

<b>Institution:</b> Imperial College London Business School		
<b>Unit of Assessment:</b> C17 Business and Management Studies		
<b>Title of case study:</b> The Impact of Applying an Innovation Theory of Harm in Merger Policy Decision Making		
<b>Period when the underpinning research was undertaken:</b> 2016-2018		
<b>Details of staff conducting the underpinning research from the submitting unit:</b>		
<b>Name(s):</b>	<b>Role(s) (e.g. job title):</b>	<b>Period(s) employed by submitting HEI:</b>
Tommaso Valletti	Professor of Economics	01/09/2000 - present
<b>Period when the claimed impact occurred:</b> 2016-2020		
<b>Is this case study continued from a case study submitted in 2014?</b> N		
<b>1. Summary of the impact</b> (indicative maximum 100 words)		
<p>Innovation is key to economic and social development. Research undertaken by Professor Valletti on the potential harmful effects on innovation of mergers, led to a <b>fundamental change in the economic framework for assessing merger impacts on innovation</b>. It proposed a novel analysis of 'unilateral effects' that focuses on the extent to which successful innovation by one merging firm is likely to divert sales from the other. <b>The research had an impact upon both the economic assessment of major EU mergers (including Dow/DuPont and Bayer/Monsanto) and the substantial remedies required for their approval, leading to major benefits for European farmers and consumers.</b> In 2018, the EU estimated total customer savings from merger interventions by the Commission of EUR 15.0-25.0 billion. The Bayer/Monsanto merger was the biggest in 2018 as was Dow/DuPont in 2017, when total customer savings were estimated between EUR 2.5-4.2 billion. This assessment approach to mergers is now established among regulators across the world as one of the key areas of investigation in mergers involving firms with significant innovation capabilities.</p>		
<b>2. Underpinning research</b> (indicative maximum 500 words)		
<p>In September 2016, Professor Valletti was seconded to the European Commission as Chief Competition Economist (while still employed at Imperial College Business School). In that role, he led the economic analysis of all major EU antitrust, merger and state aid cases. The first important case he had to handle was the merger between agrochemical companies Dow and DuPont, an industry where R&amp;D is very significant. The economic assessment started with prior research on the topic, which was typically inconclusive, as there is an alleged tension between concentration being good (the "Schumpeter" view) or bad (the "Arrow" view) for innovation. It became apparent to Professor Valletti that the "Arrow vs Schumpeter" debate was important but had not been specifically targeted at the so-called "unilateral effects" of mergers. That is to say the effects of the increased market power of the newly merged firm on its incentive to engage, for example, in innovation activity and price increases. In a merger assessment of innovation impacts, the relevant question then is to compare the incentives of the merging parties to innovate, both with and without the merger, without changing any other parameter (e.g. keeping as given the protection of intellectual property rights, which is not directly affected by a proposed merger).</p> <p>Professor Valletti had conducted prior research on investment and competition in network industries (e.g. [5], [6] and [7]), where he had studied the impact of competition and regulation on broadband investment and cellular rollout, pointing to possible differences in incentives to invest, resulting from organic growth ([5] and [6]) as opposed to changes in market structure due to licensing or mergers ([7]). He built on this prior research and, informed by the practical cases he was working on, wrote, with two colleagues (Dr Federico and Dr Langus), a first paper spelling out</p>		

a model leading to an innovation theory of harm (IToH). According to this, in a concentrated industry where further entry is unlikely, and where two merging parties are innovating stochastically in a similar technological area, and in the absence of efficiencies, the merging parties always reduce their innovation efforts after a merger. They also developed a result, demonstrating how consumers would be worse off after a merger. This happens for two reasons. First, because a merger mutes innovation competition and therefore there is a reduction in overall innovation. Second, because a merger mutes price competition and therefore causes future price increases, in the case when both innovations of the participants to the merger are successful. This led to publication [1].

