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Three Essays on Innovation Competition and Horizontal  
Mergers

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## **Three Essays on Innovation Competition and Horizontal Mergers**

Tese apresentada ao Programa de Pós-Graduação em Economia do Instituto de Economia da Universidade Federal do Rio de Janeiro como parte dos requisitos necessários à obtenção do título de Doutor em Economia.

Orientadora: Profa. Dra. Camila Cabral Pires-Alves

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Ao meu avô Ettore, o triatleta (*in memoriam*)

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## RESUMO

Os três ensaios desta tese discutem a concorrência em inovação em fusões horizontais, considerando os efeitos em inovação e as questões de inovação na avaliação. No primeiro ensaio discutimos um esquema para a escolha adequada do framework de análise para fusões em que há concorrência em inovação, debatendo, para cada situação: mecanismos para identificar a concorrência em inovação, para realizar a definição de mercado relevante, para avaliar a competitividade das empresas, identificação das teorias de dano apropriadas e evidências. Propomos então o framework das faces da concorrência em inovação, uma tipologia que considera as especificidades dos diferentes casos de concorrência em inovação e aplica o mecanismo de business-stealing effects e propõe a realização de uma avaliação de fusão baseada nas capacidades em algumas situações. No segundo ensaio, buscamos investigar como as autoridades de concorrência dos Estados Unidos e a Comissão Europeia consideram os efeitos negativos em inovação, no que diz respeito aos mecanismos, teorias de danos e evidências. Concluímos que ambas as jurisdições trabalham sob Guias de Fusão Horizontal focados na análise padrão com questões de inovação até certo ponto. No entanto, a prática também apresenta o uso de avaliações alternativas. O objetivo do terceiro ensaio é investigar se e em que medida o Controle de Fusões brasileiro, especificamente o Tribunal do CADE – a autoridade de concorrência brasileira – tratou de questões de inovação nos últimos anos (2015-2021), quando as autoridades dos EUA e, especialmente, Europa dedicaram esforços para alterar a sua avaliação dos casos de concorrência em inovação. Constatamos que a experiência brasileira é limitada, com apenas 20 casos (22,2%) sendo avaliados com questões de inovação, em que em apenas um caso foi aplicada uma avaliação específica de inovação e os outros dezenove foram avaliados exclusivamente sob a análise padrão.

Palavras-chave: Defesa da Concorrência, Fusões, Inovação, Capacidades, Estados Unidos, Comissão Europeia, Brasil, CADE

## ABSTRACT

The three essays in this dissertation discuss innovation competition in horizontal mergers, considering innovation effects and innovation concerns in the assessment. In the first essay we discuss a scheme for the proper choice of framework of analysis for mergers in which there is innovation competition, debating, for each situation: mechanisms to identify innovation competition, to undertake relevant market definition, to assess the competitive significance of firms, identification of the appropriate theories of harm and evidence. We then propose the faces of innovation competition framework, a typology which considers the specificities of the different innovation competition cases and applies the business-stealing effects mechanism and proposes undertaking a capabilities-based merger assessment in some situations. In the second essay, we aim to investigate at how US competition authorities and the European Commission consider negative innovation effects, regarding the mechanisms, theories of harm and evidence. We find that both jurisdictions work under Horizontal Merger Guidelines focused on the standard analysis with innovation concerns to some extent. However, practice presents the use of alternative assessments as well. The goal of the third essay is to investigate if and to what extent the Brazilian Merger Control, specifically the Tribunal of CADE – the Brazilian competition authority - addressed innovation concerns in the last few years (2015-2021), when the US and, specially, European authorities took efforts to change their assessment of innovation competition cases. We find that the Brazilian experience is limited, with only 20 cases (22.2%) being assessed with innovation concerns, in which in only one case an innovation-specific assessment was applied and the other nineteen were assessed exclusively under the standard analysis.

Keywords: Competition Policy, Mergers, Innovation, Capabilities, United States, European Commission, Brazil, CADE



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## INTRODUCTION

Competition policy is a fundamental institution in capitalist societies, a tool designed to protect welfare by fighting the abusive exercise of market power. Higher prices, less variety or quality of products are examples of manifestations of such exercise, as well as less innovation. Although all these ways in which market power may be harmful should be addressed, one is particularly meaningful. Innovation is the engine of economic development, a process over which the economic structure endogenously changes and allow consumers to access better and cheaper products. However, despite its importance, competition authorities, government institutions embodied with this task, seem to be primarily concerned about short run increase in prices. Before digging further in the reasons for this focus, we may present briefly how competition authorities work.

Competition agencies act horizontally (mostly without any sectors being exempted) by directly punishing the abusive exercise of market power - referred as anticompetitive practices - and by preventing it through merger control. While the first branch of competition policy is naturally grounded in an *ex post* analysis, assessing mergers is an *ex ante* exercise to avoid that post-merger increases in concentration harm competition and welfare. As any *ex ante* assessment, there is an unavoidable degree of speculation in merger control, but the theoretical foundations of competition policy provide the authorities tools to undertake this analysis.

Merger assessment is undertaken in most jurisdictions following the post-Chicago paradigm. Authorities apply a well-defined procedure, grounded in economic theory, to assess whether that specific merger could harm welfare. Even though such harm - also known as anticompetitive effects - may be considered not only through price increases, but also through other variables, short run price effects are largely considered the best representation of those effects. The important role of that specific type of effect can be assigned to the use of static allocative efficiency as the main goal for competition policy (Budzinski, 2008). Although higher prices are responsible for reductions in welfare in a static analysis, if we consider how welfare may be affected in longer time horizon, another effect plays an important role.

