Innovation Competition in EU Merger Control

Markus Seiler

Supervisor: Dr. Andreas von Bonin

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<td>CET</td>
<td>Commission Chief Economist Team</td>
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<tr>
<td>comp.</td>
<td>competition</td>
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<td>DG Comp</td>
<td>Directorate-General for Competition</td>
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<td>DOJ</td>
<td>(US) Department of Justice</td>
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<td>EC</td>
<td>European Commission</td>
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<td>European Court of Justice</td>
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<td>ECR</td>
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<td>Ed(s).</td>
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<td>e.g.</td>
<td>exempli gratia (for example)</td>
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<td>EU</td>
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<td>f.</td>
<td>et sequens (and the following one)</td>
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<td>ff.</td>
<td>et sequentes (and the following ones)</td>
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<td>FTC</td>
<td>(US) Federal Trade Commission</td>
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<td>GC</td>
<td>General Court</td>
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<td>HHI</td>
<td>Herfindahl-Hirschman Index</td>
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<td>HMG</td>
<td>Horizontal Merger Guidelines</td>
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<td>IP</td>
<td>Intellectual Property</td>
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<td>IPR</td>
<td>Intellectual Property Rights</td>
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<td>IT</td>
<td>Information Technology</td>
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<td>JV</td>
<td>Joint Venture</td>
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<td>NHMG</td>
<td>Non-Horizontal Merger Guidelines</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<td>OJ</td>
<td>Official Journal of the European Union</td>
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<td>para</td>
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<td>Research and Development</td>
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I. Introduction

Merger effects on innovation competition recently received increased attention and scrutiny from EU and other competition authorities. Innovation is key to economic development and growth. To increase its competitiveness, the EU launched several initiatives to increase innovation in Europe.\footnote{1} The EU competition authorities made a clear statement that protecting innovation is important in competition enforcement, because innovation leads to new, better, differentiated, and more affordable products and services to the benefit of consumers, and the ‘need to compete’ is the central driver for innovation.\footnote{2}

Merger control is well known for its assessment of price effects of mergers.\footnote{3} Price effects are static short-term effects a merger may have, and the static merger effects analysis mainly focuses on the detection of market power in product markets\footnote{4} and competitive constraints that may be eliminated between the merging parties (in horizontal mergers) or anti-competitive foreclosure effects (in vertical and conglomerate mergers). Static competition analysis looks at current products.\footnote{5} Innovation however creates improved and new products or processes that may replace existing products, technologies, or processes in the future. Innovation is a longer-term process not covered by static merger analysis. Innovation competition is dynamic, subject to uncertainties, where one day in the future a new product may replace an older one, where a new generation of products may address new consumer needs, or current needs are satisfied with new, more efficient and less costly products. Near term potential competition arising from innovation was traditionally included in merger control. Until recently it only included products that are about to be launched and late stage pipeline products. Now, the Commission includes early stage pipeline products and R&D activities in its assessment.

The Commission recently published a lengthy decision about the Dow/DuPont merger.\footnote{6} Within that decision, the Commission explained its new approach to innovation competition assessment

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\footnote{1} See for example \url{https://ec.europa.eu/growth/industry/innovation_en} [last accessed 15 July 2018].
\footnote{2} Vestager, How competition supports innovation, speech 2016.
\footnote{3} Mosso, Merger enforcement, page 8.
\footnote{4} Sidak, Teece, page 610.
\footnote{6} European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017.
in merger control. The Commission developed an ‘Innovation theory of harm’.\(^7\) In the Dow/DuPont merger decision, the European competition authorities outlined three channels through which a merger that reduces innovation competition can harm consumers: discontinuation of existing pipeline products, reduction in future R&D efforts, and reduction in future product market competition.\(^8\) With its new innovation competition assessment approach, the Commission extents its merger effects analysis to early stage pipeline products and research activities. The effects these activities may have in the long term are not completely predictable and harder to prove, yet they have significant influence on scientific and technological progress which will ultimately benefit the consumer. In order to assess the effects of a merger on innovation competition, the Commission defines innovation spaces where companies compete with each other and it takes into account loss of future (product) competition as a result of current reduction in innovation competition. These medium or long-term effects of a merger on dynamic innovation competition are said to be more important for progress and consumer welfare than the short-term effects of static price competition\(^9,10\), especially in high-technology industries which are characterized by dynamic innovation competition rather than static price competition.\(^11\) However, how to assess a merger’s effect on dynamic effects like innovation competition is much debated.

This thesis takes a close look at innovation competition in merger control. It explains the legal framework for the assessment of merger effects on innovation competition and describes the two seemingly conflicting economic theories about the effects a merger may have on innovation competition. Further, it addresses the positive, negative, and ambiguous effects a merger has on the incentive to innovate. This thesis also analysis and discusses the EU Commission’s new ‘innovation theory of harm’ and identifies some areas in which the Commission is likely to perform in depth innovation competition assessment from now on.

\(^7\) European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, recitals 1987 ff.
\(^9\) Sidak, Teece, 600; Federico, 2; New products and new technologies are more important to consumer welfare than short-term price-effects, and new products and technologies have the potential to lower prices much below the cost level of current products.
\(^10\) Mosso, Merger enforcement, 9.
\(^11\) Baş, page 20.
II. Legal Framework for Innovation competition assessment in EU Merger Control

A. The EC Merger Regulation

The Council Regulation (EC) No 139/2004 of 20 January 2004 on the control of concentrations between undertakings (the EC Merger Regulation)\(^\text{12}\) establishes the legal framework for merger control in the EU. Article 1 of the EC Merger Regulation sets the thresholds a merger needs to meet to have EU dimension and to fall under the scope of the EC Merger Regulation. The applicable test to assess mergers is based on the ‘significant impediment of effective competition’ (SIEC) test from Article 2 of the EC Merger Regulation:

“A concentration which would not significantly impede effective competition in the common market or in a substantial part of it, in particular as a result of the creation or strengthening of a dominant position, shall be declared compatible with the common market.”\(^\text{13}\), and

“A concentration which would significantly impede effective competition, in the common market or in a substantial part of it, in particular as a result of the creation or strengthening of a dominant position, shall be declared incompatible with the common market.”\(^\text{14}\)

Recital 25 of the EC Merger Regulations makes it clear that non-coordinated effects of a merger, also called unilateral effects, are caught by the SIEC test in oligopolistic markets where neither the merging parties nor the merged party has dominance and that “the elimination of important competitive constraints that the merging parties had exerted upon each other, as well as a reduction of competitive pressure on the remaining competitors, may, even in the absence of a likelihood of coordination between the members of the oligopoly, result in a significant impediment to effective competition.”\(^\text{15}\)

This also applies to the assessment of innovation competition in merger control. The assessment examines the loss of competition between the merging parties and extents to assess the reduction in competitive pressure on the non-merging competitors.\(^\text{16}\)

\(^\text{12}\) EC Merger Regulation.
\(^\text{13}\) EC Merger Regulation, Article 2 (2).
\(^\text{14}\) EC Merger Regulation, Article 2 (3).
\(^\text{15}\) EC Merger Regulation, recital 25.
\(^\text{16}\) EC Merger Regulation, recital 25.
To simplify and expedite merger control procedures, the Commission issued an Implementing Regulation in 2004\(^\text{17}\) and amended the Implementing Regulation in 2013.\(^\text{18}\) The Implementing Regulation provides standard merger notification forms. Through these forms, the parties have to provide information about their R&D, IP rights, and pipeline products.\(^\text{19}\)

The burden of proof to produce convincing evidence that a merger raises competition concerns is on the Commission.\(^\text{20}\) The merging parties have to substantiate and put forward efficiencies that counteract negative effects on competition themselves.\(^\text{21}\)

### B. Merger Guidelines

#### 1. Horizontal Merger Guidelines

The Commission issued guidelines how the Commission will assess concentrations. The Horizontal Merger Guidelines (HMG)\(^\text{22}\) give guidance how the Commission assesses mergers between undertakings that are actual or potential competitors.\(^\text{23}\) The assessment is based on the principle that competition benefits consumers, lowers prices, and spurs innovation and the Commission will prevent mergers that have negative effects on consumer benefits like, among others, increased prices, or diminished innovation.\(^\text{24}\) Throughout the guidelines, the reference to ‘increased prices’ is used as shorthand for various anti-competitive effects a merger may have,\(^\text{25}\) including reduction in innovation.

HMG paragraphs 24 ff. expressly mention that non-coordinated effects may significantly impede effective competition\(^\text{26}\) and describe that, through a merger, the internalization of price externalities between the merging parties – the elimination of price competition between the

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\(^\text{17}\) Implementing Regulation 2004.

\(^\text{18}\) Implementing Regulation 2013.

\(^\text{19}\) Implementing Regulation 2013, Annex I, Form CO relating to the notification of a concentration pursuant to Regulation EC No 139/2004, Sections 8.7 and 8.9; Annex II, Short Form CO for the notification of a concentration pursuant to Regulation EC No 139/2004, Section 7.2.3.


\(^\text{21}\) EC Merger Regulation, recital 29.

\(^\text{22}\) HMG

\(^\text{23}\) HMG, para 5.

\(^\text{24}\) HMG, para 8.

\(^\text{25}\) HMG, para 8.

\(^\text{26}\) HMG, para 24.
merging parties – may lead to price increases,\textsuperscript{27} or, in analogy since ‘increased prices’ stands for various anti-competitive effects, that the internalization of innovation externalities – the elimination of innovation competition between the merging parties – may reduce the incentive to innovate.\textsuperscript{28}

HMG paragraph 38 addresses markets where innovation competition is an important driving force. A merger may increase a company’s ability and incentive to develop and launch innovative products, thereby increasing the company’s own profits and putting competitive pressure to innovate on its rivals. However, a merger may significantly impede effective competition, if two important innovators with pipeline products for the same relevant market merge. Also, a company with a small market share may have significant pipeline products and represent an important competitive force which could be eliminated through a merger, resulting in a significant impediment of competition,\textsuperscript{29} especially, if the market is already concentrated.\textsuperscript{30}

The innovation potential of a company has to be taken into account regardless of the company’s market share, and if a company is an important innovator, this is one of the special circumstances where the Commission does not solely rely on HHI and Delta HHI.\textsuperscript{31}

HMG paragraphs 58 to 60 address a merger with a potential competitor. A merger with a potential competitor can have similar anti-competitive effects like a merger between two companies already active on the same market,\textsuperscript{32} if there is a high likelihood that the potential competitor will enter the market, and if there are not enough other potential competitors to maintain sufficient competitive pressure after the merger.\textsuperscript{33}

When new competitors can enter a market easily, a merger unlikely creates a significant anti-competitive risk. A new entry is a sufficient competitive constraint if the entry is likely, timely, and strong enough to counter anti-competitive effects of a merger.\textsuperscript{34}

\textsuperscript{27} HMG, para 24. ‘Price externality’ is the loss of sales to the other merging party if, absent the merger, one merging party would have increased its prices.

\textsuperscript{28} Federico, page 7. HMG, paras 24 – 25. ‘Innovation externality’ is the negative effect that innovation by one merging party has on the profits of the other merging party.

\textsuperscript{29} HMG, para 38.

\textsuperscript{30} HMG, para 37.

\textsuperscript{31} HMG, para 20 (b).

\textsuperscript{32} HMG, para 58.

\textsuperscript{33} HMG, para 60.

\textsuperscript{34} HMG, para 68.
EC Merger Regulation refers in recital 29 to Commission guidelines in which the Commission outlines how to deal with efficiencies a merger may have.\textsuperscript{35} The HMG are one of these guidelines. HMG paragraph 78 explains that the parties have to put forward efficiency claims. To be taken into account, “efficiencies have to benefit consumers, be merger-specific and be verifiable”.\textsuperscript{36}

The Commission’s Guidelines do not constitute law, they are without prejudice to the interpretation of the EC Merger Regulations by the EU General Court and the ECJ.\textsuperscript{37}

2. Non-Horizontal Merger Guidelines

The Non-Horizontal Merger Guidelines (NHMG)\textsuperscript{38} provide a similar framework to assess innovation competition effects in vertical and conglomerate mergers as the HMG do for horizontal mergers.\textsuperscript{39} The NHMG state that effective competition brings benefits to consumers, such as lower prices and increased innovation, and that a merger may lead to a reduction in innovation competition.\textsuperscript{40} Innovation is one of the special circumstances where the Commission will further investigate a merger, regardless of post-merger market share and post-merger HHI.\textsuperscript{41} Non-horizontal mergers may foreclose access to the merged entity’s products needed by other companies to innovate and stay in the market.\textsuperscript{42}

C. Remedies Notice

In case a merger significantly impedes effective competition, the parties can offer commitments to prevent the impediment. This also applies to significant impediments of innovation competition. The possibility of remedies is mentioned in the EC Merger Regulation\textsuperscript{43} and further defined in the Remedies Notice\textsuperscript{44} and in case law. A remedy must remove the competition concern completely. Structural remedies such as divestitures are preferred over behavioural

\textsuperscript{35} EC Merger Regulation, recital 29.
\textsuperscript{36} HMG, para 78.
\textsuperscript{37} HMG, para 7.
\textsuperscript{38} NHMG.
\textsuperscript{39} Competition Policy Brief, 1/2016, page 3.
\textsuperscript{40} NHMG, para 10.
\textsuperscript{41} NHMG, para 26.
\textsuperscript{42} Competition Policy Brief, 1/2016, page 3; NHMG, paras 29 ff.
\textsuperscript{43} EC Merger Regulation, recital 30.
\textsuperscript{44} Remedies Notice.
If horizontal overlaps are the reason for competition concerns, then divesture is the best way to eliminate those concerns. The divesture has to be a viable business and it has to include all assets needed to continue the business operation competitively and all required personnel. The goal is that the divested business results in a viable competitor exercising competitive constraint on a lasting basis.

