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ARTICLE

Big Tech Acquisitions and Innovation Incentives

Raphaël De Coninck & Christoph von Muellern

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In this note, which partly draws on discussions and papers presented at the inaugural DCI conference, we argue that merger policy in the tech sector must be based on solid empirical evidence. We further argue that merger policy should not only consider post-merger effects on innovation, but also its ex-ante impact on pre-merger innovation. While a growing theoretical literature is emerging on this question, more empirical evidence is needed to assess how merger policy affects not only the *level*, but also the *direction* of pre-merger innovation incentives.

1. The Killer Acquisition Debate

Big Tech continues to be on an acquisition spree. On 28 March of this year, the European Commission unconditionally approved Google's acquisition of Photomath, an online homework and study help app which allows consumers to scan and detect mathematical equations with their smartphone's camera.[1] Only shortly before that, in February, Meta officially closed its acquisition of virtual reality fitness app developer Within Unlimited after winning a court case against the Federal Trade Commission (FTC).

These two takeovers mark just some of the latest of hundreds of acquisitions the Big Tech incumbents GAFAM (Google, Amazon, Facebook (now Meta), Apple and Microsoft) have made over the recent years. In contrast to the acquisition of Photomath and Within Unlimited, most of these acquisitions did not have to be notified to the competition authorities and thus flew under the radar. In fact, focusing on transactions with a value above 1m USD an FTC report from 2021 identifies more than 600 unreported acquisitions by GAFAM in the period from

[1] The European Commission's press release is available at https://ec.europa.eu/commission/presscorner/detail/en/ip_23_1927.

2010 to 2019.[2] Almost 80% of these acquisitions had a transaction value of less than 50m USD and thus involve fairly small businesses.

Against the backdrop of GAFAM's strong track record, there have been increasing concerns about the rationale behind such acquisitions. According to the now well-known *killer acquisitions* narrative,[3] the main purpose of at least some of these acquisitions might be to eliminate innovative start-ups that could potentially turn into a serious competitive threat and challenge the incumbent's market position in the future. After the takeover, the incumbent might then decide to not even use the start-up's innovative ideas or products but instead to simply *kill*, i.e. discontinue, them.

While the empirical relevance of such killer acquisitions by Big Tech firms is far from established,[4] competition authorities, academics and antitrust practitioners are increasingly considering the potential impact Big Tech acquisitions on innovation. The growing interest into this question is hardly surprising. After all, innovation, may it be in form of *the* next big thing or the incremental improvement of existing products and services, takes the centre stage in the digital markets in which GAFAM operate.

2. Structuring the debate

The question of how Big Tech's acquisitions of start-ups affect innovation is a multifaceted issue which is complex to assess from a theoretical and empirical perspective. To find an answer one necessarily needs to form a view of how innovation would look like without these acquisitions. The need to formulate such a counterfactual scenario is of course nothing new but an essential part of any merger review (which typically involves the question of how prices in the market would develop if firm A was not allowed to take over firm B). However, studying the effects of (Big Tech) mergers on innovation is especially complex due to the elusive nature of innovation and the high degree of uncertainty surrounding it. Moreover, innovation is notoriously difficult to measure and unlike a product's price cannot be pinned

[2] Federal Trade Commission, "Non-HSR Reported Acquisitions by Select Technology Platforms, 2010–2019: An FTC Study", September 2021.

[3] See e,g, Cunningham C., Ma S. and Ederer F. (2021), "Killer Acquisitions", 129 (3) Journal of Political Economy 649 (with a particular focus on the pharmaceutical industry).