Following Schumpeter (1942), innovation is the active and dynamic side of competition, while price competition is the passive and static side of this process. The post-Chicago paradigm merger assessment is largely focused on price competition and such assessment may be inadequate when the parties involved in a merger engage in competition through innovation, henceforth named as innovation competition. Furthermore, the use of static allocative efficiency as the criteria for the impacts of merger in welfare, is naturally incompatible with innovation competition, a dynamic and forward-looking process (Budzinski, 2008).

Given the importance of innovation competition, post-merger reductions in innovation may be regarded as a particularly harmful merger effect. Considering innovation effects specifically as post-merger reductions in innovation incentives, authorities need to act to avoid such effects and protect the active and dynamic side of competition, responsible for changes in economic structure and development. However, given the inherent uncertainty of the outcomes of innovation and its diverse and heterogeneous characteristics, assessing innovation effects may not be clear-cut as price effects. Naturally, the traditional price competition-oriented merger assessment may be insufficient for such task.

Some questions may arise at this point. Is the standard, post-Chicago, analysis adequate to assess innovation effects? If yes, is it adequate to all innovation competition cases? If not, is there an alternative analysis? How have jurisdictions assessed such cases? Do they consider innovation effects? These are some, but not all, of the questions which will be addressed in this dissertation.

Before we start addressing these issues, we need to present how this work is structured: as three independent essays, designed to both be read as autonomous pieces of research and be complementary in the larger objective of discussing the assessment of innovation effects in horizontal mergers.

Proposing a framework for assessing these mergers is the main goal for the first of the three essays. After reviewing the literature on competition policy and innovation, we propose using of the business-stealing effects mechanism – the innovation incentives generated by the perspective of losing sales to a successful innovator (Federico, Scott Morton & Shapiro, 2020, p. 128) - to identify the different patterns of innovation

competition. As a result, we propose the faces of innovation competition typology, which considers the specificities of how innovation competition unfolds in each case, discussing if and how the traditional step-by-step procedure is applicable to each of these categories. Gilbert & Sunshine (1995), Katz & Shelanski (2007), Sidak & Teece (2009) and Kerber (2017), who propose looking at the firms' capabilities in different steps in merger procedure, are important references. Some gaps are identified for this framework and the use of elements taken from the resource-based view – inspired by Edith Penrose's contributions – and evolutionary approach is suggested. Also, departing from short-run price effects, we consider that innovation effects should be considered dynamically, from a short to a long- and unforeseeable-time horizon. As we could show by the typology and framework designed in the paper, the relevance of those elements, and if they act in a complementary or alternative way, is highly dependent on how innovation competition works in the market and how the merger potentially affects it.

After diving into the theoretical aspects of the assessment of innovation competition and proposing a framework for merger control in the first essay, the second one turns the attention to the US and European experiences. Specifically, we look at how both US competition authorities – the Federal Trade Commission (FTC) and the Antitrust Division of the Department of Justice (DoJ) – and the European Commission consider negative innovation effects. The choice of these jurisdictions is justified by their attempts in looking at innovation concerns: as we discuss, they gradually change their procedures to account for innovation. On one hand, the two jurisdictions work under Horizontal Merger Guidelines focused on the standard analysis, although with innovation concerns to some extent. On the other hand, practice shows the use of alternative assessments as well. The main goal of the paper is to discuss how the assessment of negative innovation effect is undertaken by these agencies regarding the mechanisms, theories of harm and evidence. We discuss how their procedures connect to the literature and present recent case studies to bring recommendations.

In the first two essays we discuss both the theoretical background and practical experience in the assessment of innovation competition in horizontal mergers. With these discussions in mind, we look at the Brazilian jurisdiction in the third and final essay. The main goal is to investigate if and to what extent the Brazilian competition authority – the Administrative Council of Economic Defense (CADE) – assessed innovation concerns in

merger control in the last few years (2015-2021), a period in which the US and, specially, European authorities undertook efforts to change their assessment of innovation competition cases. We consider as innovation concerns: (i) cases assessed under the standard analysis (focused on product market competition) in which innovation issues are relevant for the assessment of innovation and other unilateral effects (mostly prices); and (ii) cases assessed under an alternative procedure (“innovation-specific assessment”). After discussing the Brazilian institutional framework in general, we look at the Brazilian Merger Guidelines (2016) and find that it follows international patterns and focuses on the standard analysis, presenting innovation concerns in only a few steps, as its US and EU counterparts. We then explore all mergers assessed between 2015 and November 2021 by CADE’s Tribunal - a administrative body within which makes the final decision. We investigate all the relevant and formal documents (Reports, Technical Notes and Commissioners’ votes) produced during the case investigation. We not only look at how often CADE addresses innovation concerns but also in which steps of the assessment innovation plays a role. We find that in only 20 cases (22.2%) assessed by the Tribunal, innovation concerns were looked into. Furthermore, in only one case an innovation-specific assessment was applied, while the other nineteen cases were assessed exclusively through the standard analysis.

Finally, the different goals of the three essays can be summarized in two which run through all of them: advancing in the discussion of the assessment of innovation effects in horizontal merges and providing recommendations. Without aiming to provide the final call on any of the many topics addressed, we hope to take a step forward.



## **I. THREE FACES OF INNOVATION COMPETITION IN HORIZONTAL MERGERS: CHOOSING THE FRAMEWORK FOR COMPETITION POLICY ASSESSMENT**

**Abstract:** This article discusses the assessment of horizontal mergers and harm to innovation when there is innovation competition. The goal is to build a scheme for the proper choice of the framework of analysis, presenting, for each situation: mechanisms to identify innovation competition, to undertake relevant market definition, to assess the competitive significance of firms, identification of the appropriate theories of harm and evidence. We review the literature on Competition Policy and on Economics of Innovation and take examples from the US and European case law. We also briefly discuss the strategic management literature to provide insights for the assessment. Considering post-merger reductions on innovation incentives as harm to innovation, we find differences of traditional merger procedure adequacy and challenges to build evidence, considering three faces of innovation, including possible combinations of these faces within a same merger case: (i) continuous innovation efforts in the product market, (ii) ongoing efforts for developing new products and (iii) future innovation efforts. When the traditional merger procedure is inadequate, we argue in favor of using a capabilities-based assessment. Given the gaps found in the existing literature, we provide insights to the analysis as steps towards an agenda of capabilities-based merger assessment.