III. Competition and Innovation – Key Economic Factors

A. Competition, Innovation, and Growth

On the one hand, competition is an important element required for economic change, it increases efficiency, which is, in general, considered to be able to stimulate innovation and economic growth. On the other hand, perfect competition will reduce the returns of the companies involved, returns required for innovation and economic growth; a monopoly position instead would allow a company to earn good returns to invest in innovation and growth. Therefore, the relationship between competition, innovation, and economic growth is complex and not as simple as ‘the more competition the better’. There is, however, a general consent that competition is good, because it induces companies to make more and better products and sell them at a lower prices.

Innovation is an important component of competition in many industries. Companies invest in innovation to create new, differentiated products to escape the head-to-head product competition. Through innovation a company can get a temporary monopoly position and avoid

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45 Mosso, page 14.
46 Remedies Notice, recital 17.
47 Remedies Notice, recital 25.
48 Remedies Notice, recital 34.
49 Gaffard, page 12.
50 Saviotti, Pyka, page 73.
51 Gaffard, page 17.
52 Competition is sometimes measured as a degree of concentration. Katz, Shelanski, 2007, page 4. See for example the Herfindahl-Hirschman Index (HHI) for price-effect assessments: “An increase in concentration in the relevant product and geographic markets is taken as a proxy for a decrease in competition that - if large enough - will lead to a significant increase in the prices faced by consumers.” Katz, Shelanski, 2007, page 8.
53 Saviotti, Pyka, page 87.
54 Baker, page 577.
55 Mosso, Merger enforcement, page 9.
competition for a while.\textsuperscript{56} Or they invest to reduce production costs to have an advantage in price competition.

In an industry life cycle, the first entrepreneur who enters the market, or who creates the market, with a new innovation will usually have a monopoly position for a certain time during which he can earn good returns. If the innovation is successful, other companies will start to imitate the innovation, the competition increases, and the margins start to decrease.\textsuperscript{57} The number of companies in the market will increase, reach a maximum, and eventually decline again. Companies faced with a decline in margins or sales are looking out for new opportunities and invest to find the next innovation, which can create a new market – in which the company can again earn monopoly profits for a while and a new cycle starts.\textsuperscript{58} At the beginning of each new life cycle, innovation competition is about the \textit{creativity} to come up with the new product; in more mature markets, innovation competition moves towards \textit{efficiency} gains.\textsuperscript{59} The complex relation between competition, innovation, and economic growth comes – at least in part – from the two effects innovation competition has: first, innovation competition creates new products to get a temporary monopoly position (to get rid of current competitors and to escape competition), and second, innovation competition helps to be more efficient than current competitors (to face the [price-] competition).\textsuperscript{60} The main driver for economic growth is the innovation competition that induces companies to create new products.\textsuperscript{61}

Thanks to innovation, a company can get a temporary competitive advantage and a time period with extra profits. Innovation competition is more important than competition over quantity and price\textsuperscript{62} for economic growth and consumer welfare in the long run.

An oligopoly of a few large firms – the system between the monopoly of a single company without competition and perfect competition between many companies – is said to be the best industry structure to create economic growth, because oligopolists compete over product

\textsuperscript{56} Saviotti, Pyka, page 72.
\textsuperscript{57} Antonelli, Diffusion as a process of creative adoption, page 224. Imitations of successful innovations restore perfect competition.
\textsuperscript{58} Saviotti, Pyka, page 75.
\textsuperscript{59} Saviotti, Pyka, page 88.
\textsuperscript{60} Saviotti, Pyka, page 91.
\textsuperscript{61} Le, page 110.
\textsuperscript{62} Antonelli, page 12.
differentiation, not over price. Continuous innovation is the source for these new, differentiated products, and the economic growth.\textsuperscript{63}

B. Two seemingly conflicting economic theories

1. Schumpeter’s theory of ‘creative destruction’

Economists have studied the relationship between competition and innovation since years. Two seemingly conflicting economic theories have evolved.

One theory is based on Joseph Schumpeter’s analysis and conclusions published in 1942 in his book “Capitalism, Socialism, and Democracy”.\textsuperscript{64} Schumpeter emphasized that large firms operating in oligopoly markets generate the majority of innovation, not small firms in atomistic markets. Large entities have more means to invest in innovation and R&D than small companies, and large entities are better able to turn innovation into profit, because they have the scale, scope, and market access.\textsuperscript{65} The increase of profits acts as an incentive to innovate.\textsuperscript{66} Schumpeter concluded that “competitive markets are not necessarily the most effective organizations to promote innovation”\textsuperscript{67} and that temporary market power is an important award for successful innovation.\textsuperscript{68} Schumpeter’s theory is also known as ‘creative destruction’.\textsuperscript{69} Scholars of Schumpeter’s theory are of the opinion that large firms and concentrated markets offer the best structures for innovation,\textsuperscript{70} and that less competition leads to more innovation, because the profits that can be generated as a result of the innovation will be greater.\textsuperscript{71} Even without (price) competition in the market, the monopolist, or the market leader respectively, has an incentive to innovate, because, if he does not invest in innovation, a competitor may take over the market from the monopolist with a new invention (competition for the market).\textsuperscript{72}

\textsuperscript{64} Schumpeter.
\textsuperscript{65} Shapiro 2012, page 363.
\textsuperscript{66} Gilbert 2006, page 159.
\textsuperscript{67} Gilbert 2006, page 159. Perfect competition is temporarily suspended when something new is introduced; Schumpeter, page 105.
\textsuperscript{68} Shapiro 2012, page 363.
\textsuperscript{69} Gilbert, 2006, page 168.
\textsuperscript{70} Gilbert 2006, page 160.
\textsuperscript{71} Competition Policy Brief 1/2016, page 1.
Creative destruction is a never ending process.\textsuperscript{73} Even the most efficient company will be forced out of market by innovations from competitors,\textsuperscript{74} if it does not come up with its own innovations to stay in the race; or at least it’s profits will erode because of imitations from competitors.\textsuperscript{75} The payoffs from investments in innovation in the current period are the prospects of market power and monopoly profits in the next period,\textsuperscript{76} and periods of imperfect competition are needed for economic growth.\textsuperscript{77}

Some scholars of Schumpeter’s theory have oversimplified Schumpeter’s theory, making large size and market concentration the cause of innovation.\textsuperscript{78} A monopolist (protected by entry barriers) is unlikely to have enough incentive to invest in risky innovations.\textsuperscript{79} According to Schumpeter, it’s not only large scale that spurs innovation, it’s also the perspective to gain market power that spurs innovation.\textsuperscript{80} Shapiro summarized Schumpeter’s position as follows: “The prospect of market power and large scale spurs innovation”.\textsuperscript{81}

In line with Schumpeter’s creative destruction theory, Baumol states that large companies under oligopolistic competition, particularly in high-tech industries, need to innovate to stay in the market. This competitive pressure forces them to internalize innovative activities and he concludes that this is the reason why most innovation comes from large companies in oligopolistic markets, not from entrepreneurs.\textsuperscript{82} By internalizing innovation, these companies accumulate knowledge and competences for large projects which act as entry barriers for entrepreneurs and small companies.\textsuperscript{83} Others belief that Baumol underestimates the innovation contributions of entrepreneurs,\textsuperscript{84} or argue that stability - a stable group of persons who innovates continuously - rather than concentration and size drives innovation.\textsuperscript{85} Another argument in favour for entrepreneurs as innovators may be that entrepreneurs are often intrinsically

\textsuperscript{73} Antonelli, page 13.
\textsuperscript{74} Holcombe, page 81.
\textsuperscript{75} Nelson, Winter, page 266.
\textsuperscript{76} Aghion, Howitt, page 231.
\textsuperscript{77} Aghion, Howitt, page 243.
\textsuperscript{78} Dasgupta, Stiglitz, page 133.
\textsuperscript{79} Dasgupta, Stiglitz, page 158.
\textsuperscript{80} Shapiro 2012, page 363.
\textsuperscript{81} Shapiro 2012, page 363.
\textsuperscript{82} Baumol, page 20.
\textsuperscript{83} Malerba, Orsenigo, page 295.
\textsuperscript{84} Holcombe, page 83.
\textsuperscript{85} Malerba, Orsenigo, page 313.
motivated by a belief in the success of their idea; this may be rationalized away in large companies.

Baumol himself attributes the risky breakthrough innovations to a large extent to small new companies, but concludes that mainly the continuous incremental innovations made by large companies to increase capacity, speed, reliability, and user-friendliness will bring breakthrough innovations to success, and that innovation is the main mean how rival companies in oligopolistic markets try to beat each other. Le differentiates between an innovative goods sector and a traditional goods sector. In the innovative goods sectors, companies invest in innovation to create new products to get temporary monopoly positions, in the traditional sector where products are homogenous, companies innovations are directed towards production costs reduction.

Schumpeter was among the first to analyse the interaction between competition and innovation. One view often associated with Schumpeter is that monopolies favour innovation (or, more generally, higher concentrations increase rewards for innovations), or in other words: ‘Competition hinders innovation’.

2. **Arrow’s theory: ‘Competition spurs innovation’**

The other theory goes back to Kenneth Arrow. Arrow examined the incentive to innovate in monopolistic and competitive markets, and concluded that the incentive to innovate is always greater under competition than under monopoly. A monopolist already has most of the business available, and the lack of competition reduces the pressure to innovate. Companies under competitive pressure will use innovation to invent new products to gain sales from competitors and they will strive to outperform their competitors by inventing more cost-effective

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86 Baumol, page 21.
87 Baumol, page 22.
88 Le, page 110.
90 Schulz, page 6.
91 Arrow, page 619.
92 Arrow, page 621.
93 Baker, page 578.
94 De Coninck, page 43.
production processes.\footnote{Competition Policy Brief 1/2016, page 2.} Monopolists on the other hand are interested in maintaining the status quo, because they already earn a lot of profits and because sales of new products would come at the expense of their own existing products (the ‘replacement effect’).\footnote{Gilbert, 2006, page 165: The term ‘replacement effect’ was introduced by Tirole in 1997.} Further, a monopolist has no incentive to innovate disruptive technologies which could make its business and present assets obsolete,\footnote{Forbes, page 2.} and in general, also large companies need competitors in their industry to stimulate each other’s innovation activity.\footnote{Shapiro, 2012, page 362.} Arrow acknowledges that a large monopolist has better market access and would therefore be better positioned to turn innovation into profit, but that incentive will not outweigh the strong disincentives to innovate coming from a monopoly (e.g. the replacement effect).\footnote{Loasby, page 51.}

Arrow compared innovations from large and small companies and concluded that less costly and more original innovations are more likely to come from small companies, and costly developments related to a company’s existing technology are more likely to come from large companies, and that this specialisation will create a market for acquisitions of small companies by large companies.\footnote{Arrow, pages 620 and 622.}

Arrow focused on ‘knowledge as an economic good’ separate from organizations.\footnote{Arrow, Innovation in Large and Small Firms, page 113.} Knowledge is the main input into innovation and knowledge has certain limitations as an economic good:\footnote{Antonelli, page 21.} It is most valuable when it is exclusive, which it is not, unless it is kept secret or qualifies for protection, e.g. patent protection. If future competitors can imitate an innovation at lower costs than for the development costs the initial innovator had, the innovator has no or little incentive to perform his innovation.\footnote{Mansfield, Schwartz, Wagner, page 221.} Also, if the knowledge cannot be protected, imitators could be more successful than the innovator if they have lower manufacturing costs, and an innovator has no or little incentive to innovate if he cannot protect his new knowledge.\footnote{Teece, page 345.} Schmookler found
that it is not primarily the availability of all knowledge that triggers innovation, it’s the prospect of profits that stimulates innovation.\textsuperscript{106}

Shapiro summarized Arrow’s position as follows: “Product market competition spurs innovation.”\textsuperscript{107,108} The empirical study from Kukuk and Stadler confirms that competition spurs innovation,\textsuperscript{109} but according to them, it’s not the pre-innovation product market competition that spurs innovation, it’s the number of competitors that participate in the innovation race,\textsuperscript{110} and the expected competition in the post-innovation product market.\textsuperscript{111}

C. The incentive to innovate

A company’s incentive to innovate comes from the difference in the profit the company could earn when it invests in R&D compared to when it does not invest in R&D.\textsuperscript{112} Many factors influence the incentive to innovate, such as the market conditions, the technology dynamics, the characteristic of the invention (product or process innovation, incremental or breakthrough innovation, sustaining or disruptive innovation), the dynamics of R&D (e.g. patent races in selected fields), the intellectual property right protection (patents, trade secrets), entry barriers (financing research and development, access to IP), and competition before and after the innovation (e.g. temporary market power, see Schumpeter).\textsuperscript{113}

No economic theory offers “a prediction about the effects of competition on innovation that is robust to all of these different market and technology conditions”.\textsuperscript{114} However, there are models which are appropriate for specific market contexts, for example, exclusive intellectual property rights increase the incentive to innovate.\textsuperscript{115} Gilbert - after doing an extensive review of economic literature, including publications about empirical studies - concludes that empirical

\textsuperscript{106} Schmookler, page 199. Binswanger, page 147.
\textsuperscript{107} Shapiro, 2012, page 362.
\textsuperscript{108} Arrow also mentioned that financing of research and inventions by some government or other not-for-profit agency is an effective way to increase innovation. Arrow, page 623. And indeed, a lot of new technologies originate from universities or other state funded institutions, and, for example, China’s policy to push electric cars made China a leader of innovation in that field.
\textsuperscript{109} Kukuk, Stadler, Abstract.
\textsuperscript{110} Kukuk, Stadler, page 14.
\textsuperscript{111} Schulz, page 14.
\textsuperscript{112} Gilbert, 2006, page 162.
\textsuperscript{113} Gilbert, 2006, page 162.
\textsuperscript{114} Gilbert, 2006, page 162.
\textsuperscript{115} Gilbert, 2006, page 165.
literature neither supports the conclusion that large firms promote innovation (see above, Schumpeter’s theory) nor that competition increases innovation (see above, Arrow’s theory).  