[4] See e.g. Latham O., Tecu I., and Bagaria N., (2020), "Beyond killer acquisitions: Are there more common potential competition issues in tech deals and how can these be assessed?", CPI Antitrust Chronicle, May 2020, and Ivaldi M., Petit N. and Ünekbaş S. (2023), "Killer Acquisitions: Evidence from Merger Cases in Digital Industries", TSE Working Paper 13-1420. Latham et al. have a closer look at 409 acquisitions made by GAFA between 2009 and 2020, and find that only a small number of Big Tech acquisitions "could begin to fit the 'killer' narrative" (without saying that these transactions actually were killer acquisitions). Ivaldi et al. do not find any empirical support for the killer acquisition hypothesis in a sample of tech mergers reviewed by the European Commission.

down to a single number.[5] Despite (or maybe exactly because) of this complexity, there is a growing body of theoretical and empirical research that looks into the impact of Big Tech acquisitions on innovation.

When reviewing this existing literature and how it might inform potential changes to current merger policy, it is helpful to distinguish between different effects over time, different sources and types of innovation as well as different types of acquisitions:

- *Ex-ante innovation incentives vs post-merger innovation*: The regulatory review of a specific transaction typically focuses on the effects of that proposed transaction, and the authority's approval or prohibition decision will have a direct impact on innovation *post-merger*. However, merger policy more broadly (embodied by the regulatory framework and guidelines as well as the authority's past track record of allowing or prohibiting Big Tech acquisitions) might also have a significant impact on firms' incentives to innovate ex-ante, i.e. pre-merger. This is because a company's prospect of being acquired down the line, which is dependent on merger policy, affects its expected returns to innovation, before any acquisition takes place.

- *Sources of innovation*: Big Tech acquisitions might not only have an effect on the ex-ante or post-merger innovation efforts of the target firm. They are also likely to impact the innovation incentives of the incumbent firm itself and of other firms as well as potential entrants in the market. A balanced merger policy needs to weigh these different effects on innovation against each other and assess how they change the competitive situation in the long-run.

- *Types of innovation*: One commonly distinguishes between different types of innovation, e.g. by grouping innovations according to their overall impact on the market (e.g. incremental, disruptive or radical innovation). Economic theory suggests that Big Tech acquisitions might have a different impact on firms' incentive to invest in incremental or marginal product improvements than in, say, disruptive innovation. For example, a model by Katz (2021) argues that under certain conditions, Big Tech acquisitions might discourage investments in marginal improvements of product quality.[6]

[5] To make innovation nevertheless quantifiable researchers typically use proxies that either concern inputs to the innovation process (e.g. a firm's R&D spending) or outputs of innovation (e.g. a firm's number of patents).

[6] Katz M., (2021), "Big Tech mergers: Innovation, competition for the market, and the acquisition of emerging competitors", Information Economics and Policy, 54, issue C.

- *Type of acquisition:* The degree to which the acquired products are substitutes or complements, and the extent to which the transaction will permit to increase the appropriability of the target's innovation, will directly affect the likely impact of the transaction, future innovation and customers' benefits. Acquisition by Big Tech firms may also be primarily geared towards acquiring human capital – the extent to which the target's capabilities are complementary to the acquirer will be another source of efficiencies and complementary innovation.

Finally, it is important to keep in mind that Big Tech acquisitions might not affect only the level but also the *direction* of innovation, which we highlight below.

3. Pre-merger effects – innovation levels

While the general impact of mergers on post-merger innovation has been discussed for a long time, in recent years there has been an increasing interest in the impact of Big Tech acquisitions on *pre-merger innovation incentives*. Theoretical economic models suggest that the effects of big tech acquisitions on the ex-ante incentives are ambiguous.

On the one hand, economists and industry stakeholders have argued that the prospect of being acquired may strengthen a start-up's incentive for innovative entry (so-called *entry for buyout*).[7] A slightly more positive-sounding spin on that narrative – which upholds the more romantic view of tech entrepreneurs being driven by curiosity, passion and vision – is that Big Tech acquisitions provide venture capital (VC) firms with an additional exit strategy.