**Keywords:** Competition Policy, Mergers, Innovation, Capabilities

**JEL:** L40

**Resumo:** Este artigo discute a avaliação de fusões horizontais e dano à inovação quando há concorrência em inovação. O objetivo é construir um esquema para a escolha adequada do *framework* de análise, apresentando, para cada situação: mecanismos para identificar concorrência em inovação, para definir mercado relevante e avaliação da competitividade das firmas, identificação das teorias de dano adequadas e evidências. Revisamos a literatura sobre Política de Defesa da Concorrência e Economia da Inovação e utilizamos exemplos da jurisprudência dos EUA e da Europa. Discutimos também brevemente a

literatura de gestão estratégica para fornecer insights para a avaliação. Considerando as reduções pós-fusão nos incentivos a inovar como dano à inovação, encontramos diferenças quanto à adequação do passo-a-passo tradicional e desafios para construir evidências considerando três faces da concorrência por inovação, incluindo possíveis combinações destas faces em um mesmo caso de fusão: (i) esforços de inovação contínuos no mercado de produto, (ii) esforços em andamento para desenvolver novos produtos e (iii) esforços de inovação futuros. Quando o passo-a-passo tradicional é inadequado, argumentamos em favor do uso de uma avaliação de fusões baseada nas capacidades. Considerando as lacunas encontradas na literatura existente, trazemos insights para a análise como passos no sentido de uma agenda de avaliação de fusões baseada nas capacidades.

**Palavras-chave: Defesa da Concorrência, Fusões, Inovação, Capacidades**

## 1. Introduction

Preserving post-merger innovation is a relevant concern for competition policy.<sup>1</sup> Even though the proper assessment of the effects of mergers on innovation is intuitively important, the debate on the potential negative effects of mergers on innovation is still open and the authorities have not reached a consistent and consensual approach.

In the USA, as pointed by Kerber & Kern (2014, pp. 24-32), assessing innovation effects in mergers is a well-established but inconsistent practice, although it does not mean that the subject was ignored. In 34% of the cases in 1995-2008 innovation aspects were mentioned either in relevant market definition or competitive assessment.<sup>2</sup> The inconsistency, as argued by the authors, lies on the conclusion that despite the number of cases in which innovation concerns were raised, in most of them there was no specific reasoning for the alleged effects on innovation, as it is just mentioned.<sup>3</sup>

These inconsistencies may be partially explained by the fact that the conventional approach, and the competitive model generally applied in merger review considers static analysis and price effect as the main representation of merger impacts on markets, influencing the views and interpretations applied to merger analysis' procedures (such as relevant market definition, barriers to entry, anticompetitive effects, among others).

However, there are markets in which competition occurs through different variables, such as innovation, and the conventional approach is inadequate to assess such cases in some (but not all) situations (Budzinski, 2008). Following Schumpeter's seminal ideas (Schumpeter, 1942), in some industries, competition occurs mostly through innovation, dynamically, and in an active, instead of passive, way. By definition, innovation effects<sup>4</sup> are possible outcomes of mergers on innovation when there is

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<sup>1</sup> Diminishing innovation is regarded as a possible harm resulting from horizontal mergers in different jurisdictions, such as in the USA, European Commission and Brazil (Department of Justice & Federal Trade Commission, 2010, p. 2; European Commission, 2004b, p. 5; CADE, 2016a, p. 8).

<sup>2</sup> Considering both the US Antitrust Agencies: The Federal Trade Commission (FTC) and the Antitrust Division of the Department of Justice (DoJ). Gilbert & Greene (2015) make a similar study for 2004-2014 and find similar results (33.6%).

<sup>3</sup> Gilbert & Greene (2015, p. 1941-1942) also find that among the cases in which there are innovation concerns, the effects on innovation are discussed and not only mentioned between 46% and 58% of the cases (depending on the level of R&D intensity) in the USA.

<sup>4</sup> Innovation effects are possible reductions or increases on innovation as a result of mergers.

innovation competition, i.e., firms compete through innovation efforts to bring new or improved goods or services to the market as well as better production processes to both capture away and protect sales from each other (the active side of competition in a Schumpeterian view) (Federico, 2017, p.671). It is important to notice that firms which compete through innovation often compete simultaneously on other variables as well, such as prices and quantity. Negative innovation effects (innovation harm) occur through the lessening of innovation incentives and reduction of parallel innovation efforts.<sup>5</sup> The understanding of how mergers change the incentives to innovate is the main call on the literature – represented by the contributions of the contestability, appropriability, and synergies principles in Shapiro (2012), the typologies of cases where these effects are applied in Baker (2007), and the internalization of a “business-stealing effect”, in Federico, Scott Morton & Shapiro (2020).

As we will discuss in this paper, the conventional approach to merger procedure may be applied to some innovation competition cases with minor changes, but not all. Given the inadequacy of the conventional approach to merger analysis in some cases, authors like Gilbert & Sunshine (1995), Katz & Shelanski (2007), Sidak & Teece (2009) and Kerber (2017) call for the application of an alternative assessment, changes in the conventional merger procedure to adapt it to innovation competition markets, suggesting an assessment based mainly in the firms’ capabilities to innovate. For these authors, the capabilities of the firms should be considered in relevant market definition and in the assessment of competitive significance as a better way to identify competitors and as proxies of the firms’ ability to innovate.