Since the model was based on a stylized representation of competition, the same research team further produced an economic framework for analysis. In publication [2], they make use of a general approach that shows that the overall impact from a merger on innovation will arise from two effects. First, there is an “innovation externality” (or business stealing) effect. An increase in R&D spend by one firm reduces the expected profits of its rivals. This negative externality would be internalised following a merger, leading unambiguously to a reduction in post-merger R&D. This is because sales that would be gained from the rival thanks to the innovation pre-merger, become internal cannibalisation post-merger. Second, merged firms will be able to coordinate the prices of the portfolio of goods they have. This is the “price coordination” effect. This second effect may reinforce or dilute the innovation externality, because the reduction of price competition affects the profits of each merging firm, both when it successfully innovates and when it does not. By using demand functions resulting from well-established and widely used models employed in Industrial Organization, they find that the innovation externality prevails. They also show that the innovation result can be reversed if there are sufficiently high merger-related efficiency gains.

The previous publications employ formal modelling but are ultimately trying to respond to empirical considerations to be followed in practical merger cases. Publication [3] (section 1.2.4 and 2) illustrates specifically how cases involving an IToH can be run in practice, making reference to the way it was employed in the Dow/DuPont merger case, where patent citations in specific technological trajectories were used to assess the overlaps of innovation capabilities between the merging firms.

Finally, publication [4] summarises the case law in the area, and the recent revamped debate around the IToH. It is written specifically for practitioners and competition law scholars in a language that is more accessible to them (that is, with a minimal use of algebra).

### 3. References to the research (indicative maximum of six references)

1. Federico, G., G. Langus and T. Valletti, “A simple model of mergers and innovation”, *Economics Letters*, vol. 157, 136-140, 2017. DOI: 10.1016/j.econlet.2017.06.014
2. Federico, G., G. Langus and T. Valletti, “Horizontal mergers and product innovation”, *International Journal of Industrial Organization*, vol. 59, 1-23, 2018. DOI: 10.1016/j.ijindorg.2018.03.001
3. Buelher, B., D. Coublucq, G. Langus and T. Valletti, “Recent developments at DG Competition: 2016/17”, *Review of Industrial Organization*, vol. 51, n. 4, 397-422, 2017. DOI 10.1007/s11151-017-9592-x
4. Kokkoris, I. and T. Valletti, “Innovation considerations in merger control”, *Journal of Competition Law & Economics*, 2020. DOI: 10.1093/joclec/nhaa008
5. Valletti, T. and C. Cambini, “Investments and network competition,” *RAND Journal of Economics*, vol. 36, n. 2, 446-467, 2005.
6. Nardotto, M., T. Valletti and F. Verboven, “Unbundling the incumbent: Evidence from UK broadband”, *Journal of the European Economic Association*, vol. 13, n. 2, 330-362, 2015. DOI 10.1111/jeea.12127

7. Genakos, C., T. Valletti and F. Verboven, "Evaluating market consolidation in mobile communications", *Economic Policy*, vol. 33, issue 93, 45-100, 2018. DOI 10.1093/epolic/eix020

These publications are in journals that meet national or international standards of excellence.

#### 4. Details of the impact (indicative maximum 750 words)

This research has led both to substantial changes in (1) the practice of policy (2) the economic welfare assessment of specific merger decisions, and (3) the professional understanding of innovation.

##### (1) Impact on the practice of policy:

The whole economic annex (Annex 2) in the Dow/DuPont EC decision reproduces the economic analysis of the IToH in simplified non-mathematical form (see Source 5.5). The legal service of the European Commission advised that precedent required the exclusion of explicit reference to the underlying research papers or author names, as they were all working at the EC at the time, and the papers were not yet published.

The importance for practice is also reflected in the extensive interest that the IToH generated in the antitrust community, including key global antitrust conferences and symposia in which the authors presented in 2017 and 2018. Examples are the ABA (American Bar Association) Spring Meetings, Washington DC; the ICN (International Competition Network), Porto; ACE (Association of Competition Economics), Bologna; OECD Competition Committee Meeting, Paris; Meeting of the EU Chief Economists, Brussels; and the Competition Law Annual Conference, European University Institute. It is also reflected in the number of policy-oriented commentaries and reviews of their work published since 2016 (see Source 5.6), which have greatly extended the international reach of the impact of this work.