Data on VC exits show that VC firms are indeed increasingly relying on acquisitions rather than initial public offerings to cash out. According to research by Florian Ederer and Bruno Pellegrino, "During the late 1980s and early 1990s, there were about nine IPOs for every one acquisition. In 2019, however, there were over 900 acquisitions and only approximately 100 IPOs."[8] The prospect of being acquired by Big Tech is likely to help start-ups securing VC funding which is often said to have a notable positive impact on innovation. This is evidenced not least by the higher

[7] Examples of theoretical economic papers that find evidence in support of the entry for buyout theory include Motta M. and Peitz M., (2021), "Big Tech Mergers", Information Economics and Policy, volume 54,100868; Cabral L., (2021), "Merger policy in digital industries", Information Economics and Policy, 54, issue C; and Hollenbeck B., (2020), "Horizontal mergers and innovation in concentrated industries", Quant. Mktg. Econ., 18 (1), 1–37.

[8] https://clsbluesky.law.columbia.edu/2023/02/24/the-great-startup-sellout-and-the-rise-of-oligopoly/.

number of patents and R&D expenditures of VC-backed firms in comparison with firms that did not receive VC funding.[9]

Entry for buyout might in theory result in socially excessive innovative entries if the incumbent does not use the innovation of the entrant but decides to kill it (i.e. in case of a killer acquisition).[10] The relevance of excessive entry thus hinges on the prevalence of killer acquisitions among Big Tech mergers. Given the relatively thin empirical ground on which the killer acquisition narrative rests, it seems relatively unlikely that excessive entry could be a serious concern in practice.

On the other hand, Kamepalli et al. (2020)[11] argue that a permissive merger policy may reduce innovation by a potential entrant. This is because an (anticipated) acquisition by the incumbent platform shortly after entry might discourage platform content providers (app developers in the authors' example) to adapt their products and services to the entrant's platform.[12] Due to indirect network effects (the attractiveness of the platform for consumers increases with the number of content providers) the entrant might not be able to gain sufficient scale which has an impact on the its platform's value and thus on the acquisition price that the incumbent is willing to pay. A lower acquisition price in turn dampens the entrant's incentives to enter the market in the first place.

4. Pre-merger effects – empirical evidence on VC funding

With the effects predicted by economic theory being ambiguous, gathering empirical evidence on the impact of Big Tech acquisitions on (ex-ante) innovation is essential to ascertain which theoretical effects play actually a role in practice.

A recent paper by Prado and Bauer (2022),[13] which was presented by both authors at the inaugural DCI conference, is a welcome addition to the still limited but growing number of empirical studies on the topic. Prado and Bauer analyse the short-term effects of Big Tech start-up acquisitions on venture capital funding. For this purpose, they have gathered data on 392 acquisitions from 2010 to 2020 in four tech-related industries (with the acquisitions being further grouped into 173 different industry

[9] For more details, see a recent paper by Gary Dushnitsky and D. Daniel Sokol, which contains further references to evidence on the impact of VC funding on innovation and a discussion of how proposed changes to merger policy might harm the VC-backed ecosystem in the United States (Dushnitsky, G. and Sokol, D. D., (2022), "Mergers, Antitrust, and the Interplay of Entrepreneurial Activity and the Investments That Fund It", 24 Vanderbilt Journal of Entertainment and Technology Law 255.

[10] As pointed out by Katz (2021).

[11] Kamepalli S. K., Rajan R. G. and Zingales, L., (2020), "Kill Zone", Becker Friedman Institute for Economics Working Paper No. 2020-19. University of Chicago.

[12] While content providers might generally be willing to switch to adopt the new platform, switching and adaptation costs could prevent them from doing so if they can foresee that the new platform would be swiftly swallowed by the incumbent.

[13] Prado T. and Bauer S., (2022), "Big Tech platform acquisitions and venture capital funding for innovation", Information Economics and Policy 59, 100973.

segments).[14] Prado and Bauer measure the effects of Big Tech acquisitions on venture capital for start-ups in two ways.

