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Antitrust policy has the potential to affect the innovation process through merger control, which influences concentration and market power in the economy. The ultimate effect of a merger on innovation is determined by the generated efficiencies, which can tip the balance between profit cannibalization and profit appropriability. Over the past decades pre-merger notification requirements have become more lenient, allowing thousands of acquisitions of small innovative firms to avoid merger control. Concerning evidence from the United States shows that these non-notified mergers did not generate enough efficiencies to counterbalance their effect on market power, resulting in less innovation. A similar pattern of relaxation of pre-merger notification requirements has spread to several countries, contributing to the global rise in market power. Early steps have been taken to strengthen notification requirements in the Big Tech and Pharma industries, but the regulators and the authorities should be ever vigilant.

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Innovation is the engine powering economic growth. Innovation improves productivity, and in the long run productivity is almost all that matters.² Although it is common for people working on antitrust to focus on narrow industries and short time spans, industrial policy has the potential to radically change the innovation process through competition. This is because competition shapes the returns and incentives to innovation, but it does so in an ambiguous way. On the one hand, less competition means that firms can appropriate more returns from innovation, and this incentivizes creative destruction as described by Joseph Schumpeter (1934).³ On the other hand, more competition pushes companies to innovate to defend their market share, as emphasized by Arrow (1962).⁴ Then, it is only natural to ask what antitrust policy can do to improve innovation, and what has been done so far.

One of the prominent applications of competition policy is merger control, and the act of blocking a merger can have significant consequences for the affected markets. Besides, merger activity is on the rise, and it is at an all-time high. 2021 has been a record-setting year in global M&A activity. Total transaction volume topped \$5.5 trillion, exceeding prior peaks in 2007 and 2015 that remained below \$5 trillion.⁵ It is debated whether this activity is due to lax merger policy, and the effect of these mergers on innovation is unclear. While there exists a wide literature on the effects of the level of competition on innovation, the literature on mergers and innovation has only developed in recent years.

The ultimate effect of a merger on innovation is determined by the balance between profit cannibalization and profit appropriability. Cannibalization implies that, after a merger, each merging party realizes that a successful innovation will cannibalize the profits of the new partner. To be more precise, the merging party internalizes the negative externality that its innovation has on the profits of the new partner. Therefore, the cannibalization channel pushes firms to innovate less after a merger. Instead, appropriability represents the ability of a merging firm to extract returns from a successful innovation. After the merger, the resulting entity has more market power, and it can secure more profits as compensation for its innovation efforts. Consequently, the appropriation channel incentivizes the merged firm to innovate more.

I. EFFICIENCIES: WHAT ARE THEY AND WHY DO THEY MATTER?

The balance between cannibalization and appropriability is decided by the efficiencies associated with the merger. This is why efficiencies are at the heart of merger analysis involving innovation concerns. Efficiencies are a general term representing synergies and cost reductions, both in terms of production and innovation, that are possible only due to the merger. Efficiencies make it easier to produce and to innovate, increasing output and profits. Therefore, efficiencies favor the appropriability channel, increasing the amount of profits generated with a given innovation effort. The higher the efficiencies, the more likely that the merged entity will find it profitable to innovate more. Moreover, it is worth noting that efficiencies also improve the consumer surplus, and not only profits. Therefore, merger efficiencies are beneficial for an antitrust authority that has a consumer surplus standard, and for an authority that has a total welfare standard.

There is an open debate in the literature on whether efficiencies are a necessary condition for a merger to be innovation improving. In the fairly general class of models studied by Motta & Tarantino (2021), a merger absent efficiencies is always detrimental to innovation.⁶ These are models of cost-reducing innovation, which is akin to process innovation, where efficiencies reduce the fixed cost of innovation. The conclusion of these models, and similar conclusions by Federico et al. (2018), supported the divestitures imposed by the European Commission on the Dow-DuPont merger in 2017, a milestone case for innovation concerns in merger control.⁷ On the contrary, in the model described by Bourreau et al. (2021) a merger that generates no efficiencies can still lead to more innovation.⁸ This is a model of demand-enhancing innovation, which

2 As quoted from Paul Krugman: "A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker." Source: *The Age of Diminished Expectations* (1990).