In the practical side, despite the inconsistent assessment of innovation in the US case law mentioned above, there are some advances towards the consideration of

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<sup>5</sup> The maintenance of distinct parallel innovation paths is fundamental for keeping the role of the market as the selector of the most successful innovator and for the welfare of consumers. As the results of innovation are uncertain, the higher the number of innovation paths, the higher the chance that any of them reaches the market. Besides, according to Farrell (2006), diversity of approaches is a benefit of competition in itself and should be protected by the authorities. So, mergers may harm innovation also through the reduction in parallel innovation efforts. This argument comes from the evolutionary approach and may be known as the Diversity Argument (Jorde & Teece, 1990; Farrell, 2006; Sidak & Teece, 2009). This effect is also present in the rationalization effect in OECD (2018, p. 9) (one of the effects of a merger on innovation): the elimination of duplicative spending on innovation is responsible for enabling the firm to redirect innovation efforts on one hand but reduces the likelihood of that at least one innovation project reaches the market due to fewer parallel innovation efforts. Kerber & Kern (2014) find out that among the cases challenged with innovation aspects (between 1995-2008), in 33% of them there was a discussion of the effects of mergers on innovation incentives and in 7% of there were diversity arguments.

innovation aspects in the merger procedures for innovative markets can be observed since mid-1990s with the introduction of the innovation market concept and innovation effects in the agency guidelines<sup>6</sup>. The latest version of the Horizontal Merger Guidelines (2010) also explicitly states procedures for the assessment of innovation effects (Department of Justice & Federal Trade Commission, 2010, pp. 24-31). The European Commission also moved towards the assessment of innovation effects in the past few decades.<sup>7</sup> Recently, the Dow/Dupont merger (2017)<sup>8</sup> presented a significantly different approach called by Denicolò & Polo (2018) as the Innovation Theory of Harm (IToH) (Petit, 2017; Denicolò & Polo, 2018) and later called as the four-layer competitive assessment by the European Commission<sup>9</sup> and indicated concerns about harm to innovation in early steps of product development and in the incentives to undertake future innovation efforts.<sup>10</sup>

This paper's central goal is to build a scheme for the proper choice of analytical framework to be applied to the assessment of horizontal mergers<sup>11</sup> in which there is innovation competition, focusing on understanding the possible theories of harm, the different ways that innovation competition may occur – the faces of innovation competition - and their consequences to the analysis in each case. We assume that the likelihood (or potential) negative innovation effects should be addressed both when traditional and innovation competition are at stake simultaneously and when there is only innovation competition. Furthermore, we also assume that protecting innovation incentives is a key attribution of competition policy, as negative innovation effects are likely to harm consumers and the competitive process itself, and that it needs to assess the different time horizons in which innovation effects occur, considering short and long-term impacts of mergers. Although we recognize that innovation-related efficiencies – the procompetitive side of merger - should be addressed to have a complete picture of the

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<sup>6</sup> The 1992 Merger Guidelines presents the first dynamic aspects to merger assessment, with the relativization of market-shares when innovation is at stake. While the 1995 version of the Antitrust Guidelines for the Licensing of Intellectual Property describes the R&D market in a similar way to what Gilbert & Sunshine (1995) proposed, the Innovation Market Analysis (IMA) (Kerber & Kern, 2014).

<sup>7</sup> Petit (2018b) discusses the evolution of the assessment of innovation effects in the EU merger case law.

<sup>8</sup> Case COMP/M.7932 (2017).

<sup>9</sup> The four-layer competitive assessment consists in assessing a merger according to: (i) price/product competition between incumbent products; (ii) price/product competition between late-stage pipeline products; (iii) innovation competition between pipeline products in earlier stages; and (iv) innovation competition related to capabilities to innovate in certain innovation spaces (European Commission, 2020, p.5-6). The concept of innovation spaces will be further discussed in section 4.

<sup>10</sup> Bayer/Monsanto (2018, Case COMP/M.8084) is also assessed under a similar framework, confirming the shift in European merger control.

<sup>11</sup> Non-horizontal innovation concerns are also important but are not in the scope of this paper.

overall effect on innovation of each case, we focus on looking on negative innovation effects in this paper.

To achieve our goals, we review the literature in competition policy and innovation mainly for merger effects on incentives to innovate and the contributions to innovation market definition and competitive assessment, including the ones referenced above. Two important gaps are identified. First, the literature is not organized in a way that provides a framework to the authorities towards considering which innovation effects need to be investigated in merger cases, as well as which type of assessment and theories of harm need to be applied to properly protect innovation. To address this gap, the paper systematizes the literature and proposes the faces of innovation competition typology of cases where innovation effects need to be investigated - (i) continuous innovation efforts in the product market, (ii) ongoing efforts for developing new products and (iii) future innovation efforts - and discusses the adequate merger procedure, specific assessments and type of evidence for each case, as an extension of the typologies proposed by Baker (2007), Katz & Shelanski (2007), Federico, Scott Morton & Shapiro (2020). As we show, these cases are not mutually exclusive and can be assessed in the same merger analysis. We identify that while in some situations the conventional approach properly analyzes harm to innovation with minor changes, in others a different assessment is needed. The second gap is related to the assessment of the latter, as we identify to be the case when innovation efforts are not close to market launch and when there is innovation competition through future innovation efforts. We argue that the capabilities-based assessment is a relevant framework for these situations, connected with the propositions of Gilbert & Sunshine (1995), Katz & Shelanski (2007), Sidak & Teece (2009), Kerber (2017). When reviewing the literature in the capabilities-based assessment, we find the need to develop the approach further, namely the relevant market definition and the assessment of competitive significance and take contributions from the strategic management literature that follows the resource-based approach, which provides important insights, especially to the analysis of cases in which there is no well-structured R&D process and when it regards future innovation efforts. These insights help identify firms that can viably engage in competing innovation efforts, therefore exerting the necessary competitive pressure to be considered as competitors in an innovation market. This effort looks into an alternative theory of the firm to understand the capabilities to innovate, as an attempt to go further

in the practical side of the capabilities-based assessment proposition without claiming to exhaust this challenge and relevant subject.