"[Valletti's] work has been seminal in raising the awareness of innovation as a key dimension of the competitive assessment in mergers; and in emphasising the larger economic relevance of this assessment in terms of economic policy. Regulators now accept this is an important step forward: the innovation theory of harm needs to be in their toolkit" [...] "The innovation theory of harm is now established in the profession and among regulators as one of the important areas of investigation in mergers involving firms with significant innovation capabilities."

*Dr Cristina Caffarra, Head of European Practice, Charles River Associates (Source 5.3)*

##### (2) Impact on specific merger decisions:

When it comes to proving evidence of impact, there is a well-known challenge in any policy context since the counterfactual is difficult to identify. In the case of mergers, it is especially challenging since the effect is the avoidance of a negative consequence that would have happened (in the future) without the prohibition of a merger, or without the conditions required for allowing it. Still, the work of Professor Valletti on the IToH has drastically informed the merger policy process, which is an important effect in itself (Sources 5.1, 5.2, and 5.3).

The impact of the IToH on economic welfare can also be inferred by the remedies imposed as conditions in allowing mergers to proceed (Source 5.2). This is because, once a theory of harm is identified, a consequential remedy to address that harm follows.

The insights from Valletti's research papers were:

"directly used in specific merger reviews. In Dow/Dupont and Bayer/Monsanto, innovation theories of harm were the core of the competition concerns and the mergers were approved subsequent to significant divestments offered by the merging firms."

*Margrethe Vestager, Vice President of European Commission and Commissioner for*

*Competition, DG Competition (Source 5.1)*

In the specific case of Dow/DuPont, the merger created significant overlaps in terms of innovation capabilities in herbicides, insecticides, and fungicides, in the entire EEA. The parties were ultimately required to divest the global R&D facilities of DuPont to FMC (\$1.6 billion). Similarly, in the Bayer/Monsanto case, the divestment (to BASF) amounted to \$9 billion. As reported in the Annual Activity Report of DG Comp 2018 (see Source 5.4), for instance, the European Commission writes, “[in] 2018, the Commission intervened in several proposed concentrations, which, in addition to price, quality and choice concerns, risked impeding innovation. **In Bayer/Monsanto and BASF/Bayer divestment business the Commission identified concerns related to innovation. The Commission approved the Bayer/Monsanto transaction after the parties submitted an extensive divestiture package comprising in particular Bayer’s global vegetable seed business and broadacre crop seed and trait business (including R&D), its glufosinate business and its digital agriculture activities. These divestitures addressed all competition concerns identified by the Commission, including those related to innovation. The divestiture businesses were sold to BASF. The acquisitions would allow the company to compete and innovate as actively and effectively against the merged firms, for the benefit of European farmers and consumers.**” (Page 33, emphasis added). The press release of the EC also states that, absent the remedies imposed, the Bayer/Monsanto merger “would have significantly reduced innovation, which is very important to develop seeds with a higher yield or pesticides that are less toxic, less damaging to the environment”.

As for a quantification of the effects, the same Annual Report states (page 13) that “[i]n 2018, total customer savings from merger interventions by the Commission (KPI 2) varied between EUR 15.0-25.0 billion”. While the publication does not apportion the overall benefits (which are calculated as NPV) from merger intervention to the level of the single transaction, the Bayer/Monsanto merger was the biggest one in 2018 (as was the Dow/DuPont merger in 2017, when total customer savings were estimated between EUR 2.5-4.2 billion).

These impacts are lower bound estimates since implementation in enforcement cases is still ongoing and has spread beyond the EU. For instance, the US Department of Justice investigated in 2020 the \$360m merger between Sabre (the largest global distribution system for airline bookings) and Farelogix. The merger was abandoned in May 2020 because of the opposition it encountered from the UK’s Competition and Market Authority, and on the IToH grounds that innovation would have been negatively impacted by the merger (Source 5.12).

“In the UK, both Professor Valletti’s research and its application to EC cases have in recent years influenced the CMA’s attitude to potential innovation-related harms in merger control... the CMA continues to make efforts to ensure that its merger assessments capture potential harms relating to reduced incentives to innovate. This is perhaps most clearly reflected in our proposed new Merger Assessment Guidelines (MAGs), which the CMA is currently consulting on.”