Aghion et al. stipulate an inverted-U relationship between product market competition and innovation. Competition encourages neck-to-neck companies to innovate but discourages laggard companies from innovating. In neck-to-neck situations, companies innovate to escape competition. Innovation is low in market structures close to monopoly; innovation increases if competition increases and peaks at intermediate levels of oligopoly; if the competition level further increases innovation starts to decrease and innovation is low if the competition level is high; companies no longer can generate profits to invest in innovation. Although, the incentive to innovate increases again when confronted with the probability of going bankrupt. Antonelli’s and Rosenberg’s results confirm that extra profits stimulate innovation, but at the same time Antonelli observed a failure induced ‘creative reaction’ stimulating innovation, Rosenberg adds not wanting to miss a tangible opportunity as inducement.

With regard to antitrust, Baker highlighted four principles in connection with the relation between competition and innovation:

First, competition in innovation itself – the competition among companies that race for the same innovation, all wanting to win, encourages innovation.

Second, competition in the existing product market encourages companies to innovate for lower production costs, improved quality, or new, better products to escape competition. The harder the competition in the existing product market, the higher is the incentive to escape competition.

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117 Aghion, page 701.
118 Aghion, page 702.
119 Katz, Shelanski (2005), page 132; citing Scherrer F. M., Market structure and employment of scientist and engineers, American Economic Review, 1967, 524, and others who disagree with the inverted-U theory.
120 Schulz, page 7.
121 Antonelli, A failure-induced model of R&D expenditure, page 107.
122 Rosenberg, The Direction of Technological Change, page 123.
123 Baker, page 579.
124 Baker, page 579.
125 Baker, page 579.
126 Baker, page 580.
Third, competition in the product market after innovation – if the competition in the existing market is low and it would be high in the market after the innovation (for example because the innovation can easily be imitated, or by attacking strong market players in their core product market), the high competition in the post-innovation market reduces the incentive to innovate in the first place. It may, however, also induce companies to introduce new products that are differentiated from products of rival companies to face less product market competition in the post-innovation market.\textsuperscript{127}

Fourth, the pre-emption incentive – that is the extra incentive to innovate a company gets when it can discourage competitors to invest in innovations by its own innovations. The fourth principle works together with the third principle: the follower will enter into a market with competition whereas the initial innovator enjoyed a monopoly position.\textsuperscript{128}

In contrast to Kukuk and Stadler’s empirical study mentioned above (see footnote 109) that attributed the highest importance to the first and third principle and questioned the second principle, Baker together with Michael Porter and others who based their opinion also on empirical studies attribute the second principle - competition in the current product market – an important role in encouraging innovation. Empirical studies showed that industries and nations increase productivity and innovate more during competitive periods, and that competition is a powerful motivation to innovate (expecting higher profits post-innovation).\textsuperscript{129} Nevertheless it is plausible and well accepted that companies competing in innovation are not necessarily competitors in the pre-competition product market, and that innovation competition is not necessarily linked to existing product markets.\textsuperscript{130}

D. Merger effects on the incentive to innovate

1. The three common guiding principles

With regard to merger control, the question is, if a merger would increase, lessen, or not affect innovation. A merger usually increases the size of the company and also increases concentration,

\textsuperscript{127} Baker, page 580.
\textsuperscript{128} Baker, page 581.
and some mergers may increase market power. A horizontal merger will at least eliminate competition between the merging parties\textsuperscript{131} which can reduce the incentive to innovate.\textsuperscript{132} A merger may, on the other hand, stimulate the incentive to innovate by eliminating involuntary know-how spill over or by bringing together complementary knowledge and R&D assets.\textsuperscript{133}

Joining the debate about the appropriate economic base for merger control, Shapiro gives a framework of three common guiding principles to assess the effect of a specific merger on innovation competition,\textsuperscript{134} three principles which are compatible with Schumpeter’s and Arrow’s theory.\textsuperscript{135} Shapiro refrains from trying to give a universal model for the relationship between competition and innovation and explains how the three principles integrate Arrow’s and Schumpeter’s perspective.\textsuperscript{136}

a) Appropriability

Appropriability is “the extent to which a firm can capture the value created by its innovation and protect the competitive advantage associated with it”.\textsuperscript{137} Increased appropriability increases the incentive to innovate.\textsuperscript{138} Intellectual property rights like patents can offer good protection for innovations. Trade secrets may offer protection if they cannot be imitated easily by competitors. If competitors can easily imitate or ‘patent around’ an invention, the successful innovator will not be able to differentiate his products, or keep cost advantages, and he cannot increase his profit margin through innovation. Therefore, his incentive to innovate is low. If imitation is fast, an innovator can hardly offer more value to the customers than his rivals, and the principle of contestability becomes insignificant (for contestability see next section).\textsuperscript{139}

If appropriability is low, and therefore the competition level in a market so severe that an innovative company is not able to turn its innovations into profit, a company has no incentive to
innovate; this is in line with Schumpeter’s finding that competitive markets are not necessarily the most effective structures to promote innovation.\footnote{Gilbert, 2006, page 159.} \footnote{Shapiro, 2012, page 364.}

If appropriability is high, for example through good patent protection, a successful innovator is more likely able to turn his innovations into profit (e.g. through sales or licensing) in a competitive market than in a stable market (with low switching rates), which is in line with Arrow’s theory that product market competition increases innovation. Further, with high appropriability, a successful innovator has an increased incentive to innovate because he can obtain temporary market power, which is a large incentive to innovate according to Schumpeter.\footnote{Shapiro, 2012, page 363.}

Although appropriability is not directly related to the number of innovation players,\footnote{Shapiro, 2012, page 365.} concentration can increase appropriability because of scale effects of cost-reducing process innovations and reduction of negative spill-over effects. When appropriability is already high, for example because of strong IPRs for product innovations, a merger does not further increase the incentive to innovate. Figure 1 gives a simplified overview of appropriability effects. To assess the effect of a merger, the situation after the merger can be compared with the situation as it would be without the merger (the counterfactual).

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\textbf{Figure 1. Simplified overview how appropriability and the number of relevant innovators influence the incentive to innovate}

<table>
<thead>
<tr>
<th>Number of relevant innovators</th>
<th>Product Innovation Appropriability</th>
<th>Process Innovation Appropriability</th>
</tr>
</thead>
<tbody>
<tr>
<td>low (no IPR)</td>
<td>high</td>
<td>medium (secrecy)</td>
</tr>
<tr>
<td>medium (strong IPR)</td>
<td>low</td>
<td>high</td>
</tr>
</tbody>
</table>

\textbf{Legend:}
- High incentive to innovate
- Low incentive to innovate
- \(+\) Margin increase on own sales, market expansion through better priced products
- ++ Licensing plus all of \(+\) Quantity increase (price advantage over competitors) plus all of \(+\)
- +++ Patent races, licensing plus all of +++
Appropriability is from the perspective within the company. High appropriability can induce a company to innovate pre-emptively, mainly in the form of patent protected product innovations. With pre-emptive patenting, a monopolist can create entry barriers for new entrants (blocking patents), and in an oligopoly, pre-emptive innovation can discourage competitors from inventing in the same direction. In a market with many innovators, the pre-emption strategy may become too costly, because one of the rivals may be faster or have a substitute solution for the same customer need. A patent race goes in the same direction. The winner takes it all and can make the profit, all the others – in extreme cases – are left behind with innovation sunk costs (often innovators can create [product] variations and their investment in innovation is not entirely lost – or they create innovations that complement or build on the previous innovation with the result that combination of the innovations increases customer value more than the sum of the individual innovations; this increment could be shared [with a ratio subject to negotiation] among the different innovators).

b) Contestability

Contestability means: “The prospect of gaining or protecting profitable sales by providing greater value to customers spurs innovation”.\textsuperscript{144} A company has an incentive to invest in innovation to invent new products, to the extent it can replace products from competitors with its own new products, and thereby gaining sales from those competitors; and it has an incentive to innovate to protect its sales to be replaced by a competitor. The extent to which customers are willing to switch depends on the product market competition. If customers have high switching costs or strong brand preferences, or are otherwise bound to their existing suppliers, relatively few customers will switch to the new product. In such a case, relatively few sales are contestable and a company’s incentive to innovate is lower than in a market where customers switch products often and market shares are not sticky.\textsuperscript{145}

This is in line with Arrow’s theory that product market competition is a driver for innovation, and that a monopolist has less incentive to innovate, because it already has substantial part of the sales and there are little (if any) sales to take away from competitors.\textsuperscript{146}

\textsuperscript{144} Shapiro, 2012, page 364.
\textsuperscript{145} Shapiro, 2012, page 364.
\textsuperscript{146} Shapiro, 2012, page 364.
Contestability is also in line with Schumpeter’s theory. If a company is able to gain large market shares through an innovation that is an important incentive to innovate for that firm and it is at the core of Schumpeter’s ‘creative destruction’ theory: the innovative firm may be rewarded with temporary market power. If, on the other hand, the market is such that a small company will not be able to grow much even with an important innovation, such small company will have less incentive to invest in innovation than a large company has.\textsuperscript{147}

The Commission’s competition policy brief on ‘EU merger control and innovation’ refers to Shapiro, agrees to the principle of contestability, and confirms that contestability is in line with Schumpeter’s and Arrow’s theory, because “both accept that markets need to remain \textit{contestable} for innovation to flourish”.\textsuperscript{148}

Figure 2 shows a simplified summary of the effect appropriability and contestability have on the incentive to innovate. Efficiencies, or synergies, are not shown because they are about the \textit{ability} to innovate, not about the \textit{incentive} to innovate. The driver of the innovation is the incentive: the

\begin{footnotesize}
\textsuperscript{147} Shapiro, 2012, page 364.
\textsuperscript{148} Competition Policy Brief 1/2016, page 2.
\end{footnotesize}
prospect of higher profits. Ability is the enabler; but ability without incentive will not trigger innovation.

c) Synergies

Shapiro’s synergy principle is as follows: “Combining complementary assets enhances innovation capabilities and thus spurs innovation”\.149 Unlike contestability and appropriability, which are about the incentive to innovate, synergies are about the ability to innovate\.150 A company cannot innovate in isolation. Synergies are especially important if products incorporate multiple different components, which is, for example, the case in the information and communications technology (ICT) sector\.151 Mergers can have procompetitive effects when complementary R&D, knowledge, or IP assets are combined; and synergies arising from combining complementary R&D, knowledge or IP assets will enhance the ability to innovate\.152 A larger company size may increase the ability to absorb risk or fund innovation\.153 Duplicate R&D efforts can be reduced, and synergies can free financial and personnel resources to start additional new innovation projects. Further, less competition could lead to greater product market profits which can be used to fund innovation\.154

2. A merger may have positive or negative effects on innovation competition

The relationship between market concentration and innovation is still ambiguous\.155 Schulz analysed and summarized some empirical studies that addressed merger effects on innovation. In the aggregate, the effect of mergers and acquisitions on innovation was negligible or negative\.156 although in a context where the merging partners had complementary technologies, innovation activities increased\.157 He could not extract a clear and simple correlation between mergers and innovation\.158 Entezarkheir and Moshiri observed in their study a positive correlation between

156 Schulz, page 5.
157 Schulz, page 4.
158 Schulz, page 6.
mergers and innovation, and they attributed it to efficiency gains such as economy of scale and scope, and a broader knowledge base.\textsuperscript{159} Hollenbeck found that in the short run, in general, a horizontal merger is harmful to consumers, but in the long run allowing mergers increases innovation and consumer welfare, because being an attractive acquisition or merger target may act as an incentive to innovate.\textsuperscript{160} Meder analysed drug development activities in the pharmaceutical industry – an R&D intensive industry – and found a similar result: Mergers had a positive effect on innovation by the merged parties and their competitors. The positive effect on the merged parties was attributed to synergies, shared knowledge and positive collaboration effects, as well as to increased market power and larger scale and scope.\textsuperscript{161}

Ornaghi’s empirical analysis of mergers in the pharmaceutical industry had the opposite outcome: The merged companies had worse innovation performance than the non-merging companies,\textsuperscript{162} because a merger between alike companies may create anti-competitive market power in some technology areas, which led to the decrease in innovation.\textsuperscript{163} Haucap and Stiebale also researched how mergers affected innovation in the pharmaceutical industry and found that after mergers, innovation activity of the merged entity as well as of the non-merging rivals declined substantially.\textsuperscript{164} Despite that finding, they suggest not to generalize and to use a cautious case-by-case assessment.\textsuperscript{165} Incentives to innovate may increase or decrease if market concentration increases, notes Haucap.\textsuperscript{166} Igami and Uetake analysed the relationship between competition and innovation in the hard disk drive industry. They found a plateau-shaped relationship (instead of an ‘inverted U’ relationship) between competition and innovation and came to the conclusion that competition authorities should stop mergers in a market with six or fewer companies.\textsuperscript{167} According to their model, the pro-competitive effects of stopping mergers

\textsuperscript{159} Entezarkheir, Moshiri, pages 4, 13. In their analysis, a merger increased innovation significantly in the computer and electrical sector, but not in the drugs, chemicals, and mechanical sectors; Entezarkheir, Moshiri, page 16.