3 Schumpeter, Joseph A. *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*. Rochester, NY, 1934. <https://papers.ssrn.com/abstract=1496199>.

4 Arrow, Kenneth. "Economic Welfare and the Allocation of Resources for Invention." In *The Rate and Direction of Inventive Activity: Economic and Social Factors*, 609–26. Princeton University Press, 1962. <https://www.nber.org/books-and-chapters/rate-and-direction-inventive-activity-economic-and-social-factors/economic-welfare-and-allocation-resources-invention>.

5 For more information see <https://www.nytimes.com/2021/12/18/business/dealbook/deals-of-the-year.html>.

6 Motta, Massimo & Emanuele Tarantino. "The Effect of Horizontal Mergers, When Firms Compete in Prices and Investments." *International Journal of Industrial Organization* (2021): 102774. <https://doi.org/10.1016/j.ijindorg.2021.102774>.

7 Federico, Giulio, Gregor Langus & Tommaso Valletti. "Horizontal Mergers and Product Innovation." *International Journal of Industrial Organization* (2018): 590–612. <https://doi.org/10.1016/j.ijindorg.2018.11.005>.

8 Bourreau, Marc, Bruno Jullien & Yassine Lefouili. "Mergers and Demand-Enhancing Innovation," (2021). <https://papers.ssrn.com/abstract=3846118>.

is closer to product innovation. The authors also propose a comparison between innovation diversion and price diversion ratios to evaluate the likely impact of a merger on innovation.

Assessing the existence and the extent of efficiencies generated by a merger is a challenging task, both before and after the merger has taken place. The problem lies in the lack of a counterfactual, as it is often the case in economics. Once the merger is realized, it is impossible to know how much the merging parties would have produced or how much they would have innovated absent the merger. An additional issue is the measurement of innovation, which is a long and complex process. The economic literature has frequently relied on patents as a readily available source of information on the innovation.⁹ The recent work on killer acquisitions by Cunningham et al. (2019), instead, studies the development and approval process in the pharmaceutical sector.¹⁰ A further challenge is given by the nature of innovation, which is often carried out by young startups. There is very little information available on these small enterprises, and their prospects tend to be uncertain.

II. A USEFUL EXPERIMENT: WHAT HAPPENS WHEN THE AUTHORITY GOES BLIND?

A sudden change in policy provides a unique opportunity to find out the actual effect of merger control on innovation. In December 2000, the Clinton administration approved an amendment to the Hart-Scott-Rodino act (hereafter “HSR act”) that disciplines the pre-merger notification requirements in the United States. The four pages amendment was part of a 320-page omnibus bill signed at the end of the year, and so it was not a publicly transparent or an expected attempt to weaken antitrust enforcement in the United States.¹¹ Despite its little news coverage, this amendment led to a 70 percent decline in pre-merger notifications. By avoiding pre-merger notifications, firms elude antitrust enforcement almost entirely, resulting in stealth consolidation. Wollmann (2019) defines stealth consolidation as a series of horizontal mergers that go unnoticed by the antitrust authorities, because they are not notified.¹² Mergers consumed in the period before the amendment provide a suitable counterfactual for the new mergers that arise due to stealth consolidation and that are outside of merger control by the authorities. This allows us to identify the effect of these new mergers on innovation, which is ultimately the effect of a policy change that removes merger control for a subset of mergers.