*Dr Andrea Coscelli, CBE, Chief Executive, Competition & Markets Authority (CMA), UK (Source 5.2)*

The IToH is also relevant to frame the current debate in the digital economy as to whether Big Tech firms have been allowed to acquire a sub-optimally large number of firms in the past two decades. Publication [1] is referenced in the UK’s assessment of mergers in digital markets (source 5.8), in the New Zealand Productivity Commission report on the digital economy in Australia and New Zealand (Source 5.9), and in the OECD Background Note on non-price considerations in merger control (Source 5.10). Publication [4] is specifically quoted in the draft of the UK’s CMA new Merger Assessment Guidelines, encapsulating more concerns around innovation theories of harm (Source 5.11).

**(3) Impact on professional understanding:**

The research also spurred several responses among academic-economists. The papers were

written just over three years ago, but they have over 120 citations already (Google scholar). Other researchers followed on the topic, both proposing alternative theory models and conducting empirical assessments (see Sources 5.6 and 5.7 for some illustrative references of papers already in print). This has meant that the impact reach of Valletti's research on the IToH has been global.

"All of this research has had a significant impact on how competition authorities think about innovation concerns in mergers, and has led to a more widespread use of innovation theories of harm."

*Dr Andrea Coscelli, CBE, Chief Executive, Competition & Markets Authority (CMA), UK.  
(Source 5.2)*

"These discussions informed competition authorities around the world and contributed to advancing the understanding of when and how mergers can be harmful for innovation. Given the importance of innovation for economic growth, this literature and its advancement are highly relevant for competition authorities but also from a wider economic policy perspective."

*Dr Margrethe Vestager, Vice President of European Commission and Commissioner for Competition, DG Competition (Source 5.1)*

#### 5. Sources to corroborate the impact (indicative maximum of 10 references)

##### Supporting Sources

- 1 Supporting letter from Margrethe Vestager, Vice President of European Commission and Commissioner for Competition, DG Competition.
- 2 Supporting letter from Dr Andrea Coscelli, CBE, Chief Executive, Competition & Markets Authority (CMA), UK.
- 3 Supporting letter from leading economic consultancy, Dr Cristina Caffarra, Head of European Practice, Charles River Associate.
- 4 Annual Activity Report of DG COMP\_2018  
([https://ec.europa.eu/info/sites/info/files/comp\\_aar\\_2018\\_final.pdf](https://ec.europa.eu/info/sites/info/files/comp_aar_2018_final.pdf))
- 5 [a] Annex 2 of the Dow DuPont decision. Case M.7932  
([https://ec.europa.eu/competition/mergers/cases/decisions/m7932\\_13668\\_3.pdf](https://ec.europa.eu/competition/mergers/cases/decisions/m7932_13668_3.pdf)) See also [b] the short summary in EC Competition Merger Brief Issue 2/2017 July (pages 4 and 5)  
<https://ec.europa.eu/competition/publications/cmb/2017/kdal17002enn.pdf>
- 6 Sample of policy-oriented papers written as a response to the ITOH
- 7 Sample of responses to the IToH from academic-economists
- 8 UK Government: Merger Control Decisions in Digital Markets:  
<https://www.gov.uk/government/publications/assessment-of-merger-control-decisions-in-digital-markets>
- 9 Productivity Commission report on the digital economy in Australia and New Zealand:  
<https://apo.org.au/node/220146>
- 10 OECD Background Note: [https://one.oecd.org/document/DAF/COMP\(2018\)2/en/pdf](https://one.oecd.org/document/DAF/COMP(2018)2/en/pdf)
- 11 UK's CMA new Merger Assessment Guidelines:  
[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/935593/Revised\\_MAGs\\_Nov\\_2020.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/935593/Revised_MAGs_Nov_2020.pdf)
- 12 UK's Competition and Market Authority Report (Farelogix):  
[https://assets.publishing.service.gov.uk/media/5e4564e640f0b677bd7abee7/Sabre\\_Farelogix\\_Provisional\\_Findings\\_-\\_Version\\_for\\_publication\\_Redacted2\\_----.pdf](https://assets.publishing.service.gov.uk/media/5e4564e640f0b677bd7abee7/Sabre_Farelogix_Provisional_Findings_-_Version_for_publication_Redacted2_----.pdf)