\textsuperscript{160} Hollenbeck, pages 1, 19, 26.

\textsuperscript{161} Meder, page 28. Increased innovation by the non-merging competitors was attributed to their strategic reactions triggered by the merger.

\textsuperscript{162} Ornaghi, page 71. Ornaghi bases his analysis on patent data, which means at the early research or discovery stage, not at the later development stage; Ornaghi, page 71. Ornaghi puts the attention to a common problem of empirical analysis: if companies merge in anticipation of poor performance, patent expiry, or other difficult situations, the results measured may not be caused by, or the effect of, the merger; Ornaghi, page 71.

\textsuperscript{163} Ornaghi, page 78.

\textsuperscript{164} Haucap, Stiebale, 2016, page 1.

\textsuperscript{165} Haucap, 2017, page 12.

\textsuperscript{166} Haucap, 2017, page 6.

\textsuperscript{167} Igami, Uetake, page 1. Mergers in the hard disk drive market are motivated by softening competition through elimination of rivals and by combining knowledge; Igami, Uetake, page 9. In the traditional oligopoly theory, the purpose of mergers is to
increases if the number of companies decreases (and is highest in a merger to monopoly) and outweighs the continuation-value-destructing side-effects of reduced merger opportunities, when only six or fewer companies remain in the market.\textsuperscript{168}

The Commission’s Chief Economist team (CET) modelled a situation where companies compete with differentiated products, which they can enhance by innovating. The CET concluded that in an oligopoly market, a merger reduces the incentive to innovate in the absence of merger specific internalisation of knowledge spill-over effects, cost, and other efficiencies.\textsuperscript{169} The reduced incentive to innovate was attributed to the internalization of the ‘innovation externality’, the negative effect that innovation by one merging party has on the profits of the other merging party.\textsuperscript{170} The CET, in another recent paper, notes that the inverted-U relationship between competition and innovations seems not to have an equivalent in merger settings, and that a merger always reduces the incentive to innovate (absent efficiencies) because of standard unilateral effects: Prior to the merger, the merging parties innovate to take customers away from the other merging party; post-merger, the internalization of this effect makes it a cannibalisation effect which mutes innovation competition.\textsuperscript{171}

Both CET papers mention that the merging parties could increase prices post-merger which would act as an incentive to innovate, but they suggest that the dominant driver is the internalization of the innovation externalities which leads to the reduced incentive to innovate after the merger.\textsuperscript{172} Along the same lines, Motta and Tarantino also conclude that a horizontal merger always reduces total investment and consumer surplus, except with sufficient efficiency gains.\textsuperscript{173}

Denicolo and Polo argue that CET’s analysis does not take into account that a merger can increase probability of successful innovation. A horizontal merger allows the merged entity to reduce R&D duplication and to allocate the research resources to the most promising project.
That increases probability of innovation success which directly translates into greater consumer welfare. Denicolo and Polo also emphasized the positive effect of sharing innovation among the merging parties and that a broader applicability of research results, e.g. of basic innovations, may increase the incentive to invest in basic innovations.

Also Jullien and Lefouili do not agree with CET’s generalization: In their opinion, post-merger increased prices increase the incentive to invest in innovation for next-generation products, and increased margins increase the incentive to invest in innovation to increase demand by offering a broader variety of differentiated products, and these positive effects on innovation may be stronger than the negative effect of the internalization of each other’s profit reduction when the merging parties can differentiate their products and increase demand as a result (‘demand expansion effect’). Jullien and Lefouili conclude by recommending a neutral perspective when assessing merger effects on innovation. Further, they suggest to include all merger effects, including positive spillover effects for future innovations, and other efficiencies, into the main part of the competitive assessment by the Commission, and to consider the theory of benefits together with the theory of harm.

Federico summarizes that the economic literature suggests three channels through which horizontal mergers affect the incentive to innovate: 1. Innovation competition, 2. Product market competition, and 3. Appropriability.

Through the innovation competition channel, a merger internalizes the negative innovation externality (the negative effect that innovation by one merging party may have on the profits of the other merging party). This affects profits on current and future products and unambiguously reduces the incentive to innovate of the merged party.

Through the product market competition channel, a merger internalizes the negative price externality, which leads to an ambiguous result with regard to innovation: less price competition

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174 Denicolo, Polo, page 11. Parallel R&D efforts may also have positive effects on innovation, e.g. in patent or innovation races; Baker, page 579.
175 Denicolo, Polo, page 26.
176 Jullien, Lefouili, pages 18 and 27.
increases the profits of the merging parties both if they innovate and if they don’t innovate. The incentive to innovate increases through the product market channel, if less intense product market competition increases post-innovation profits more than pre-innovation profits; and decreases, if less intense product market competition increases pre-innovation profits more than post-innovation profits.\textsuperscript{181} Post-innovation price increases reduce the benefit the consumer gets from innovations. The effect of the innovation competition channel combined with the product market channel could result in a reduction in innovation efforts and an increase in post-innovation prices.\textsuperscript{182}

Through the appropriability channel, a merger internalizes involuntary knowledge spill over between the merging parties. Through the appropriability channel, a merger may increase the incentive to innovate.\textsuperscript{183} Except, if appropriability is already high pre-merger, e.g. through strong IP protection, the merger is unlikely to increase appropriability and the incentive to innovate will not increase through the appropriability channel.\textsuperscript{184}

In general, economists share the opinion that “the relationship between firm size, market structure and innovation has remained unsettled in economic theory since Joseph Schumpeter”.\textsuperscript{185} However, they agree that innovation competition assessment in a dynamic setting is possible, if based on a fact-intensive case-by-case approach.\textsuperscript{186}

Here is a summary of some reasons why a merger may have positive or negative effects on innovation competition:

a) \textbf{Positive effects of mergers on innovation competition}

- A merger can combine complementary R&D assets and knowledge, which can increase the ability to innovate.\textsuperscript{187}

\textsuperscript{181} Federico, page 8.
\textsuperscript{182} Federico, page 11.
\textsuperscript{183} Federico, page 6.
\textsuperscript{184} Federico, page 13.
\textsuperscript{185} Katz, Shelanski, 2007, page 47. In line with Gilbert, 2006, see above III. C. The incentive to innovate.
\textsuperscript{186} Katz, Shelanski, 2005, page 136: Combining complementary assets could sometimes be achieved by alternative means without eliminating a competitor or reducing product market competition, e.g. through licensing, or research joint ventures.
\textsuperscript{187} Mosso, page 4. Schulz, page 4. Katz, Shelanski, 2005, page 136: Combining complementary assets could sometimes be achieved by alternative means without eliminating a competitor or reducing product market competition, e.g. through licensing, or research joint ventures.
- The merged entity can increase innovation productivity by reallocating researchers to the most promising projects and thereby increasing probability of innovation success.\textsuperscript{188}

- A merger can increase the incentive to innovate by increasing appropriability:\textsuperscript{189}
  - A merger can increase economy of scale for process innovations.
  - A merger can internalize involuntary knowledge spill-over to rivals and free-riding of rivals by merging with these rivals. With a high market share, a company is more able to appropriate innovation, which cannot be protected by intellectual property rights.\textsuperscript{190}
  - A merger can help to amortize fixed R&D costs.\textsuperscript{191}
  - A merger may increase the sales basis for an innovation.\textsuperscript{192}

- Eliminating unnecessary parallel, duplicate, redundant R&D efforts (wasteful innovation competition) frees money and personnel for additional innovation projects.\textsuperscript{193}

- A merger may lead to economies of scope and scale in R&D.\textsuperscript{194}

- If a merger leads to R&D efficiencies, lost opportunities to enter new downstream markets through lack of innovation may more significantly exceed the required addition R&D effort (for the innovation required to enter these new downstream markets).\textsuperscript{195}

- If, without the merger, the merging parties would have taken significant future profit from each other by competing with their new products, the merger would allow the merging parties to lessen product competition between their new products and to

\textsuperscript{188} Jullien, Lefouili, page 25. Denicolo, Polo, pages 4 - 6.
\textsuperscript{189} Mosso, page 4.
\textsuperscript{190} Gilbert, Sunshine, page 577. Katz, Shelanski, 2005, page 114: The merger creates a dilemma: allowing a merger that internalizes the free-rider problem and fosters innovation on the one hand but may eliminate product market competition on the other hand, is a choice between long-term innovation and short-term product pricing competition.
\textsuperscript{191} Katz, Shelanski, page 19.
\textsuperscript{192} De Coninck, page 44. Denicolo, Polo, page 13.
\textsuperscript{193} Gilbert, Sunshine, page 573: Although, empirical studies confirmed “the conventional wisdom that society is better off with greater investment in research and development.” And combining R&D efforts eliminates the possibility of finding alternative solutions; Gilbert, Sunshine, page 579. From a positive perspective, (wasteful) duplication of R&D is simultaneous testing of different hypothesis and parallel experimentation; Kern, page 29.
\textsuperscript{194} Gilbert, Sunshine, pages 579, 594. Jullien, Lefouili, page 22.
\textsuperscript{195} Gilbert, Sunshine, page 596.
coordinate their product positioning and pricing strategies in order to increase the profits generated by the new products, which increases the incentive to innovate.\textsuperscript{196}

- Coordination of product differentiation and product pricing among the merged companies also allows coexistence of the old products with differentiated new products.

- A merger may relax product market competition and allow higher prices for next-generation products which means higher returns on innovation and a higher incentive to innovate.\textsuperscript{197}

- A merger may increase margins which induces firms to innovate in product differentiation to increase demand (‘demand expansion effect’).\textsuperscript{198}

- A merger between two laggard companies may increase their chances and their incentive to innovate to catch-up with the leader.\textsuperscript{199}

- The prospect of being an attractive acquisition target,\textsuperscript{200} and the threat of being acquired, can be an incentive to innovate.

- A merger may lift financial or credit restraints that limited one of the merging companies’ possibilities to invest in innovation.

\textbf{b) Negative effects of mergers on innovation competition}

- A merger eliminates competition between the two merging parties and can therefore reduce the incentive to innovate.\textsuperscript{201} The harm can arise from eliminating R&D or future product market competition between the merging parties.\textsuperscript{202} The harm may be larger, if two out of a few companies merge, or if rivalry of the merging parties was critical to drive innovation.

\begin{flushleft}
\textsuperscript{196} Marshall, Parra, 2016, page 4. Marshall and Parra argue that a merger may increase consumer surplus in the long run thanks to an increased incentive to innovate, even if prices increase in the short run. Although such a merger is likely to raise price-competition issues.

\textsuperscript{197} Jullien, Lefouili, page 2.

\textsuperscript{198} Jullien, Lefouili, page 3.

\textsuperscript{199} Kern, Mantilla Contreras, page 13.

\textsuperscript{200} Hollenbeck, pages 1, 19, 26.

\textsuperscript{201} Mosso, page 4.

\textsuperscript{202} Katz, Shelanski, 2005, page 113.
\end{flushleft}
- A merger may eliminate the ‘escape competition’ effect that increases innovation activities, especially if the merging companies produce close substitutes and product competition in the pre-innovation market is high.\textsuperscript{203}

- A merger between partners with substitutive technologies decreases R&D activities.\textsuperscript{204}

- A merger between companies that have the control over significant innovations pools for future markets may impede innovation competition and even exclude superior technology.\textsuperscript{205}

- If, without the merger, the merging parties would have taken significant future sales from each other thanks to their innovation efforts, the merger internalizes this negative innovation effect – the merged party would cannibalize its own future sales – which reduces the merged party’s incentive to innovate.\textsuperscript{206} This effect is particularly high if two close, highly active innovators merge.\textsuperscript{207}
  
  \begin{itemize}
    \item Similarly, the motivation to take away sales from the other merging party is no longer present.\textsuperscript{208}
  \end{itemize}

- A merger increases market power and may create upward price pressure; higher prices may lower demand and reduce the incentive to invest in cost-reduction innovation, because the benefit of cost-reduction innovations is smaller if the output is smaller (‘margin expansion effect’).\textsuperscript{209}

  \begin{itemize}
    \item Higher prices may also increase profits without investing in innovation and decrease the incentive to innovate.\textsuperscript{210}
  \end{itemize}

- A merger with efficiency gains may accelerate concentration to monopoly because of post-merger cost advantages and thereby eliminating innovative competitors or forcing them out of the market.\textsuperscript{211}

\textsuperscript{203} Kern, Mantilla Contreras, page 6.
\textsuperscript{204} Cassiman, pages 24 – 25.
\textsuperscript{205} Drexl, page 19.
\textsuperscript{206} Mosso, page 4.
\textsuperscript{207} Gilbert, Sunshine, page 578.
\textsuperscript{208} De Coninck, page 44.
\textsuperscript{209} Motta, Tarantino, page 2. Jullien, Lefouili, page 3.
- A merger which increases financial leverage reduces innovation activity.\textsuperscript{212}

- Overlapping innovations which could increase product variety may be stopped after the merger.\textsuperscript{213}

- If, after a merger, overlapping or duplicate R&D efforts are eliminated and the number of researchers is reduced, the brain drain caused by the merger may reduce not increase the ability to innovate.\textsuperscript{214}

c) **Ambiguous effects of mergers on innovation competition**

- A merger eliminates current and future price competition between the merging parties. This has an ambiguous result with regard to innovation: less price competition increases the profits of the merging parties both if they innovate and if they don’t innovate (product market competition channel).\textsuperscript{215}

- Many merged parties are not able to successfully implement the efficiencies and synergies identified pre-merger.

