligation and confidentiality agreements that often go beyond what is in accordance with national labour law and principles, while the employees, when holding options and shares, can be viewed as owners rather than employees of the target according to national corporate rules.[51]

[50] Reuters, Germany tries to halt U.S. interest in firm working on coronavirus vaccine, 15 March 2020. https://www.reuters.com/article/us-health-coronavirus-germany-usa/germany-tries-to-halt-u-s-interest-in-firm-working-on-coronavirus-vaccine-idUSKBN2120IV

[51] Hansen and Lundgren, Köp og salg af virksomheder, 5 ed. 2014, 234 et seq.

However, tying individuals or specialised R&D driven firms as described above to the invention and the project do not need to be pursued by mergers. Large pharma or biotech firms often does not need to resolve to purchasing promising research result by merging with the often smaller R&D driven firms. Indeed, there are several forms of collaboration that the parties can enter where still the larger pharma firm is put in control of the promising research result. While merger possibly is used to exclude certain parts of management (as shown by Cunningham et al), other forms of collaborations may be built on the active inclusion of the inventor and the R&D start-up and where the R&D start-up is controlled through covenants regarding inter alia exclusive license, scientific board and option programme.

d. Other forms of collaborations

As stated above, one of the results of the trend for specialisation by firms in the pharma and biotech sector is the great increase in the amount of technology transfer, licenses and collaborations entered into in the pharma and biotech sectors by independent parties.[52] Even the largest firms do not today conduct research, develop and market drugs and treatments in-house. Instead, collaborations, and not only mergers, in the form of license agreements, R&D ventures, and co-marketing agreements, to develop and market new research result into drugs are on the increase. Generally, pharma and biotech firms are collaborating more and more and thus are entering more and more agreements on the creation, facilitation and transfer of patents, molecules, knowledge and technologies. This exchange or transfer of information and ideas coupled with, firstly, complex agreements with terms, obligations and covenants that may exclude and restrict the parties and, secondly, with the market transparency due to patent and market approval procedures creates a rather distinctive setting for this industry.[53]

Below is a graph which depicts the regular agreements entered into in the life time of a compound or a drug. Often, before any intellectual property rights have been established, any agreement between parties needs to be adjoined with a confidentiality obligation. Such confidentiality agreements are also after the intellectual property rights (often patents) are established important for the protection of the 'know-how' that accompanies the patents and are included in the technology transfer agreements when the substance or molecule is transferred between firms.

[52] Robinson, D. T. & Stuart E. T., 'Financial Contracting in Biotech Strategic Alliances', (2007) 50 Journal of Law and Economics, 559-596. See also Gjalt de Jong, Rosalinde JA Klein Woolthuis, 'The Content and role of formal contracts in high-tech alliances', (2009) 11 Innovation: Management, Policy & Practice, 44-59.

[53] Arnold, K., Coia, A., Saywell, S., Smith, T., Minick, S., & Löffler, A. 2002. Value drivers in licensing deals. Nature Biotechnology, 20(11), 1085-9; Bagga, J., Watkins, K. 2003. A survey of strategic licensing practices in the pharmaceutical industry. IBM Corporation; Chesbrough, HW., 2003. Open Innovation: The new imperative for creating and profiting from technology. Boston: Harvard Business School Press; Chesbrough, Henry William. 2006. Open innovation: The new imperative for creating and profiting from technology. Harvard Business Press; Chesbrough, Henry. 2011, "Pharmaceutical innovation hits the wall: how open innovation can help." Pharmaceutical Innovation 2: 02.

In the early to mid-stages of the development/product life cycle of a molecule the firms may enter into collaborations regarding research and development. The R&D agreements may be entered for several reasons: there is a genuine need for the meeting of minds of researchers to create something. Possibly, different firms hold core knowledge in different part of the innovation chain, where one firm has developed the research tools that a second firm needs to understand and use. Perhaps, there is no intellectual property right yet so any transfer and joint creation of knowledge needs to be boxed in with confidentiality covenants. Moreover, joint R&D agreements often focus on the mechanism for dividing the intellectual property rights *ex post* the collaboration has ended.