The recent work of Morzenti (2023) uses patenting activity as a measure of innovation, and so it focuses on the first stages of the innovation process.¹³ On average, mergers lead to a 28 percent decline in innovation in the 6 years following the transaction. However, there is high heterogeneity around this figure, as 36 percent of these mergers actually raise innovation. This implies that the work of an antitrust authority is particularly challenging when dealing with the innovation effects of a merger, and only a careful study of each case can determine its likely outcomes. Removing pre-merger notifications, instead, prevents the authority from monitoring every transaction for potential harmful effects. Indeed, horizontal mergers that were not notified due to the amendment lead to a further 30 percent decline in innovation. This can be considered the effect of removing antitrust scrutiny indiscriminately. A notification to the authorities, instead, would have prevented this decline in innovation.

A particularly strong decrease in process innovation drives the decline in overall innovation, supporting the argumentations of Motta & Tarantino (2021) on cost reducing innovation. On the other hand, the effect on product innovation is less pronounced. This suggests that affected firms become less productive after these mergers, and this can have dire consequences in the long run for economic growth and welfare. The two industries that are most affected by the policy change are big tech and the pharmaceutical sector. This is not surprising, as these are the industries that produce most patents, and so they have the most innovation to lose.

The burgeoning literature on killer acquisitions focuses on the future of firms that are target of acquisitions. In the case of the amendment to the HSR act, however, it is the acquiring firms that tends to decrease innovation more after the merger. This phenomenon has been called reverse killer acquisition by Caffarra et al. (2020), and it implies that the large acquiring firm kills its own project to replace it with the new

9 See for instance the work of Haucap, Justus, Alexander Rasch & Joel Stiebale. “How Mergers Affect Innovation: Theory and Evidence.” *International Journal of Industrial Organization* (2019): 283–325. <https://doi.org/10.1016/j.ijindorg.2018.10.003>.

10 Cunningham, Colleen, Florian Ederer & Song Ma. “Killer Acquisitions” (2019)

11 Lancieri, Filippo, Eric A. Posner & Luigi Zingales. “The Political Economy of the Decline of Antitrust Enforcement in the United States.” *Antitrust Law Journal* (Forthcoming) (2022)

12 Wollmann, Thomas G. “Stealth Consolidation: Evidence from an Amendment to the Hart-Scott-Rodino Act.” *American Economic Review: Insights* 1, no. 1 (2019): 77–94. <https://doi.org/10.1257/aeri.20180137>.

13 Morzenti, Giovanni. “Antitrust Policy and Innovation,” Mimeo (2023) https://www.dropbox.com/s/pxwr4wt9hh5rate/Antitrust_and_Innovation_Paper_V2.pdf?dl=0.

acquired one.¹⁴ Even though the acquiring firm develops a final product, by killing its original project the firm reduces the number of competing products on the market, and this has the potential to harm the consumer.

As the amendment to the HSR act focused on small and private firms, it is natural to wonder whether the overall level of innovation was affected in a significant and detectable way. If the merging firm has an incentive to reduce innovation after the merger, then its rivals might find it optimal to increase their innovation effort in response. Therefore, the effect of a merger on the whole industry is a priori ambiguous. In the case of the amendment to the HSR act, the affected industries became more concentrated after the policy change. Moreover, the profit margins of these industries soared, indicating a likely increase in market power. Both R&D spending and overall investment declined after the policy change, and this can be considered the effect of a merger wave that is not monitored by the antitrust authority.

III. A GLOBAL PHENOMENON

The United States were one of the first countries to relax their pre-merger notification rules, but they were not the only one by far. In the two past decades 11 countries have amended their notification practices to make them more lenient, largely to follow in the United States footsteps. As an example, Italy amended its pre-merger notification program in 2012, resulting in an abrupt 90 percent year-over-year decline in merger filings. The list includes several European countries, but also Canada, Japan, and Russia. In all these cases, pre-merger filings declined sharply. The fact that notifications diminished is not surprising, as this was the original intent of regulators. The size of such a decrease is quite striking, and it shows that such amendments had a significant impact on the merger policy in affected countries.