At the end, we point out not only how to identify the faces of innovation competition that may be applied to each merger case and the appropriate assessment for each situation, but present analytical elements to undertake such assessment, such as relevant market definition, the assessment of competitive significance and how the merger affects innovation incentives, including theories of harm and possible evidence, for each case. Cases are used to exemplify along the text.

Three methodological choices are important to be noted before we proceed. First, product innovation is the focus of our analysis, more specifically, innovation that creates new or improved products, even though process innovation is an important topic of discussion. Second, it is also important to acknowledge that improved products are higher quality versions of existing products which emerge from innovation efforts dedicated to generating vertical differentiation.<sup>12</sup> Third, by assuming that R&D spending is not the only necessary input to bring innovation to the market and that its importance to innovation varies between sectors, but by knowing its advantage of being much simpler, we will follow the literature and use R&D efforts and their developments (pipelines) when referring to innovation efforts, in some situations, but will also offer alternatives for assessing cases in which innovation does not occur through pipeline phases.

This paper is structured as follows: section 2 discusses relevant market definition and the assessment of competitive significance both in traditional and innovation competition, presenting the conventional approach to merger assessment, its features and limitations when applied to innovation competition, as well as presenting an alternative approach, the capabilities-based assessment. Section 3 debates innovation incentives and theories of harm to innovation, emphasizing the role of business-stealing effects in identifying possible negative effects to innovation through reductions on innovation incentives. Section 4 presents the faces of innovation competition, discussing its features, type of assessment, specificities on how merger affects innovation incentives, the theories of harm and evidences, while using cases to exemplify. The Section 5 deepens on the

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<sup>12</sup> Another type of product differentiation is horizontal differentiation, which occurs when the different products cannot be ranked in terms of quality (e.g., a different flavor of ice cream, or even a different color of a bag, etc.).

capabilities-based assessment, providing insights taken from strategic management literature and from an alternative theory of the firm to fill gaps identified throughout the text and discusses the challenges of practical application. The final section presents the proposed scheme and the concluding remarks.

## **2. Traditional and innovation competition: relevant market definition and the assessment of competitive significance**

The assumptions about how competition works interfere in an agency's concerns about a merger effect and its decision. When it comes to the real-world practice some of the theoretical basis and models may not be a good representation of the market. This is the case when innovation is an important attribute or even the driving force of competition. This section is devoted to briefly discussing both traditional competition and innovation competition views, how the post-Chicago<sup>13</sup> (henceforth called "conventional approach") assesses such cases and its limitations when addressing the latter.

### **2.1. The traditional competition and conventional approach to merger analysis**

When undertaking merger analysis of traditional competition cases, the competition authority assess competition that occurs within a product market (which is not necessarily the case when discussing innovation competition). The assessment counterbalances the potential anticompetitive effects and countervailing efficiencies. In other words, if the net effect of a merger in consumer's welfare is negative<sup>14</sup>, the competition authority will approve it subject to remedies<sup>15</sup> or even block the entire merger. The fundamental questions that arise are: what are the likely effects of a merger

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<sup>13</sup> The post-Chicago paradigm, which is the basis for competition policy analysis in most jurisdictions contains influences from the Harvard and Chicago Schools. For more on this debate, see Budzinski (2008, p. 298-301).

<sup>14</sup> See Motta (2004).

<sup>15</sup> Competition policy remedies are conditions imposed by the authority to approve a merger.



and how to assess them? To answer that, we must bear in mind that preserving welfare is the goal of competition policy. And to achieve it, authorities pursue economic efficiency to avoid consumer welfare losses.

The concept of static economic efficiency can be divided into different concepts, the most well-known being productive and allocative efficiency (Motta, 2004; Price & Walker, 2016, p. 475). The first one is achieved when the use of inputs is at the optimal level for a given output. The second one is achieved when there is no deadweight loss, i.e., when price is at competitive levels. Increases in prices represent allocative inefficiencies and reduce consumer welfare. If prices are alleged to be higher after the merger due to the increase in market power derived by the operation, the latter is considered to be anticompetitive. The price increases may occur unilaterally or in a coordinated basis, considering horizontal mergers. The changes in the short run price are then considered usually as the main variable to represent merger effects by the conventional approach, despite also considering a variety of goals, such as product quality and innovation.<sup>16</sup>

The conventional approach presents a well-defined merger procedure to be taken before deciding about the merger potential effect, including: (i) relevant market definition; (ii) measurement of market shares and market concentration (indicating the existence and increase of market power, but also the competitive significance of the merging parties and their rivals); (iii) assessment on the likelihood of anticompetitive effects (unilaterally and/or through coordinated behavior); (iv) entry and buying power; (iv) evaluation of possible countervailing efficiencies (European Commission, 2004b; Department of Justice & Federal Trade Commission, 2010).

In the conventional approach, the relevant market is the *locus* of competition, and to define it, the authorities delimitate its product and geographical dimensions.<sup>17</sup> After defining the relevant market, authorities usually assess market shares and market concentration as a screening part of the analysis to indicate the competitive significance of the merging parties and the direct effect of the merger on concentration (European

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<sup>16</sup> Other possible mergers effects are reductions in output and choice. (European Commission, 2004b, p. 5).

<sup>17</sup> The most common method to define the relevant market is the Hypothetical Monopolist Test (HMT). If the hypothetical monopolist can implement a small but significant non-transitory increase in price (SSNIP) in a profitable way, the market is well defined (Department of Justice & Federal Trade Commission, 2010, p. 7-15).