From the parties perspective the base for any form of collaboration in the pharma or biotech sector realise, firstly, heavily on the 'license agreement'. In fact, there are numerous sorts of agreements pharma and biotech firms may enter (cf. graph above), but at the heart of these agreements, irrespective how they are named or captioned, is often a right or license to use a patent covering a molecule or antidote to develop and sell a drug or treatment, or an assignment to develop research result and then license or assign the developed product further. Even the share transfer agreements or the asset transfer agreement of the R&D specific firm often includes elements of an assignment of the patent rights or the license of the same, since it is the innovation which is the main asset which the purchaser wants to acquire and control. Indeed, the remuneration for the shares or assets are often exclusively connected to milestones for the development of the research into a drug, e.g. clinical testing, successful phase I, phase II etc.

Notwithstanding this, it seems that license agreements with connected collaboration features, inter alia setting up a scientific board of experts from both the Big Pharma firm (licensee) and the R&D start-up (licensor), are generally a more popular method of transferring promising research result than mergers.[54]

The licensing agreement, even though not being a change of control of the firm, may thus often in the pharma sector stipulate a transfer of the main assets (molecule and connected know-how) and an in-depth and lengthy collaboration between the parties making specific covenants connected to the licensor making available specific researchers to spur the development of the drug. The smaller firm acts as a licensor, while the larger firm is granted an exclusive license to develop the substance or molecule further.[55]

[54] For example, a Deloitte report from 2015 shows that of the volume of alliances reported between January 2011 to May 2012, 751 consisted of licensing, while 498 where M&A. Cf.
Ralph Marcello, Glenn Carroll, Gaurav Vadnerkar, and Adam Volini, *Executing an open innovation model: Cooperation is key to competition for biopharmaceutical companies*, Deloitte, 2015, It also shows that Open Innovation is more successful than Closed Innovation.[There are several sources revealing the trend towards inlicensing of R&D to Big Pharma in more popular that acquisitions We need better sources here] See also Alex K PavlouMark J Belsey, BioPharma licensing and M&A trends May 2005, Nature Reviews Drug Discovery 4(4):273-4. See also for example McKinsey, https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/whats-behind-the-pharmaceutical-sectors-m-and-a-push#].

[55] The licensee, the larger pharma or biotech firm are generally not bound by a non-compete obligation. On the contrary the agreements often clarify that the licensee is not bound by a non-compete.

Even though the larger firm is granted an exclusive right to develop the research result and conduct clinical and other tests, the smaller firm still needs to provide know-how and guidance by granting access to individuals from the firm being available as experts on the research board/committee overseeing the development under the license agreement. The collaboration my hence last for a long period of time, possibly until the end of commercialisation of the drug in every relevant jurisdiction, while the licensee (the Big Pharma firm) often holds the exclusive prerogative whether, and to what speed, the research result should be developed.[56]

Interestingly, a license and collaboration agreement as presented above is generally more lucrative and less risky for Big Pharma to enter then being forced to purchase and merge with smaller R&D intensive firms to gain access to the interesting R&D results. With the use of an exclusive license and a collaboration agreement, they still control the molecule or substance through the terms and conditions of the agreement, while often do not need to transfer an up-front purchase sum when entering the license agreement and take risk up-front. Remuneration under the license agreement can instead by transferred in dispersed milestone payments, connected to the various stages in the development of the drug.