Besides the direct effects of the merger, also other market conditions have to be taken into account. For example, high or low entry barriers can have a more prominent influence on innovation competition than a merger; alternative sources of innovation, substitutes for innovation activities of the merged entity, or the threat of losing the R&D race can induce the merged entity to keep a high innovation level;\textsuperscript{216} the strength and activity in innovation of rivals, the number and size of rivals, the availability of intellectual property right protection, and the characteristics of the products (homogeneous or differentiated), all influences innovation competition.

\textsuperscript{210} Competition Merger Brief, 2/2017, page 5.
\textsuperscript{211} Marshall, Parra, 2016, page 5.
\textsuperscript{212} Schultz, page 3.
\textsuperscript{213} De Coninck, page 46.
\textsuperscript{214} Ornaghi, page 72.
\textsuperscript{215} Federico, page 6.
\textsuperscript{216} Gilbert, Sunshine, page 595.
In general, no anti-concentration presumption should be applied in innovation competition merger assessment, and a neutral (except in a merger to monopoly), fact-based approach should be chosen.\textsuperscript{217}

\section*{IV. Innovation competition assessment in EU Merger Control}

\subsection*{A. Innovation competition assessment according to the Horizontal Merger Guidelines}

Most mergers do not harm competition.\textsuperscript{218} Some mergers may have unilateral – also called non-coordinated – effects: The merged parties gain or increase their market power which allows them to increase prices or to reduce innovation.\textsuperscript{219} A merger may also have coordinated effects: The ability of the merged party to coordinate its behaviour with competitors to exercise collective market power may increase.\textsuperscript{220} The complex and uncertain nature of R&D, the possibility to keep innovation secret, and the long period it would take for competitors to find out if a party breaches coordination, makes the monitoring of tacit and explicit coordination difficult in innovation and R&D. Coordinated effects are therefore unlikely to cause innovation competition concerns in mergers.\textsuperscript{221} Horizontal mergers bear the highest risk of anti-competitive effects since they remove an actual or potential competitor from the market.

According to Article 2 (2) of the EC Merger Regulation,\textsuperscript{222} the Commission shall approve a merger which would not ‘significantly impede effective competition’ (SIEC); a merger which would ‘significantly impede effective competition’ shall not be approved (Article 2 (3) EC Merger Regulation). The burden of proof to produce convincing evidence that a merger raises competition concerns is on the Commission.\textsuperscript{223} The merger assessment compares the

\textsuperscript{217} Katz, Shelanski, 2007, pages 5 - 6.
\textsuperscript{218} Whish, Bailey, page 862.
\textsuperscript{219} Whish, Bailey, page 862.
\textsuperscript{220} Whish, Bailey, page 863.
\textsuperscript{221} Katz, Shelanski, 2007, page 48.
\textsuperscript{223} ECJ, Judgment in Commission v Tetra Laval BV, C-12/03, European Court Reports 2005 I-987, ECLI:EU:C:2005:87, para 48.
competitive situation that would result from the merger, with the situation as it would be without
the merger (the ‘counterfactual’), and the Commission can take into account reasonably
predictable future changes to the market.224

The Commission issued guidelines on the assessment of horizontal and non-horizontal
mergers.225 The Horizontal Merger Guidelines outline the Commission’s approach to merger
assessment:226 1. Market shares and concentration levels; 2. Anti-competitive effects analysis; 3.
Countervailing buyer power; 4. The possibility of new entries into the market; 5. Efficiencies; 6.
Failing firm defence.

1. Market shares and concentration levels

The assessment begins with the definition of the relevant market. Market shares in and
concentration levels of the relevant market give a first indication of the market structure and the
competitive importance of the merging parties and the competitors. A market share of the
merged party in the relevant market below 25 % is an indication that a merger can be presumed
not to be anti-competitive.227

The Commission uses the Herfindahl-Hirschman Index (HHI) to assess the overall concentration
level in the market.228 The Commission unlikely challenges a merger, if the HHI is low or the
change in the HHI is small, except if, among other factors, one of the merging parties is a recent
entrant with small market share or a potential entrant; one of the merging parties has a market
share above 50%; or one or both parties are important innovators and their importance is not
reflected in their market share.229

2. Anti-competitive effects analysis, the SIEC-Test

The anti-competitive effects analysis is based on the SIEC-Test (significant impediment of
effective competition): would the merger ‘significantly impede effective competition’?230 In

224 HMG, para 9.
225 European Commission, HMG, NHMG.
226 HMG, para 11.
227 HMG, para 18.
228 HMG, paras 19 ff. The HHI is the sum of the squares of the market shares of all competitors in a market; Whish, Bailey, page 45.
229 HMG, para 20.
230 HMG, para 22.
general, competition is harmed if the merged party obtains market power, if the merger would eliminate a competitive constraint on the merging parties (e.g. a close competitor, a potential competitor), or if the merger would significantly increase the likelihood of coordination among the competitors.231

In horizontal mergers, the following factors may be relevant when assessing if unilateral (non-coordinated) merger effects are significant: 1. “Merging firms have large market shares”, 2. “Merging firms are close competitors”, 3. “Customers have limited possibilities of switching supplier” (few alternative suppliers or high switching costs), 4. “Competitors are unlikely to increase supply if prices increase” (capacity constraints, costly capacity expansion), 5. The merged entity will be able to hinder expansion by competitors (e.g. through control over patents or other intellectual properties), 6. The “Merger eliminates an important competitive force” (e.g. by removing a particularly innovative competitor).

A merger with a potential competitor can have the same significant anti-competitive effect as a merger between two competitors, if there is significant likelihood that the potential competitor will become an effective competitor, and if there are no or not enough other potential competitors remaining in the market to exert sufficient competitive pressure.

A merger may also cause significant coordinated effects. Since R&D and innovation activities are complex, often secret and difficult to monitor, coordinated effects are very unlikely in R&D and innovation competition (see above IV. A. first paragraph).

3. Countervailing buyer power

Competitive pressure may not only come from competitors, but also from customers with countervailing buyer power. Countervailing buyer power is the bargaining strength a buyer has vis-à-vis the supplier in commercial negotiations. Such bargaining strength may come from
buyer’s size, its commercial importance to supplier, its ability to immediately switch to alternative sources, its possibility and likelihood to vertically integrate into the upstream market or to sponsor new entrants in the upstream market.\(^{239}\)

If customers have countervailing buyer power, even a supplier with high market share cannot act independently and is constraint by its customers. Countervailing buyer power cannot compensate for potential adverse merger effects, if only a particular segment of customers has countervailing buyer power.\(^{240}\)

4. **The possibility of new entries into the market**

A merger is unlikely to cause a significant impediment to effective competition, if entering into a market is sufficiently easy. A new entrant must be able to exert a sufficient competitive constraint. An entry must be likely, timely, and of sufficient scope to counter the anti-competitive effects of a merger.\(^{241}\) Incumbents’ preferential access to intellectual property rights, innovation, or R&D or economy of scale can constitute entry barriers.\(^{242}\)

5. **Efficiencies**

The Commission will take efficiency into account in its overall competition assessment. It’s the merging parties’ duty to put forward efficiencies,\(^{243}\) because that information is in the possession of the merging parties. The merging parties have to provide the information to the commission in due time, and demonstrate that the efficiencies benefit consumers, are merger specific, and verifiable.\(^{244}\) With regard to innovation competition, efficiencies are also possible in R&D and innovation.\(^{245}\)

\(^{239}\) HMG, paras 64 – 65.
\(^{240}\) HMG, para 67.
\(^{241}\) HMG, paras 68 – 75.
\(^{242}\) HMG, para 71 (b).
\(^{243}\) EC Merger Regulation, recital 29.
\(^{244}\) HMG, paras 78 and 87.
\(^{245}\) HMG, para 81.
6. **Failing firm defence**

A problematic merger may nevertheless be cleared by the Commission, if one of the merging parties is a filing firm. For the failing firm defence to be applicable, the following three criteria have to be met: 1. If not taken over, the allegedly failing firm would be forced out of the market in the near future because of financial difficulties. 2. There is no less anti-competitive option than the merger. 3. The assets of the failing firm would exit the market absent the merger.

B. **Recent horizontal mergers which raised innovation competition concerns**

1. **The traditional innovation competition assessment focused on pipeline products**

A merger with a potential competitor who has pipeline products that are close to market launch can be assessed with the similar approach outlined above for the product market competition.

A merger with a potential competitor can significantly impede competition, if two conditions are fulfilled: 1. The potential competitor is already a significant competitive force or it will grow into a significant competitive force with a significant likelihood; and 2. There are not enough other potential competitors to generate sufficient competitive constraints after the merger. The significant likelihood of becoming a strong competitor sets a high bar for the Commission’s prediction of the future market and the future competition.

Pipeline products in late development stage close to market launch are called late pipeline products. Pipeline products at the early stage of development are called early pipeline products. Predictions for late pipeline products are generally reasonable, predictions for early pipeline products are difficult and uncertain and therefore, until recently, the Commission limited its assessment to late pipeline products. The merger of the two pharmaceutical companies Medtronic and Covidien is such an example. The target company Covidien had a late-stage pipeline product that was very likely to grow into a significant competitive force for Medtronic.

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246 HMG, para 89.
247 HMG, para 90.
248 HMG, paras 58 – 60: Merger with a potential competitor.
249 HMG, para 60.
who has very few competitors. The elimination of a credible competitor would remove the competitive constraint under these circumstances and innovation competition would be significantly impeded. The merger was approved by the Commission after the divestiture of the late-stage pipeline product together with all assets and personnel to bring the product to market.251 Similarly, in another pharmaceutical merger, Pfizer/Hospira,252 the merging parties were required to divest Pfizer’s late-stage biosimilar pipeline product that was very likely to become a significant competitive force against the product marketed by Hospira. The potential delay or discontinuation of Pfizer’s late-stage pipeline product and with only one additional potential competitor left, innovation competition would have been significantly impeded by the merger.253

The two mergers just mentioned deal with a potential competitor of a product already on the market. In yet another pharmaceutical merger, the Novartis/GlaxoSmithKline (GSK) oncology business merger,254 the Commission extended innovation competition assessment also to overlapping early pipeline products of the merging parties. The merging parties each developed products with the same mechanism of action, and, to avoid duplicate clinical trials, one of the two innovative early-stage pipeline paths would have been stopped. Since there existed only one additional player for the medical treatments of concern, the merger would have significantly impeded innovation competition and the merging parties had to divest Novartis’ early-stage pipeline products.255 This merger differs from the previous cases in two ways: early pipeline products with success probabilities of less than 50% were included into the analysis, and the overlap was not between a current product and a potential product, but between two potential products.

The probability that an early-stage pipeline product becomes a successful competitor is below the ‘significant likelihood’ stipulated in the HMG. The Commission’s Horizontal Cooperation Guidelines mention that in the pharmaceutical industry early-stage pipeline products can be easily identified and that the research process follows a structured path,256 which makes it

252 European Commission, Commission Decision in Case No COMP/M.7559, Pfizer/Hospira, 4 August 2015.
253 Competition Policy Brief, 1/2016, page 5.
256 Horizontal Cooperation Guidelines, para 120.
somehow predictable – but the low success probability of early-stage pipeline products remains. The Commission addressed innovation competition concerns created by overlapping early pipeline products, research, and innovation not only in the pharmaceutical market. In the General Electric/Alstom merger, the innovation pool of Alstom was likely to disappear. The market had high entry barriers and only few companies were able to produce large gas turbines worldwide. The elimination of that innovation pool would have significantly impeded innovation competition. The transaction was approved by the Commission subject to a remedy-package that ensured continuing innovation in the industry. In 2012, the Commission prohibited the Deutsche Börse/NYSE Euronext merger, not only, but also because the merger significantly impeded innovation competition. Similar to the General Electric/Alstom case, the innovation competition concern was not about concrete potential competitor products entering the market and becoming a significant competitive force with high likelihood, the concern was the decreased incentive to innovate and the development of new ways to trade, process, and clear in general. Deutsche Börse appealed the Commission’s decision. The General Court rejected the appeal and also rejected the applicant’s arguments that challenged the way the Commission assessed innovation competition. The GC imposed the duty to rebut the validity of the evidence on which the Commission based its innovation competition conclusion on Deutsche Börse, and the GC did not challenge the conclusion the Commission made based on that evidence, inter alia, that the pre-merger close competition between the merging parties was an important driver of innovation.

2. The new Innovation Theory of Harm extends assessment to innovation spaces

Merger control traditionally assesses effects of a merger on a market, and the correct definition of the relevant product and geographic market is the basis of the assessment. That concept works for pipeline products and potential competition. However, innovation competition can take place

262 Mosso, page 4.
without being linked to a current product market, or where the future product market cannot be
defined yet, and the future players and their respective market shares cannot be determined. The
Commission addresses this issue with ‘innovation spaces’. Gilbert and Sunshine tried to solve
the issue that innovation competition may be independent from a product market by introducing
the concept of ‘innovation markets’ in 1995. Although the ‘innovation market’ concept
presented by Gilbert and Sunshine was criticized and not formally introduced into merger
control because innovation competition not covered under potential competition takes place
mainly outside and before a ‘market’ exists, some of the thoughts of the ‘innovation market’
concept are relevant for ‘innovation spaces’, too.

a) Innovation markets

Gilbert and Sunshine suggested to define an innovation market and to include an innovation
market competition assessment into merger analysis. Mergers with effects on innovation may
have consequences in product markets where the merging parties did not compete pre-merger.
After defining the relevant innovation market, the analysis of the market structure effects on
innovation is based on these three questions:

First, in analogy to the product market share, it is analysed if the merged company would have
such a significant share in total R&D investment in the innovation market that it would have the
ability to decrease the total market investment in innovation.

Second, if the merged entity would have the ability to significantly reduce total R&D
investments, would it have the incentive to do so? Competition in the innovation market, the
downstream final product market, or the desire to penetrate other additional downstream markets
may require the merged party to keep its pre-merger innovation level.