Commission, 2004b, p. 6-7; Department of Justice & Federal Trade Commission, 2010, p. 15-19). In cases in which there is traditional competition, concentration and market share are used as indicatives of firms' incentive to raise prices (decrease quantity, or lower quality) and of their ability to compete. Larger firms may be less willing to decrease prices or increase quality of all their costumers to attract new customers. Also, larger market shares may represent advantages on cost or more attractive products in other attributes than price (Department of Justice & Federal Trade Commission, 2010, p. 15-19). However, this relation is weakened when products are differentiated, in which substitutability between merging parties' products or brands, diversion ratios and markups of diverted sales may be more relevant as screening to potential price increase pressures than the resulting market share and concentration index.<sup>18, 19</sup> Rivalry and entry conditions are also investigated among other to access the likelihood of anticompetitive effects. Also, countervailing efficiencies are considered to the final conclusion about the overall price effect. To estimate the potential effects on prices, many different quantitative tools may be used, if necessary, most considering the assumptions of the classic oligopoly models (Bertrand or Cournot competition). Furthermore, the usual approach mostly considers short-run price effects, and that competition occurs within the product market.

## **2.2. Innovation competition, conventional approach limitations and the capabilities approach**

The use of the conventional approach to merger assessment may overshadow other possible merger effects, such as innovation. The role of innovation in the competitive process is best described by Schumpeter (1942), who understood competition as being a dynamic process centered on innovation. For the author's conception, there is an active dimension of competition, in which new opportunities to innovate are sought

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<sup>18</sup> Unlike the case of homogeneous products, in which there is a direct connection between market power and shares derived from the Cournot model and the HHI, when there are differentiated products, diverted sales are a better indicative of these effects (Department of Justice & Federal Trade Commission, 2010, p. 21). Furthermore, UPP and GUPPI models (which measure unilateral incentives to raise prices and are derived from the Bertrand model) are frequently considered as better filters for the potential effect on price imposed by the merger (Farrell & Shapiro, 2010a, p. 3-6).

<sup>19</sup> Also, in rapidly changing markets, market-shares can be volatile, as sales can be highly contestable by possible future entrants.

and created and the firm always seeks to differentiate itself so that it can obtain monopoly gains. Unlike the passive price dimension of competition, Schumpeter argues that this is not a stationary process as in perfect competition - it is a process of changing the economic structure endogenously, the Process of Creative Destruction (Schumpeter, 1942). Furthermore, the Schumpeterian Competition framework understands that the competitive process permanently generates diversity and changes to market structure, and that competition occurs through different variables, so that price is just one of them, other ones being product differentiation and, specially, innovation (Schumpeter, 2008, p. 81-86; Sidak & Teece, 2009, p. 40-41). This last form of competition, in which firms compete to bring new or improved products or processes, is called innovation competition.<sup>20</sup> It is important to notice that while traditional competition occurs necessarily only within a product market, innovation competition occurs whenever firms compete through innovation efforts, being product market competitors (or within a product market), or not.

Innovation competition is at stake in different situations, and the possible different faces that it can assume is further discussed in section 4. For now, we can think of two hypothetical examples. In the first one, firms compete in the product market through prices or quantities while engaging on innovation efforts to improve its product to capture sales from its competitors (incremental innovation). In the second example, firms are engaging in a race through innovation efforts to develop new products which will be competitors in a still non-existent product market and their pipeline projects are not close to market launch. In the first case, innovation competition occurs simultaneously with traditional competition (or within a product market), while in the second one competition occurs mostly in the innovation dimension, while creating a new product/market.

These examples may be subject to innovation effects, although they have important differences. The first difference is the type of the innovation activity engaged by firms. We are considering as incremental (product) innovation all innovation activities

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<sup>20</sup> Schumpeter considers the active side of competition as the "...competition for the new commodity, the new technology, the new source of supply, the new type of organization..." (Schumpeter, 2008, p. 84). We consider a definition of innovation competition in the same direction as Schumpeter pointed out. Considering a more recent approach, we follow Federico (2017, p. 671) who sees innovation competition as a process of rivalry through innovation efforts to bring new or improved goods or services to the market as well as better production processes to both capture away and protect sales from each other.

that does not create a new product/market (disruptive). The second difference is related to the adequacy of the conventional approach to merger procedure.

The second example certainly needs a different approach, starting from the first step: relevant market definition. The product dimension of a relevant market definition is a process to identify all goods or services considered close substitutes. However, in our second hypothetical situation, there is no product market yet, so a SSNIP would be unfeasible. Besides, an important characteristic of innovation is the uncertainty regarding future outcomes of innovation efforts: it is impossible to determine whether pipeline projects will be launched (except in close-to-market pipeline projects) and, therefore, whether firms will actually compete in the product market.<sup>21</sup> A preliminary conclusion is that traditional relevant market definition may be unfeasible in some innovation competition cases. However, the conventional merger procedure can be applied to the first example when it comes to relevant market definition, just as it is for traditional competition with differentiated products. In these cases, competition occurs within a product market, so the Hypothetical Monopolist Test can be undertaken as there is price competition, and the product and geographical dimensions can be defined.

Moving to the discussion of the assessment of competitive significance, there will be differences in both examples. When innovation competition is at stake, firm's shares will not provide an indicative of the competitors' significance, incentive, and ability to innovate. In our first hypothetical example, there is traditional competition, but as argued in the last subsection, diversion ratios and markups of diverted sales are better indicators of competitive significance when firms compete through differentiated products. Furthermore, price should not be the only variable to measure merger effects, as reductions in incremental innovation efforts harms consumers. In the second example presented, the fact that the product market is still non-existent reinforces the inadequacy of current sales as indicators of competitive significance and price effects are not considered as well. Actually, the use of shares as proxies of the firms' ability to exercise market power reflects a view of a static competitive environment, represented as the ability of fixing a price above marginal cost. The nature of competition in these markets

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<sup>21</sup> As argued by Jorde & Teece (1990), Gilbert & Sunshine (1995), Katz & Shelanski (2007), Sidak & Teece (2009). Furthermore, sometimes it is also complex to determine the geographical dimension: there are virtually no transportation costs related to the licensing of the use of intellectual property, which does not influence the geographical dimension of the market.

is dynamic, as the future introduction of new products and processes makes a firm successful, not only its current sales and prices (Katz & Shelanski, 2007; Sidak & Teece, 2009; Shapiro, 2012; Kerber, 2017).