The collaborations falling short from being mergers may not need to be notified under the merger rules, since it is not certain there they represent change of control of the start-up, and it is not even clear that the transfer of the license imply the transfer of a source turn-over.[57] They might under certain jurisdictions be required to be notified as Joint Ventures, if they are considered full-functioning or as a concentration (merger). However, the requirements for "full-functioning" JVs are high and difficult to meet (cf discussion below). Moreover, even if they are notified, the great majority of the collaborations in the pharma sector – reflecting the above scenario - are generally viewed beneficial for the parties, the industry and society at large. From a competition law perspective, analysing the agreements *ex ante*, the collaborations often need to be deemed pro-competitive. They, usually, cannot be regarded anticompetitive for several reasons. The research conducted by the R&D start-up can be in early stages and there are great uncertainties whether the research actually will result in an effective drug. The Big Pharma firm is needed to conduct the necessary testing and development of the drug, and the potential killing aspects of the collaboration cannot be detected from the wording of the collaboration. However, the competition authorities conclusions in these cases can be based on them utilizing the wrong tests, not taking innovation in consideration to the degree needed. This will be discussed below.

However, what is needed to be pointed out is that the terms and conditions of these collaborations reflect poor business acumen on the behalf of the management and owners of the smaller R&D driven firms, being individuals often identical to or closely connected to the innovators. Researchers and having the main employment with universities. The mergers or license agreements sometime reflect is a clash between idealistic researchers and shrewd

[56] The licensor should be made aware that it needs to enclose in the agreement hard milestones connected to future dates, so to push the development of the research result. It should be noted that often the licensee has the obligation to return the exclusivity to the licensor should it decide not to pursue the development further. Notwithstanding this, it even exists licensing agreement where there is no one-time up-front payment, while all remuneration for the licensor will be triggered in milestones which the licensee de facto decide when they will be met.
[57] For example, generally a license agreement does not trigger EU Merger Regulation.

businessmen.[58] What these collaborations often *de facto* will come represent is an agreement of transferring know-how and research result with the guarantee from the small R&D driven firm to exit the research area when the transfer has been completed. Indeed, what they represent from an *ex post* perspective is an agreement not to compete for the future.

e. Concluding remarks

It can be concluded in this part I that given what we know from economic research, pharma mergers should generally benefit from a heighten competition law scrutiny, taking into consideration innovation and competition in innovation to a greater extent. It seems plausible that several of the large pharma mergers should not have been approved by the competition authorities. That there has been an under-enforcement of competition law in reference to mergers in the pharmaceutical industry.[59] Yet, the research regarding 'killer acquisitions', shows that what also needs to be scrutinized under competition law is large pharma or biotech firms (Big Pharma) purchasing smaller R&D intensive start-up firms, with the aim or effect to dismantle them as competitive threats. These mergers seem to fallen under the radar, and have not even been reviewed by competition authorities.

Moreover, the value chain in the pharma industry seems increasingly to be divided, with few firms today developing drugs in-house, from early research to end product. Large scale collaborations including licensing agreements are perhaps even more common than mergers in the pharma and biotech industry. Licensing agreements and collaborations which do imply integration between firms for the transfer of patents and know-how, yet do not amount to mergers, also need to be scrutinised and analysed so that innovations are not lost due to misplaced incentives for the Big Pharma firms acting as exclusive licensees. It seems possible to dismantle competing innovations by utilising licensing agreements and collaborations. In fact, the anticompetitive effects of a 'killer acquisition' and of a Big Pharma firm getting an exclusive license in a patent with the aim not to develop the molecule or active ingredient further (i.e., 'shelving' the antidote or molecule) are similar, if not identical. Indeed, it should be concluded that society would benefit from an intense competition law scrutiny of mergers and strategic R&D alliances, especially when these forms of collaboration originate from the pharmaceutical industry. Whether this is happening, and suggestions on how such intense scrutiny should be conducted, will be presented and discussed in part II of this article.

[58] Several books discuss the general development of the pharma industry. For example, Frederick M. Abbott and Grahamn Dukes Global Pharmaceutical Policy – Ensuring the Medicines for Tomorrow's World. Edward Elgar 2009. See also industry leaders like Garnier, JP. 2008. Rebuilding the R&D engine in big pharma. Harv Bus Rev. 86(5):68-70, 72-6, 128. (Jean-Pierre Garnier (jean-pierre.garnier@gsk.com) was at the time of writing the article, the chief executive officer of GlaxoSmithKline and is based in London and Philadelphia).
[59] The OECD seems to have reached a similar conclusion. See OECD Op. cit. P. 37 et seq.