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263 Gilbert, Sunshine, page 569.
264 Drexl, page 1.
265 Gilbert, Sunshine, page 570. The ‘innovation market’ is detached from a particular product market.
267 Gilbert, Sunshine, page 594: The innovation market can be defined with a hypothetical monopolist test which is – in analogy
to the product market definition – based on a “small but significant and nontransitory reduction in R&D efforts”. It can be
presumed that the relevant geographic area of an innovation market is the world (assuming no regulatory or trade barriers
prevent R&D at [or sending knowledge to] any location).
268 Gilbert, Sunshine, pages 590 - 594.
269 Gilbert, Sunshine, pages 590 - 594.
270 Gilbert, Sunshine, pages 590 - 594.
And third, are there merger specific efficiencies in R&D which would enable the merged company to engage in greater innovation activity, or to reach a higher innovation level because of the new possibilities offered by the combination of complementary asset or knowledge.\textsuperscript{271}

Gilbert and Sunshine set up a five-step framework to assess innovation competition effects of a merger:\textsuperscript{272} In the first step, it is analysed if the R&D activities of the merging parties overlap. In the second step, alternative R&D sources and technology substitutes are identified. In the third step, competition in the downstream market is analysed. In the fourth step, the effect of increased concentration on R&D investments is analysed, especially if the merged entity has such a significant share in the innovation market to be able to influence overall R&D spending in the market. And in the fifth step, it is evaluated if a potential decrease in R&D spending is justified by efficiencies (e.g. elimination of duplications).\textsuperscript{273} The analysis is much in line with traditional merger assessment, except that competition analysis is not focused on a real product market, but instead includes innovation competitors detached from the product market.\textsuperscript{274}

Opponents of the ‘innovation market’ approach argue that the market boundaries of innovation markets cannot be defined precisely enough to serve as basis for a rational decision, the future product market is too uncertain, or – based on Schumpeter’s replacement effect – that even market power created through a merger would be of no or only limited harm, since it will last only temporarily and the next innovator is already on its way to challenge the leader or to replace the leader thanks to a significant innovation, and that too strict merger enforcement bears the risk to hinder innovation by prohibiting mergers which would be beneficial for innovation because they combine complementary innovation assets.\textsuperscript{275} Opponents further criticize that in the ‘innovation market’ approach input (R&D spending) rather than output or competitive outcome is analysed.\textsuperscript{276}
b) Innovation spaces

The main reasons why the ‘innovation market’ concept was not accepted, was because innovation competition is not linked to a ‘market’ and Gilbert and Sunshine’s ‘innovation market’ concept tried to link the ‘structure’ of the innovation ‘market’ and the concentration level of R&D to the incentive to innovate, but they failed to show why a market share analysis from a true market can be transferred to the ‘innovation market’ where no transactions in innovation take place. The novel approaches to assess innovation competition in mergers avoid the term ‘market’ for innovations and are not based on market share and concentration level for innovation activities assessment. In the recent European Commission DG COMP decision in the Dow/DuPont merger, the Commission emphasized that “innovation should not be understood as a market on its own right,” but as an input activity for the upstream technology market and the downstream product market. The Commission introduced the term ‘innovation spaces’ to assess the impact of a merger on innovation.

The Commission assesses merger effects on innovation competition in ‘innovation spaces’ and at the industry as a whole. At the core of the innovation competition assessment is the question, whether the merging parties will reduce existing innovation by discontinuing, delaying, or redirecting the merging parties’ overlapping research lines and pipeline products; or whether the merging parties’ or the whole industry’s incentive to initiate new innovation projects is decreased after a merger. For this analysis, the Commission does not define a separate innovation market. The Commission rather identifies the companies which have the ability to compete in the innovation of new products, and the different ‘innovation spaces’ in the industry.

Innovation competition takes place in the innovation spaces within an industry. An innovation space includes the lines of research and the early pipeline products. A line of research consists of

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277 Drexl, pages 10 – 12.
284 OECD, Considering non-price effects, page 12.
the scientists, patents, trade secrets, assets, and equipment dedicated to a discovery target.\textsuperscript{285} Companies do not innovate randomly, they have specific target research areas. A discovery target, for example an active ingredient, can have a use in several downstream formulated product markets. Innovation activities may target an existing product market or a wider innovation area. Therefore, the innovation spaces are usually broader than the individual downstream product markets, but still narrow and much narrower than the industry.\textsuperscript{286}

To identify and evaluate the innovation strength of the players in the industry and each innovation space, the Commission used innovation output measures such as number of patents and new active ingredients created in the past. The Commission evaluated the concentration level in each innovation space based on citation-based patent shares and turnover weighted new active ingredients shares.\textsuperscript{287} In the above mentioned Dow/DuPont merger assessment, the Commission did not take into account input measures like R&D spending.\textsuperscript{288}

C. The new EU Commission ‘Innovation Theory of Harm’ in Merger Control

1. Structure of the innovation competition assessment

Except that the Commission did not start its innovation competition assessment by defining a relevant market, but instead started its analysis with the identification of the relevant players that have the ability to participate in a given innovation competition, the Commission used the analytical framework of the HMG to assess the unilateral merger effects on innovation competition.\textsuperscript{289} The innovation competition effects of the merger were assessed in innovation spaces and at the industry as a whole.\textsuperscript{290} In its innovation competition assessment, the Commission used following structure:\textsuperscript{291}

\textsuperscript{286} European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, recitals 350 – 351.
\textsuperscript{287} European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, recitals 379 – 402.
\textsuperscript{288} European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, recital 384.
\textsuperscript{289} European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, recitals 1993 ff.
\textsuperscript{290} European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, recital 352.
\textsuperscript{291} Competition Merger Brief, 2/2017, page 5; European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, recital 2038: 8.3.5 Structure of the Assessment.
a) Market features and structure

The Commission assesses if innovation is an important factor in an industry, what the key drivers for innovation in a given industry are, the characteristic of the innovation (product or process innovation, the degree of uncertainty of innovation), if entry or expansion barriers are present, if customers are likely to switch to innovative products (contestable environment), the strength of intellectual property (appropriability), the time to market of an innovation, other industry specific features such as regulatory pressure or resistance development against active ingredients, and how many other relevant innovation competitors are present (concentration at industry level and in innovation spaces) and if the innovation capabilities of the other players are comparable with those of the merging parties (e.g. similar assets, expertise, financial strengths). The commission also takes into account how past mergers affected innovation competition in the industry.\(^{292}\)

b) The importance of the merging parties as innovators (at industry level)

Market share or similar measures may not adequately reflect a party’s innovation strength.\(^ {293}\) A more accurate measure of innovation strength is, for example, a party’s quality rated patent share or its share in successfully launched new innovative products or active ingredients (based on turnover in the downstream markets).\(^ {294}\) A merger between two important innovators may significantly impede innovation competition.\(^ {295}\)

c) The intensity of innovation rivalry between the merging parties (in innovations spaces)

Here the Commission assesses if the two merging parties are close innovation competitors. Close innovation competitors have overlapping lines of research and overlapping early pipeline products. Closeness is an indicator of how much sales the two merging parties would take away from each other without the merger, or for cannibalisation if the merger takes place. Close

\(^{292}\) European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, Section V.8.4 – V.8.6, recitals 2039 – 2395.

\(^{293}\) HMG, para 37.


\(^{295}\) European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, recital 2599; HMG, para 38.
innovation competitors invest in products that can substitute each other’s products; this overlapping innovation effort is likely to be reduced by a merger.296

d) The impact on the incentive to innovate and evidence on effects on innovation

Where the merging parties are active in the same innovation spaces or where the merging parties target the same innovation spaces, innovation efforts in overlapping lines of research and overlapping pipeline products are likely to be reduced after a merger because the final products would cannibalize each other post-merger (internalization of negative externalities). One of the overlapping projects may be discontinued or delayed, which decreases product variety, eliminates the future competitive pressure these products may have on each other if developed by independent companies and reduces the overall chance that an innovative product is brought to the market at all.297 The Commission also takes into account evidence from the merging parties documents about future R&D plans and planned reductions in innovation efforts.298

e) Can the remaining competitors offset the loss in innovation competition

The Commission also assesses if the remaining competitors are able and willing to compensate the reduction in innovation competition in the innovation spaces targeted by the merging parties and at the industry level.299

2. Relevant factors of the innovation competition assessment in merger control

The EU Commission does not start innovation competition assessment with the presumption that a merger decreases innovation. However, the EU Commission considers that there is a solid economic basis that a merger may reduce innovation competition under certain conditions.300 In the Dow/DuPont merger the Commission outlined its new Innovation Competition Theory of harm and identified following factors as relevant to innovation competition in a merger.301

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297 European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, Section V.8.9, recitals 3015 ff.
299 European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, Section V.8.10.6, recitals 3225 ff.
300 Mosso, page 5.
a) High industry concentration and high entry barriers

As mentioned above, innovation is not a market in its own. It is an input activity for the upstream technology market (licensing and sale of technology) and the downstream product market. Neither the relevant upstream technology market nor the relevant downstream product market can be used directly for innovation competition assessment, even though innovation results in products competing in these markets. Innovation competition assessment starts with identifying, at the industry level, the R&D players that have the capabilities to innovate in a given industry: the companies with the required scale, capabilities, assets, and access to the markets.

In the Dow/DuPont case, there were only five relevant companies participating in the innovation competition at industry level, including the two merging parties, and since not all relevant companies are active in all innovation spaces, concentration at innovation space level was even higher than at industry level. A survey showed that entry and expansion barriers were high, therefore it is unlikely that new players will enter the scene. A merger in an environment with high concentration levels and high entry barriers is likely to significantly impede innovation competition. The Commission considers a five to four merger (at industry level), respectively a four or less to three or less merger (at innovation space level) in an environment with high entry barriers a relevant indicator that the merger significantly impedes innovation competition.

b) Innovation results in cannibalisation of existing and future sales of rival firms

If successful innovators can win large shares of the market at the expense of the other party, then rivalry is an important driver for innovation. Through a merger, this rivalry between the merging innovators is lost. The effect is more prominent if only few companies compete in the same innovation space. Rivals in a particular innovation space can be identified through their overlapping lines of research and early pipeline products. Post-merger, the merged company

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would have an incentive to reduce this innovation competition in the overlapping lines of research and in the overlapping pipeline products of the merging parties because post-merger, the future, overlapping products developed will not take away sales from a rival, they will rather cannibalise the merged party’s own future products.\textsuperscript{310} The reduction of product variety is the result of significantly impeded innovation competition in the affected innovation spaces. This effect is more prominent if the feature of the innovation is mostly product innovation.

c)  **Limited switching costs and high contestability**

In order to gain large market shares from rivals, the relevant product market has to be contestable. In a contestable environment, customers can easily switch to improved products, customer are not locked-in to their current products. In a market where companies, acting independently, can earn large incremental sales at the expense of their competitors with innovative, new, better products, this high contestability on the basis of innovation is a strong incentive to innovate and competition is a strong driver for the innovation. A merger between two out of a limited number of competing innovators will lower contestability, because the competition between the two merging innovators to introduce rival innovative products will be lost, resulting in a reduction of the incentive to innovate of the merging innovators.\textsuperscript{311} I will come back to this conclusion in the discussion.

d)  **High appropriability – Product innovation protected by effective IPR**

The main argument why less competition is better for innovation is that with less competition, innovators can better appropriate the profits of their innovations. Because of scale effects, a merger can increase process innovation appropriability. If the innovation takes place mainly in the form of product innovation and the innovation already has strong protection through effective intellectual property rights, a merger does not further increase the incentive to innovate through even higher appropriability.\textsuperscript{312}

\textsuperscript{310} European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, recital 3022.

\textsuperscript{311} European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, recitals 2052 – 2054; this effect is most prominent if the total demand is capped (as in the crop protection industry) and innovation will not increase the overall demand or market size; recital 2055.

\textsuperscript{312} European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, recital 2064.
e) **Product cannibalization may affect profitability of R&D investments**

A party’s incentive to innovate comes from the potential increase in future profits. If a R&D project would lead to cannibalization of a company’s own product sales, this would negatively affect profitability of such R&D investment. A merger between rival innovators with overlapping research lines and early pipeline products therefore reduces the incentive to continue cost intensive innovations in parallel. Further, the merged company will have a larger product portfolio which creates more possible product cannibalisation effects.313

f) **The merging parties are important innovators**

A party’s share in quality rated patents and the market share of its newly launched products in the downstream product market gives an indication if a party is an important innovator. A party’s importance as an innovator may not correspond with its overall size, its overall investment in R&D, or its market share at industry level. The Commission considers a party an important innovator if the party has a significant share in the innovation performance indicators (e.g. patent share, new active ingredient share).314 A merger of two important innovators is likely to impede innovation competition. The impediment on innovation competition is most significant if the merging parties are important innovators in the same innovation space.