Some literature contribution is devoted to discussing the use of an alternative relevant market definition when the conventional market definition and assessment of competitive significance is inadequate and innovation competition is at stake. Gilbert & Sunshine (1995), Katz and Shelanski (2007), Sidak & Teece (2009) and Kerber (2017) suggest the use of a capabilities approach, i.e., both a capabilities-based market definition and competitive assessment. Regarding the market definition, these authors argue that markets should be defined by the skills in innovating and not by their products and, in the case of Sidak & Teece, they propose: (i) the use of the capabilities to innovate (and managerial) in market definition; and (ii) an increase in the importance relegated to potential competition. Analyzing capabilities of current and potential competitors can be done using literature in the field of strategic management and through the analysis of the firm's R&D activities (Sidak & Teece, 2009, p. 36).

An early contribution to the assessment of innovation competition mergers which employ the use of capabilities is the Innovation Market Analysis (Gilbert & Sunshine, 1995). The IMA considers that relevant markets, called as innovation markets in this case, should be defined by looking at the overlapping R&D activities, i.e., directed to specific new products or processes, and at alternative sources of R&D, including firms which could acquire the necessary assets for R&D in a short period of time. After identifying competitors, the authorities need to check if the firms have the necessary capabilities and incentives to slowdown or interrupt R&D efforts to consider the merger effects on innovation. The influence of the IMA can be identified in the 1995 version of the Antitrust Guidelines for the Licensing of Intellectual Property, in which innovation markets are defined in a similar way to what Gilbert & Sunshine proposed (Kerber & Kern, 2014, p. 36). For the purpose of this paper, we follow a similar innovation market definition in cases which demand a capabilities-based assessment, although with important differences which will be discussed further ahead.

Despite the criticism<sup>22</sup>, Gilbert & Sunshine were careful to recommend the use of the IMA in cases in which the R&D efforts are developed enough to make the effects of the introduction of the new product or process in the product market predictable. The framework proposed by the authors is destined to assess the effect of mergers on overlapping ongoing innovation efforts. On one hand, it provides important insights regarding the identification of competitors to such innovation efforts but focuses only on firms which are undertaking such efforts. On the other hand, the assessment of competitive significance proposed by the IMA includes an analysis of the concentration in R&D, as it would be a proxy of the ability of the merged entity to compete in that innovation market, but R&D expenditures do not have a clear relation with innovation outcomes (Rapp, 1995, p.33-36). Therefore, concentration in R&D is not an adequate measure for the ability of a firm to bring innovations to the market.

### **3. Innovation Incentives and harm to innovation**

Adopting a proper framework regarding relevant market definition and assessing competitive significance are important first steps in assessing mergers effects, as authorities need to ensure that their assessment is capturing all possible sources of competitive pressure faced by the merging parties. Yet the agency needs to assess the likelihood of potential harm to competition. We will focus in one effect in particular: the potential merger effect on innovation, by examining how it may alter the incentives to innovate of the merging firms.

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<sup>22</sup> Katz & Shelanski (2007) and Kerber & Kern (2014) list some of the critics over the IMA: arguments that the analysis of potential competition is enough to assess innovation effects (Hay, 1995; Rapp, 1995) or the use of the future goods market analysis (Bernard, 2011), the presumption of negative merger effects on innovation even though there is no clear linkage of the effects of market structure on innovation (Hay, 1995, Rapp, 1995, Davis, 2003), a possible decline in predictability of enforcement (Carlton, 1995) and the lack of legal basis to base decisions in the effects on variables other than prices (Hoerner, 1995; Davis, 2003).

### 3.1. Concentration and Innovation

The discussion on the effects of mergers on innovation incentives is present in the debate on the effects of firm size and concentration on innovation. This topic has several contributions arguing in favor of different positions and no final conclusion. In 1942, Schumpeter writes ‘Capitalism, Socialism and Democracy’ and presents his views on the process of innovation, emphasizing the role of the large company and more concentrated markets in promoting innovation, the so-called Schumpeterian Hypotheses.<sup>23</sup>

The Schumpeterian view is frequently seen as opposite to the model proposed by Arrow (1962). Arrow, assuming an appropriability regime of perfect patent protection, compares the extreme situations of perfect competition and monopoly and concludes that incentives to innovate are higher in the competitive situation due to the so-called replacement effect (investment in R&D by the monopolist would result in cannibalization of at least a part of the firm’s profit) (Gilbert, 2006, p. 165-166). Finally, the controversy between Arrow and Schumpeter is centered in one question: which market structure promote greater incentives to innovate?

There are numerous theoretical and empirical contributions to this debate, such as the patent race literature,<sup>24</sup> and the hypothesis presented by Scherer (1965) in which concentration and innovation would have an inverted U relation: higher levels of concentration generate increases on innovation up to a certain level and further rises in concentration would mean reductions on innovation.<sup>25</sup>

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<sup>23</sup> In 1912, Schumpeter publishes ‘The Theory of Economic Development’ emphasizing the role of the entrepreneur in introducing innovations, which is known as Schumpeter Mark I. In 1942, he considers big business as the engine of innovation, in ‘Capitalism, Socialism and Democracy’, considered as Schumpeter Mark II (Malerba, 2007, p. 345).

<sup>24</sup> Which assumes perfect patent protection and winner-take-all markets, as the first to launch the innovative product in the market gets all the profit. For an overview on this literature check Kerber & Kern (2014) and Kerber (2017).