Finally, there is a general consensus that the pharmaceutical industry has been struggling the last decades from low R&D output and rather distorted incentives.[60] Few block busting drugs treating serious illnesses have been released on the market, while society faces a number of medical challenges in the form of pandemics and the loss of effective antibiotics. Life style drugs are however on the rise. The poor R&D output has led to several waves of consolidations, where a great number of pharmaceutical firms have merged so that currently 'Big Pharma' only consists of very few firms. While this has not produced better R&D results, the difficulties regarding creating new form of block busting drugs addressing serious illnesses seem to be real. However, the market failure in reference to R&D on the pharmaceutical markets is not strictly a competition law issue. It concerns the fact that the current methodology from creating cures to serious illnesses seem to have lost it generally effectiveness.[61] It is hence more than a market failure, it failure for society to provide a right to health.

[60] See generally Frederick M. Abbott and Grahamn Dukes Global Pharmaceutical Policy – Ensuring the Medicines for Tomorrow's World. Edward Elgar 2009. See also industry leaders like Garnier, JP. 2008. Rebuilding the R&D engine in big pharma. Harv Bus Rev. 86(5):68-70, 72-6, 128. (Jean-Pierre Garnier (jean-pierre.garnier@gsk.com) was at the time of writing the article, the chief executive officer of GlaxoSmithKline and is based in London and Philadelphia).
[61] Ibid.

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«Убийственные» слияния и поглощения и другие формы антиконкурентного сотрудничества в период пандемии COVID-19. Ч. 1 [Электронный ресурс] : препринт WP22/2021/01 / Б. Й. Ландквист; Нац. исслед. ун-т «Высшая школа экономики». – Электрон. текст. дан. (400 Кб). – М. : Изд. дом Высшей школы экономики, 2021. – (Серия WP22 «Конкурентное право и политика БРИКС»). – 27 с. – На англ. яз.

В препринте, состоящем из двух частей, анализируются так называемые убийственные слияния и поглощения и другие формы антиконкурентного сотрудничества. Утверждается, что «убийственные» слияния и поглощения – явление, которое на практике происходит не только в традиционной форме (в виде слияния, присоединения и иных форм реорганизации компании), но в гораздо более широких и завуалированных формах сотрудничества. Например, когда конечной целью приобретения компании является получение не ее активов, а ключевых сотрудников и менеджмента: в случае такого «убийственного» поглощения ключевые сотрудники и менеджмент получают значительное количество акций и опционов от компании-покупателя. В этом случае «убийственные» слияния и поглощения направлены на удержание ключевых сотрудников и менеджмента приобретаемой компании, а не на традиционную смену контроля над предприятиями и активами компании.

Другие формы сотрудничества, например, объединение компаний для проведения совместных научных исследований, могут иметь схожий эффект «убийственного» слияния и поглощения. В период пандемии сотрудничество между крупными фармацевтическими компаниями и небольшими стартапами для совместной разработки вакцин стало частым явлением, и возможно, что в ряде случаев «убийственные» слияния и поглощения могли происходить посредством заключения соглашений о совместной деятельности и объединения проектов и ключевых сотрудников таких компаний. Для научного обоснования представленной теории, во-первых, анализируется экономическая доктрина, а во-вторых, изучается практика, сложившаяся в фармацевтической индустрии. На основании анализа, проведенного в первой части препринта, сделан вывод о том, что компетентным органам необходимо осуществлять гораздо более тщательный контроль экономической концентрации: контроль за сделками слияний и поглощений компаний и контроль за соглашениями компаний о проведении совместных научных исследований, особенно в области фармацевтической индустрии.

Ключевые слова: слияния и поглощения, стратегические альянсы, конкурентное право, убийственные слияния и поглощения, фармацевтика, БРИКС

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Часть 1

(*на английском языке*)

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