314 European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, recitals 2549 – 2550: The Commission talks about a ‘significant share’ if the (patent) share is above 10-20%, and a ‘limited share’ if it is below 5-10%. The Commission used the metrics developed by ‘PatentSight’ to analyse the patent data; European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, Annex 1 to the Commission Decision, The Commission’s economic analysis of patent data; recital 30. Patent shares were also used to calculate the HHI and changes in the HHI.

g) **The merging parties are close competitors and have overlapping lines of research**

Overlapping lines of research and early pipeline products are likely to lead to products that can substitute each other. Parties with these overlaps are therefore close competitors. A merger of close competitors with overlapping lines of research will eliminate the competitive pressure coming from this overlap and it will likely result in reduced innovation post-merger.315 If the merging parties are the only companies that focus on a specific innovation space, innovation competition may cease completely in such innovation space.

h) **Efficiencies**

Some mergers, mainly those mergers which combine complementary assets, may increase innovation. On the other hand, “consolidation between rival innovators is unlikely to be associated with efficiencies”\(^{316}\) the Commission states and does not search for synergy or efficiency effects in its merger assessment. The burden of proof for efficiencies is with the parties because the parties have the knowledge and the evidence. Efficiencies must benefit the consumer, be merger-specific, and verifiable (reasonably certain and substantial).\(^{317}\) Examples of efficiencies that may increase the incentive to innovate are more efficient sharing of knowledge, partial internalization of involuntary knowledge spill-over, and combination of complementary assets. Reductions in R&D efforts are not efficiencies\(^{318}\) and joint ventures to develop a new product may be a less anti-competitive alternative than an autonomous joint venture or a merger (merger specificity).\(^{319}\)

**D. Remedies under the new Innovation Theory of Harm**

The main requirements for remedies are as outlined above under II. C. Remedies Notice. This applies to remedies addressing innovation competition concerns, too. In case of horizontal overlaps, divesture of one of the overlapping research lines or pipeline products together with the required assets (including IP rights) and the required personnel is the main remedy. Often, divesture of a whole R&D section is needed, and because the divested business has to be a sustainable business entity, further business activities that deliver profit to pay for the research have to be divested together with the R&D section.

**E. Innovation competition in vertical & conglomerate merger**

1. **Structure of the assessment**

Vertical mergers are less likely to raise competition concerns than horizontal mergers,\(^{320}\) and if they do, the issues are mainly non-coordinated upstream or downstream market foreclosure

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\(^{317}\) HMG, para 78.

\(^{318}\) Mosso, pages 13 – 14.

\(^{319}\) HMG, paras 81 and 85.

320 NHMG, para 11.
effects (input foreclosure,\textsuperscript{321} customer foreclosure\textsuperscript{322}), coordinated effects may rise, too.\textsuperscript{323} Conglomerate mergers are unlikely to raise competition concerns; theoretically, an increased portfolio of products or services could allow the merged entity to tie and bundle its products and to exclude competitors from the market by these means.\textsuperscript{324} Non-horizontal mergers do not eliminate a competitor from the relevant market,\textsuperscript{325} and they usually integrate complementary assets which will lead to efficiencies.\textsuperscript{326}

As with a horizontal merger assessment, the Commission starts the assessment with a market share and concentration level analysis. If the merged entity does not have market power in at least one of the markets concerned, non-horizontal mergers do generally not raise anti-competitive issues.\textsuperscript{327} Where, in each of the markets, the post-merger market share is below 30\% and the post-merger HHI concentration level is below 2’000, the Commission will not further investigate such mergers.\textsuperscript{328} However, special circumstances may induce the Commission to investigate a merger anyway: The NHMG mentions several circumstances, one of them is a merger with a company that – thanks to a recent innovation – will significantly grow in the future.\textsuperscript{329}

A vertical merger can result in input foreclosure, if the merged entity could restrict access to products or services that it would have supplied absent the merger to its rivals in the downstream market.\textsuperscript{330} Input foreclosure can occur when the upstream merging partner of the vertical merger has market power.\textsuperscript{331}

A vertical merger can result in customer foreclosure, if a supplier integrates with a large customer in the downstream market. That large customer will no longer buy from rival suppliers, and the rivals in the upstream market may be deprived of a significant part of their customer

\begin{thebibliography}{1}
\bibitem{321} NHMG, paras 31 – 57.
\bibitem{322} NHMG, paras 58 – 77.
\bibitem{323} NHMG, para 17.
\bibitem{324} Whish, Bailey, page 864.
\bibitem{325} NHMG, para 12.
\bibitem{326} NHMG, para 13.
\bibitem{327} NHMG, para 23.
\bibitem{328} NHMG, para 25.
\bibitem{329} NHMG, para 26.
\bibitem{330} NHMG, para 31.
\bibitem{331} NHMG, para 31.
\end{thebibliography}
base.\textsuperscript{332} Customer foreclosure can occur, when the downstream merging partner of the vertical merger has market power.\textsuperscript{333}

The Commissions assesses foreclosure effects by following analysis: Will the merged party have the \textit{ability} to foreclose (e.g. market power of the upstream or downstream entity of the vertical merger)? Will it have an \textit{incentive} to foreclose (would a foreclosure be profitable)? And would a foreclosure \textit{impact} competition?\textsuperscript{334}

Because of the complex, uncertain, and secret nature of R&D and innovation, coordinated effects are unlikely to be relevant for innovation competition assessment.

Conglomerate mergers will usually not lead to competition issues.\textsuperscript{335} The main concern is, as with vertical mergers: Foreclosure. The merged entity may tie and bundle products to leverage the strong market position it has in one market in another market which may reduce competitors’ ability to compete.\textsuperscript{336} Foreclosure effects in conglomerate mergers are assessed similar to foreclosure effects in vertical mergers: Does the merged entity have the ability to foreclose, an incentive to foreclose, and would the foreclosure have negative impact on competition.\textsuperscript{337}

With regard to innovation competition, the foreclosure effect of a non-horizontal merger can harm the ability to innovate of the merging party’s competitors, as illustrated below.

2. \textbf{Recent non-horizontal mergers which raised innovation competition concerns}

The Intel/McAfee merger\textsuperscript{338} raised vertical input foreclosure concerns: Intel could have used its strong upstream position in the chip market to foreclose downstream competitors of McAfee from running their security software on Intel’s dominant chips.\textsuperscript{339} The ARM/Giesecke & Devrient/Gemalto Joint Venture\textsuperscript{340} raised similar concerns. The remedy in both cases ensured

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{332} NHMG, para 58.
\item \textsuperscript{333} NHMG, para 58.
\item \textsuperscript{334} NHMG, paras 29 – 77, mainly paras 32 and 59.
\item \textsuperscript{335} NHMG, para 92.
\item \textsuperscript{336} NHMG, para 93.
\item \textsuperscript{337} NHMG, para 94.
\item \textsuperscript{338} European Commission, Commission Decision in Case COMP/M.5984 – Intel/McAfee, 26 January 2011.
\item \textsuperscript{339} Competition Policy Brief, 1/2016, page 6.
\item \textsuperscript{340} European Commission, Commission Decision in Case COMP/M.6564 – ARM/Giesecke & Devrient/Gemalto JV, 6 November 2012.
\end{itemize}
\end{footnotesize}
that the downstream competitors are not blocked from the input required to develop their products.

F. Additional innovation competition issue - Acquisitions of innovative Start-ups

Once a start-up company or another small innovative company has made an innovation, an acquisition of the innovation or the whole company by a large company can help to faster ramp up the innovation to industrial scale production and to sell more of the new product thanks to the marketing know-how of the large company with its established distribution channels. Many entrepreneurs who tried it on their own were overrun by a fast imitating large company, or could not exploit the full potential of the innovation because of lack of funding and access to customers. If a large company wants to bring an acquired innovation from a small company to the market, this is in general good for the innovation. A potential sale of an innovation to a large company can also act as an inducement for the entrepreneur innovators.

However, some acquisitions are made to eliminate potential future competition or are otherwise significant or problematic but the Commission cannot step in because the turnover thresholds are not met. For these cases, the EU may introduce a ‘size of transaction’ threshold or otherwise change the threshold of notification to be able to assess innovation competition in cases where someone buys an innovator with lots of ideas but little sales.

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341 Eliasson, page 345.
342 Eliasson, page 346.
343 Cunningham, Ederer, Ma, page 36.
344 Germany and Austria introduced ‘size of transaction’ thresholds in 2017 and recently published a draft joint guidance on the new transaction value threshold, available at: https://www.bundeskartellamt.de/SharedDocs/Meldung/EN/Pressemitteilungen/2018/14_05_2018_TAW.html [last accessed 15 July 2018].
V. Assessment of innovation competition in merger control is not unique to Europe

Not only the EU Commission assesses merger effects on innovation competition, the US authorities do so, too. Their innovation competition assessment is described in Section 6.4 of the US Department of Justice and the Federal Trade Commission Horizontal Merger Guidelines. In the Dow/DuPont merger, the US authorities found that the merger would reduce the incentive to innovate for broadleaf herbicides for winter wheat and insecticides for chewing pests products, but, unlike the EU Commission, the US Antitrust Division did not find negative innovation competition effects on the development of new crop protection chemicals for the US market. Other cases where the US authorities identified innovation competition concerns in mergers between two competitors are: AT&T/T-Mobile, Applied Materials/Tokyo Electron, and Halliburton/Baker Hughes.

VI. Discussion

1. The level of likelihood of potential future competition

Traditionally, the Commission has analysed pipeline-to-product and pipeline-to-pipeline overlaps in merger effects on innovation competition. According to the HMG, potential competitors need to grow into an effective competitive force within 2 – 3 years and with a significant likelihood. If they do not become an effective competitive force with a significant likelihood, one of the basic requirements for a merger with a potential competitor to have significant anti-competitive effects under the HMG is not fulfilled. In this case, according to the HMG, the Commission would not challenge the merger. The Commission can reasonably...
predict the chances of success for late pipeline products that are about to be launched within the next 2 to 3 years. However, the likelihood of success of an early pipeline product or an R&D target is uncertain, nearly impossible to predict in the specific case, and on average the likelihood of success is much lower than ‘significant likelihood’. Also, the time to market for a product that one day may result from today’s R&D activity can easily exceed 5 years, or even ten and more years in regulated industries like the pharmaceutical industry where efficacy and safety of the new product have to be tested in clinical trials. The long time-period and the uncertainty if R&D activities will result in a marketable product makes a prediction of far future product competition difficult and uncertain.

It seems that the Commission acknowledges this argument, since it does not address innovation competition solely by assessing future product competition, but also by assessing current innovation competition at industry level and in innovation spaces. This is a new approach, which adds an additional aspect to merger control unrelated to concrete products and markets. A reduction in innovation efforts today is generally able to reduce future product market competition. In the Deutsche Börse case the General Court did not object the Commission’s approach that a decrease in the incentive to innovate significantly impedes innovation competition to the detriment of consumers, in general and without the need to establish a clear relation to a potential future product market. This new case law indicates that the Commission does not have to predict future effects in innovation competition with ‘significant likelihood’, it is enough when it bases its predictions on solid evidence (e.g. internal documents and plans).

The innovation competition assessment in merger control is here to stay. This is reemphasized in the next section, which outlines that the Commission uses a similar innovation competition assessment in R&D collaboration agreements and technology transfer agreements.

2. The new innovation competition assessment in merger control compared to existing innovation competition assessment in R&D collaborations and technology transfer

R&D cooperation between two companies and technology transfer agreements also raise questions on innovation competition, not only mergers between two innovative competitors do so. The EU Commission issued a R&D Block Exemption Regulation\(^{350}\) with accompanying

\(^{350}\) R&D Block Exemption Regulation.
Horizontal Cooperation Guidelines with a Technology Transfer Regulation and accompanying Technology Transfer Guidelines on the application of Article 101 TFEU. In these regulations and guidelines, the Commission analysed the question of innovation competition based on R&D poles: competing R&D poles innovate for the same new products or technologies and aim to develop – with the same timing – substitutable products or technologies for those products or technologies subject to the co-operation agreement. The cooperation does not raise competition concerns – if after the agreement – a sufficient number of competing R&D poles remain. R&D poles can be identified in, for example, the pharmaceutical industry. If an industry does not allow to identify R&D poles, the Commission will not assess innovation competition in co-operation agreements.

R&D co-operations to develop new products for completely new markets are treated as agreements between non-competitors and are exempted by the R&D Block Exemption Regulation (and therefore allowed), except where the agreement would eliminate effective innovation competition. For these new products in completely new markets no market shares (dominance) can and are calculated, only the dynamic innovation competition effects are assessed.

According to the Commission’s Horizontal Cooperation Guidelines, most R&D agreements do not have anti-competitive effects, because they are far from exploiting the possible results of their research, and R&D agreements between competitors are in general covered by the R&D Block Exemption Regulation, if the combined market share does not exceed 25%. If, however, joint exploitation of the results is part of the cooperation agreement, too – a situation with parallels to mergers – anti-competitive effects of the agreement will be examined more

351 Horizontal Cooperation Guidelines.
352 Technology Transfer Regulation; also called Technology Transfer Block Exemption Regulation, TTBER.
353 Technology Transfer Guidelines.
354 Horizontal Cooperation Guidelines, para 120.
355 Horizontal Cooperation Guidelines, para 120.
356 Horizontal Cooperation Guidelines, para 122.
357 Horizontal Cooperation Guidelines, para 126; R&D Block Exemption Regulation, recital 21, and Articles 4 (1) and (3).
358 Horizontal Cooperation Guidelines, para 126.
359 Horizontal Cooperation Guidelines, para 129.
360 Horizontal Cooperation Guidelines, para 134. The market share thresholds under the Technology Transfer Regulation are a combined market share of 20% in the relevant market for competitors, or a 30% market share of each of the parties for non-competitors in the relevant market(s), Technology Transfer Regulation, Article 3.
closely by the Commission.\textsuperscript{361} Anti-competitive effects are unlikely, if a sufficient number of competing R&D poles remain.\textsuperscript{362} The Technology Transfer Guidelines mention a number of four or more independently controlled R&D poles in addition to the parties as a sufficient number.\textsuperscript{363}

The companies of the same innovation spaces in merger control can be compared with the R&D poles, but they do not exactly match. R&D poles describe companies that may create substitute products or technologies in a timely manner. Innovation spaces include companies that have the ability to compete in a given innovation space which can bring out innovations for different upstream technology markets or downstream product markets over a longer period of time. Further, a merger will allow the merging parties to determine pricing, and to coordinate output and research activities among the involved parties in other fields, which are hardcore restrictions under the R&D Block Exemption Regulation\textsuperscript{364} and the Technology Transfer Regulation.\textsuperscript{365}

Nevertheless, these regulations give insight how the commission deals with innovation competition under a broader perspective. The start of the assessment is the identification of the relevant players that participate or that have the ability to participate in the innovation competition, and then the dynamic competition based on innovation is assessed.