Moreover, these countries show evidence of stealth consolidation after the relaxation of notification rules. This implies that these policy changes generated more horizontal mergers that were outside of the control of the national antitrust authorities. As in the case of the United States, these other countries experienced rising levels of concentration in affected industries, indicating that merging firms are gaining more market power due to these amendments. These findings relate to the recent evidence of rising market power in the United States and on a global level. De Loecker et al. (2022) show that markups have been increasing in the past decades, indicating that firms are becoming more profitable, and they are capturing a larger share of the economic surplus.¹⁵ Using a similar approach, Diez et al. (2019) show that markups have risen on a global scale.¹⁶ A laxer antitrust policy is often mentioned as a possible explanation for the rising firms' market power. The HSR amendment in the United States and similar policy changes around the world are a clear example of the global relaxation of antitrust enforcement. And the first scientific studies on their outcomes do not paint a favorable picture.

IV. WHAT HAS BEEN DONE AND WHAT CAN BE DONE?

Given the available evidence, the regulators have started to recognize the need for thorough antitrust scrutiny in industries that are most crucial for innovation. For instance, in the United States the FTC issued special orders compelling big tech to disclose previously non-reportable deals, citing past stealth consolidation as justification.¹⁷ Moreover, the New York Senate passed a bill creating a first-of-its-kind \$9.2 million state-specific pre-merger notification threshold. This new regulation was implemented following concerns regarding the big tech sector, as stated by the regulators themselves.¹⁸ In the European Union a recent Commission Guidance on Article 22 regulating the referral of transactions to the European Commission, states that national competition authorities can report mergers that do not trigger national filings to the Commission, if these affect the pharmaceutical and the digital sectors.¹⁹ All these examples show that regulators around the world are considering seriously the issue of mergers and innovation, and they are moving to restore antitrust control over industries that are inherently innovative.

14 Caffarra, Cristina, Greg Crawford & Tommaso Valletti. "How Tech Rolls": Potential Competition and 'Reverse' Killer Acquisitions." VoxEU (blog), May 11, 2020. <https://www.competitionpolicyinternational.com/how-tech-rolls-potential-competition-and-reverse-killer-acquisitions/>.

15 De Loecker, Jan, Jan Eeckhout & Gabriel Unger. "The Rise of Market Power and the Macroeconomic Implications" The Quarterly Journal of Economics 135, no. 2 (2022): 561–644. <https://doi.org/10.1093/qje/qjz041>.

16 Diez, Federico J, Jiayue Fan & Carolina Villegas-Sanchez. "Global Declining Competition," (2019)

17 "We support the Commission's decision to issue a 6(b) study designed to assess the sufficiency of the Hart-Scott-Rodino Antitrust Improvement Act of 1976 ("HSR Act") thresholds with respect to technology mergers and acquisitions of competitive significance." As cited from the Joint Statement by the FTC Commissioners, 2020. https://www.ftc.gov/system/files/documents/public_statements/1566385/statement_by_commissioners_wilson_and_chopra_re_hsr_6b.pdf.

18 "The Bill applies to all industries. But... concerns about purported anticompetitive behavior in the "Big Tech" sector were the spark." As cited from: <https://www.whitecase.com/publications/alert/new-yorks-sweeping-new-antitrust-bill-requiring-ny-state-premerger-notification>.

19 "... this includes in particular transactions in the digital and pharma sectors." Commission Guidance on the application of Article 22 https://ec.europa.eu/competition/consultations/2021_merger_control/guidance_article_22_referrals.pdf.

The available evidence shows that relaxing antitrust policy could have far reaching and unintended consequences. A wave of mergers outside the control of antitrust authorities can increase concentration, raise profits, and stifle innovation. Policymakers should not dismiss small mergers as negligible for competition and innovation either. Quite to the contrary, a large number of these transactions may have a profound impact in localized and segmented product markets. By implementing a series of small acquisitions in a fragmented product market, a strategy called “roll-up” in the private equity jargon, large companies can increase concentration without triggering any merger notification. The antitrust authorities should be ever vigilant, and policymakers should ensure that they have the appropriate laws and funds to do so. By monitoring the market, the authorities can foster competition, to the benefit of the consumer and of future innovation.



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