First, they analyse whether there is a correlation between the number of acquisitions in an industry segment and the VC activity (in terms of number of VC deals and total VC funding) in that segment. Prado and Bauer find that the number of VC deals globally increased by 20% in the quarter in which the acquisition took place and the three subsequent quarters.

Second, the paper compares the VC activity over time for industry segments in which a Big Tech acquisitions has occurred with the VC activity in industry segments in which no such acquisitions were witnessed. This comparison confirms Prado and Bauer's generally finding that Big Tech acquisitions had a positive impact on VC investments into start-ups. On a global level, there is a statistically significant increase of the number of VC deals, the total amount of VC funding and the average VC funding of 6%, 19% and 13%, respectively, in the quarter of the acquisition. Importantly, the positive effects on VC activity do not appear to be long lasting but wear off in the quarters following the acquisition. Similarly, the impact of acquisitions on VC activity appears to be larger when solely focusing on the effects of the first acquisition observed in the respective industry segment during the observation period. This suggests that successive Big Tech acquisitions in the same industry segment might have a decreasing positive impact on innovation.

This research is important in documenting the link between mergers on VC funding, and therefore helps better understand pre-merger incentives. While other pre-merger effects could in theory be considered,[15] one could expect that the first order effect of providing entrepreneurs with a better prospect for a successful exit strategy would logically be to increase their investment incentives. Overall, the empirical evidence provided by Prado and Bauer establish support for this hypothesis.[16]

5. Pre-merger effects – direction of innovation

However, it is not only the *level* of innovation that matters for an informed merger policy. The next step would be to understand in *which direction* the increased incentives associated with a better exit strategy affect the entrepreneur's pre-merger innovation incentives. Will the possibility of a buyout by the incumbent lead new

[14] The four industries are: Internet Software & Services, eCommerce, Mobile Commerce, and Mobile Software & Services.

[15] See e.g. Katz M., (2021), "Big Tech mergers: Innovation, competition for the market, and the acquisition of emerging competitors", Information Economics and Policy, 54, issue C.

[16] As Prado and Bauer point out, the observed increase of VC activity may also be due to Big Tech acquisitions signalling increased market potential and the "attractiveness of investment in complementary innovation activities".

entrants to invest into products that are more substitutable or complementary with the incumbent? Will a possible buyout better align the new entrants' innovation choices with the social optimum or, on the contrary, lead to further divergence?

As already referred to in this note, there is a growing theoretical literature on these points (e.g. Motta and Peitz (2021), Dijk at al. (2022)).[17] Theory indicates that the possibility of buyout will at the margin lead to innovation that is more valuable to the incumbent – but the specific modelled outcomes are highly dependent on the respective model assumptions. More empirical evidence on how merger policy affects the type of innovation brought to the market by new entrants is therefore needed.

Finally, the question should not simply be about assessing the impact of a more or less lenient merger policy. Rather, the specific theories of harm pursued under the merger policy will themselves have an impact on pre-merger innovation. For instance, a merger policy that blocks complementary acquisitions for tech companies (such as emerging "ecosystem" theories of harm) would deprive consumers of superior products in the specific case reviewed by the authority, thereby bringing back under a different label the long-discarded efficiency offences. But such theories of harm would also more generally risk affecting the types of innovations brought in the future. This is too important for a sound merger policy to entirely ignore.

Raphaël De Coninck
Vice President at Charles River Associates (CRA).

Christoph von Muellern
Principal at Charles River Associates (CRA).

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[17] Motta M. and Peitz M., (2021), "Big Tech Mergers", Information Economics and Policy, volume 54,100868; Dijk, E., Moraga-González J. and Motchenkova E. (2022), "How do Start-up Acquisitions Affect the Direction of Innovation?", Tinbergen Institute Discussion Paper 2021-065/VII (revised 18 Nov. 2022).