3. Taking a closer look at contestability

Contestability is an import driver of innovation. Contestability means that an innovative company can gain or protect profitable sales by providing greater value to the customer.\textsuperscript{366} In its assessment of the Dow/DuPont case, the Commission concluded that contestability decreases if two of a limited number of innovative competitors merge, because the rivalry between these two innovators is lost.\textsuperscript{367} This is a rather direct relation the Commission makes between the number of players and contestability. Shapiro writes in his publication that contestability does not

\begin{itemize}
  \item \textsuperscript{361} Horizontal Cooperation Guidelines, para 137.
  \item \textsuperscript{362} Horizontal Cooperation Guidelines, para 138.
  \item \textsuperscript{363} Technology Transfer Guidelines, para 157 and para 26, footnote 28.
  \item \textsuperscript{364} R&D Block Exemption Regulation, Article 5.
  \item \textsuperscript{365} Technology Transfer Regulation, Article 4.
  \item \textsuperscript{366} Shapiro, 2012, page 385.
  \item \textsuperscript{367} European Commission, Decision in Case M.7932 Dow/DuPont, 27 March 2017, recitals 2052 – 2054, 2112, and 2122. The decrease in contestability comes from the internalization of negative merger externalities (e.g. cannibalization of own sales after the merger), which is an important factor in markets with high entry barriers and high concentrations – an assessment the Commission already addressed under ‘High industry concentration and high entry barriers’.
\end{itemize}
directly relate to concentration.\textsuperscript{368} Contestability covers two additional aspects the Commission did not take into account: (i) the extent to which customers are willing to switch products is not altered by the merger, and (ii) in a market where customers are willing to switch products easily, even where a dominant company has not much more sales to gain from its competitors, it still has an incentive to innovate to protect its sales (absent entry barriers) – and other companies have the incentive to gain these sales. Contestability is not a function of market concentration.\textsuperscript{369}

If customers would be willing to switch but there are no alternatives, entry barriers are the main issue.

Where a market is contestable in the sense of consumer’s high willingness to switch to better products, and these better products can be protected by IPRs (high appropriability), the incentive to innovate remains high: the current market leader wants to protect its highly profitable sales, and new competitors can gain these sales – which is at the core of Schumpeter’s ‘creative distraction’. The market leader, even a monopolist, will invest in pre-emptive innovation if the cost for pre-emption is less than the profits it is likely to lose without innovation.\textsuperscript{370} And customers willing to easily switch to better products induce other companies to innovate to gain profitable sales from the leader. Although, even in a market with high appropriability and high contestability in the sense of customer’s high willingness to switch to better products (no or little imitation risk and no barrier from the customer side), the incentive to innovate for the incumbent company and the entrant will decrease if other entry barriers (e.g. assets, expertise, and capabilities) hinder new entries. Whether the entry barriers are high enough to prevail over the incentive to innovate coming from customers’ willingness to easily switch to new products, is case specific.

The lower the entry barrier for new companies is, and the more new competitors are expected to enter the market, the stronger is the incentive of an incumbent innovative company to accelerate its innovation activities.\textsuperscript{371} In markets with low entry barriers, companies spend significant parts

\begin{footnotes}
\item[368] Shapiro, 2012, page 365.
\item[369] Shapiro, 2012, page 381.
\item[370] Gilbert, Newbery, page 514; analysed for pre-emptive patenting.
\item[371] Scherrer, page 125.
\end{footnotes}
of their profit on innovation to prevent or be ahead of new entrants. The speed of innovation is greater in markets with low entry-barriers.

Even if contestability does not directly relate to the number of companies, the most apparent thing a merger does is that it reduces the number of companies by one. If the number of independent relevant innovators changes from many to many minus one, there are still many. If the merger would change the number from two to one, no competitor would remain and the resulting monopolist would have no competitive constraint – if high entry barriers are present. It could have a small but negligible incentive for cost saving process innovations to increase its margin or to be able to expand the market with better priced products. With decreasing entry barriers, the incentive to innovate to protect own profitable sales increases.

In a market with few companies, the harm a merger may have on the incentive to innovate also depends on factors such as if the merging innovators are close and active innovators; if many relevant innovators are present, this becomes less relevant. The number of relevant innovators after the merger gives an indication of the competitive constraints that still exist after the merger. The negative effect on the incentive to innovate is highest, if two active innovators with overlapping R&D lines merge (closeness), where only few relevant innovators are present.

If the two only innovators merge, innovation competition will be significantly impeded. How many independent companies in an innovation space or at industry level are needed to create enough competitive constraints on each other is also influenced by all the other factors assessed (see mainly IV.C.1 Structure of the assessment, and IV.C.2 Relevant factors of the innovation competition assessment in merger control) and difficult to generalize. For instance, the 4 to 3 merger of Bayer/Monsanto that followed the 5 to 4 merger of Dow/DuPont (at industry level) raised less innovation competition concerns. Nevertheless, the Commission identified innovation competition concerns where overlapping R&D activities existed and required divestments and commitments in areas of innovation where Bayer/Monsanto had overlapping R&D activities. As a rule of thumb, parties in innovative industries should expect the

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373 Dasgupta, Stiglitz, page 150.
Commission to raise innovation competition concerns if they have overlapping R&D lines or pipeline products.

Figure 3 gives a simplified overview of the effect contestability, entry barriers, and number of relevant innovators have on the incentive to innovate. If the comparison of the post-merger situation with the situation without a merger (the counterfactual) reveals that the merged party is located at a “low incentive to innovate” quadrant and the counterfactual would be located in a “high (or moderate) incentive to innovate” quadrant (for example ‘one’ relevant innovator compared to ‘few’ (two) relevant innovators), that is an indication that the merger significantly impedes effective innovation competition.

Figure 3. Simplified overview how contestability, entry barriers, and the number of relevant innovators influence the incentive to innovate

4. With high pre-merger appropriability, a merger does not further increase the incentive to innovate by increasing appropriability

Except in industries with already high appropriability thanks to strong IPRs, where a merger increases appropriability – by limiting unwanted spill-over of and imitation from innovation or in case process innovations can be used in larger scale/scope – an increase in appropriability increases the incentive to innovate post-merger. If appropriability is already high thanks to patent protected product innovations, a merger does not further increase the incentive to
innovate by increasing appropriability. If appropriability is already high pre-merger and only a few players can participate in innovation competition at industry level and in innovation spaces, and if entry barriers are high, a further increase in appropriability by the merger will not be enough to prevent divesture of one of the overlapping R&D activities or pipeline products as a remedy before a merger can be approved.
VII. Conclusion

Innovation is the main driver for economic growth and consumer welfare, and the aim to protect innovation in merger control is a legitimate goal. Unfortunately, economic research does not give a general answer whether a merger is good or bad for innovation, and a fact-intensive case-by-case analysis has to be performed. The assessment of a merger’s effects on innovation competition is much more difficult than the assessment of a merger’s static price effects.

The combination of complementary assets, skills, and knowledge through a merger can enable the merged party to perform innovation it would not be able to do absent the merger, or to fund innovation one merging party alone would not have been able to, or to accelerate and increase market access for new, innovative products. The combination of overlapping research lines and overlapping pipeline products may create efficiencies but also synergies in the sense of potential to reduce duplications. The combination will eliminate the competition between the merging parties in the overlapping innovation spaces, and the loss in rivalry will result in a loss of innovation competition, at least between the two merging parties.

Late pipeline products are assessed according to the HMG ‘potential competitor’ approach. The Commission’s new innovations competition assessment approach outlined in the Dow/Dupont decision extents the assessment to overlapping R&D lines and early pipeline products, and takes into account the R&D activities and innovation output of the parties and the industry. When two out of a limited number of innovators merge in a high-technology industry with high entry barriers, the Commission will most likely ask them to divest one of the two overlapping R&D lines or pipeline products. The divesture will be in a form that the divested unit can generate profits to sustain its long-term viability and continuous R&D efforts.376

Although there is no presumption that a merger decreases innovation competition, there are circumstances in which a merger is likely to reduce innovation competition. In high concentrated, innovation driven industries or innovations spaces where entry barriers are the issue, creating (or maintaining) a competitive force by requiring the divesture of overlapping R&D lines and pipeline products seems a reasonable approach to prevent the disappearance of an independent innovative competitor. Where high entry barriers exist, it is unlikely that a new

376 Competition Merger Brief, 2/2017, page 8.
entrant would be able to exert the same competitive constraint, if it is able to enter the scene at all. In that sense, the Commission helps a new entrant to enter the scene (the divestment remedy) who otherwise would not have been able to enter, and innovation competition remains at a similar level than without the merger.

The impact of the new innovation competition assessment in merger control will be most prominent in the high-technology industries. Telecommunications, biotechnology, agrochemicals, computer and computer software, medical equipment, electronics, aerospace, fine chemicals, pharmaceutical, and semi-conductor industries are examples of high-technology industries. However, I expect that the Commission will briefly scan mergers in any industry for overlapping R&D lines and overlapping products in developments (pipeline products), and if they find these overlaps, they will assess on a case-by-case basis if negative effects on innovation competition are likely to result from the merger. If high entry barriers are present and there are only few players who can participate in innovation competition, the merging parties should expect that the Commission requires them to divest the overlapping R&D lines and pipeline products.

In a high-technology environment with a rapid pace of technological development and global competition, also large firms may not have all necessary assets, expertise, capabilities, skills, and technologies to advance their innovation to a next level or to sustain their competitive position. Access to complementary technology, assets, and expertise is often an incentive in mergers with non-competitors (vertical and conglomerate mergers) and does not include the overlapping R&D lines and pipeline products at the focus of innovation competition concerns in EU merger control. The Commission did raise innovation competition concerns in non-horizontal mergers (Intel/McAfee merger and ARM/Giesecke & Devrient/Gemalto Joint Venture). These concerns were based on foreclosure issues, the main issue of non-horizontal mergers. Vertical and conglomerate mergers do, in general, not involve overlapping pipeline products and overlapping R&D lines. Vertical and conglomerate mergers in high-technology industries will therefore not be affected as much as horizontal mergers in high-technology industries from the new ‘Innovation Theory of Harm’ innovation competition assessment approach of the Commission.
VIII. Abstract

This thesis takes a close look at the assessment of innovation competition in EU merger control and discusses the underlying economic principles. Unlike price competition, innovation competition is a dynamic process where over time one innovation may succeed another innovation. Because innovation creates value and benefits for the customers and ultimately leads to economic growth and consumer welfare, assessment of innovation competition to ensure the continuing of innovation activities is important. Unfortunately, merger effects on innovation competition are complex, sometimes ambiguous, and seldom easy to assess. Two seemingly conflicting theories exist: Schumpeter’s theory of ‘creative destruction’ in which high concentrations levels, even a monopoly, does not unduly distort innovation competition, because the next innovator is already working on winning over the market with a new innovation. Arrow, on the other hand, argues that large companies would replace their own pre-innovation sales (the ‘replacement effect’). According to Arrow’s theory ‘competition spurs innovation’.

Despite all controversy, there are three common guiding principles for innovation competition assessment in mergers: appropriability, contestability, and synergies. Appropriability and contestability are about the incentive to innovate, synergies are about the ability to innovate. ‘Appropriability’ basically means that the innovator can protect his innovation from imitation while commercialising it. ‘Contestability’, in general, is about the willingness of customers to switch to better products and about market entry barriers for new entrants. The term ‘synergies’ is used in the sense of combining complementary assets and know-how.

In recent merger control cases, the EU competition authorities extended their innovation competition assessment from late pipeline products to early pipeline products, and ultimately to innovations spaces. They analysed the R&D effort and output of the merging parties and the industry as a whole. If the merging parties have overlapping R&D lines or pipeline products (close competitors) and operate in an innovation driven high-technology industry with high concentration levels and entry barriers, the Commission requires the divestiture of one of the overlapping R&D activities together with all the assets and personnel needed for the divested part to become a viable business, in order to maintain the competitive constraint that is lost if the merging parties reduce the combined effort in the overlapping R&D areas post-merger.
Resume

Markus Seiler

Markus Seiler was born on July 18, 1970 in Brig, Switzerland. Since several years he is working as Legal Counsel at Sensirion AG in Stäfa (Zurich Area), Switzerland. He has a master in law from the University of St. Gallen, Switzerland (M.A. HSG in Law) and gathered his first practical experiences in law as substitute at Rentsch Partner, Attorneys at Law and Patent Attorneys, Zurich. Markus Seiler has a diploma (master) in science with focus on biochemistry and biotechnology from the Swiss Federal Institute of Technology in Zurich, Switzerland (Dipl. Naturwissenschafter ETH) and a post-graduate degree in business administration from the Swiss Federal Institute of Technology (Dipl. NDS ETHZ in Betriebswissenschaften). Prior to his career and his studies in law, he worked for several years in pharmaceutical marketing and sales (Pfizer and Merck [MSD]) as Sales Representative, Product Manager, Marketing Manager, and Head Key Account Manager where he discovered his interest in business law.

Markus Seiler participates in the Course XXII / 2017 – 2018 Executive Master of European and International Business Law M.B.L. – HSG at the University of St. Gallen.
Statement

I hereby declare

- that I have written this paper without any help from others and without the use of documents and aids other than those stated above,

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