<sup>25</sup> Some empirical work has been done regarding the inverted U relation, the most prominent being Aghion et al. (2005). The authors compare innovation incentives in neck-and-neck and leader-laggard industries, concluding that it depends if in the specific sector Schumpeterian rents are higher or lower than the escape competition effects. Other references are Gilbert (2006), Sutton (1998, 2007), Cohen (2010). See Kerber & Kern (2014) for an overview on the literature regarding the inverted U hypothesis.

Even though the debate presents important advances, the models have limited applicability: (i) they usually depend on several hypotheses (Kerber, 2017, p. 7);<sup>26</sup> (ii) they are hard to be estimated (Gilbert, 2006, p.191-200); (iii) there is great variability between different sectors and markets in a number of variables (Cohen, 2010, p. 194).<sup>27</sup> Furthermore, a central mechanism to Schumpeter's writings is the endogeneity of firm size, as innovation affects firm's growth. Studies measuring the effect of firm size or concentration on innovation may overlook this effect and present endogeneity (Cohen, 2010, p. 140). Federico, Scott Morton, & Shapiro (2020, p.136) also add that contributions on the literature on competition and innovation may lead to a misleading understanding that excessive competition negatively affects innovation and argue that such a conclusion confuses two different and important questions, the effect of changes in cost and demand on innovation and the impact of a specific merger between rivals on innovation.<sup>28</sup>

Concluding, if there are no overall relations between innovation and structure that we can assure *a priori*, it is not possible to make assumptions of the effects of a specific merger on innovation without understanding the competition and innovation process, meaning that the increase on concentration as a result of the merger cannot be assessed under any presumption of its effect on innovation.

### **3.2. Business-stealing effects**

Considering, as argued, that there is no optimal market structure which maximizes innovation incentives and that merger analysis regarding innovation

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<sup>26</sup> Such as if product is homogenous or differentiated, whether the model includes product or process innovations, appropriability conditions, entry barriers or if competition occurs in price or quantities (Kerber, 2017, p. 7).

<sup>27</sup> Such as demand, opportunity and appropriability conditions. See Cohen (2010, p. 194).

<sup>28</sup> Given the lack of a clear relation between concentration and innovation, sector/market specific and ex post assessments studies are important tools to develop a better understanding of those markets. The latter are important exercises to check the impact of the merger on innovation. For a review on 14 ex post assessments of the mergers effects analyzed by the European Commission on innovation, check Ormosi, Mariuzzo & Havel (2015).



competition must be undertaken on a case-by-case basis, how to identify whether post-merger innovation incentives will be diminished or not?

There are different contributions that attempt to capture the mergers effects on innovation incentives in a process analogous to the estimation of unilateral price effects. Farrell & Shapiro (2010a, p. 33-34) propose the innovation diversion ratio, which is the share of gross profits earned by a firm when it engages in innovation efforts at the expense of the other merging party's profit. This line of thought is also present in Shapiro (2012) as one of the guiding principles about the relation of competition and innovation is the Contestability Principle, which is "[t]he prospect of gaining or protecting profitable sales by providing greater value to customers spurs innovation" (Shapiro, 2012, p. 364). The reduction of innovation incentives corresponds to the internalization of the negative externalities placed by the firms on each other (Shapiro, 2012, p. 391-392).

To consider both possible ways of internalization of externalities placed by price and innovation strategies, Federico, Scott Morton & Shapiro (2020, p. 128) present the broader notion of business-stealing, a dynamic process of gaining or protect sales from rivals by providing value to customers, through which firms provide value to the costumers, including price and innovation. So, according to the authors, the internalization of price-related and innovation-related business-stealing effects resulting of the merger may generate unilateral price effects and unilateral innovation effects, respectively.

The post-merger internalization of innovation-related business-stealing effects reduces the competitive pressure and, therefore, reduces innovation incentives. As a result, the merged firm may reduce innovation efforts, resulting in less innovation. In other words, absent countervailing efficiencies, mergers in which innovation-related business-stealing effects are internalized result in harm to innovation (Federico, Scott Morton, & Shapiro, 2020, p. 130-135).<sup>29</sup> As in the price-related business-stealing effects

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<sup>29</sup> Jullien & Lefouili (2018, p. 11) call the effect of a merger on innovation incentives as a result of the internalization of a sales externality as the Innovation Diversion Effect and argue that as in some situations the sales externality exerted by innovating firms may have a positive effect on innovation, the direction of the effect may be positive. So, they criticize the view that innovation always divert sales from its rivals, generating a negative externality, present not only in Federico, Langus & Valletti (2017) but in other papers by Federico, such as Federico, Langus & Valletti (2018) and Federico, Scott Morton & Shapiro (2020). For Jullien & Lefouili, the diversion of sales generated by the innovation occurs when innovation results in vertical differentiation, as the creation of a higher quality product in fact should induce sales to divert to the innovator. However, when the results of the innovation efforts materialize in the form of horizontal

case, mergers involving innovation efforts considered close substitutes to the other merging party's product or innovation efforts by the consumer raise higher concerns to the authorities, as the business-stealing effects tend to be higher. We can conclude that, the innovation diversion ratio, by analyzing the closeness of the innovation efforts by quantifying the amount of profit earned by the successful innovator at expense of its rival, is a measure of the strength of the innovation-related business effects.

Innovation competition is naturally a complex subject for competition policy, as the uncertain nature of innovation makes it harder to assess post-merger effects on the introduction of innovation. The mechanism of assessing whether a merger internalize business-stealing effects is a way to identify such possible sources of harm. The next section uses such a criterion to identify the different situations in which there may be harm to innovation: the different faces of innovation competition.

Before moving on, two important observations must be made. First, the business-stealing effects contributes only to the examination of the anticompetitive side of mergers. This is natural given that this process identifies theories of harm to innovation and does not present a final conclusion on the net effects of mergers on innovation. However, there are situations in which mergers internalize positive innovation externalities and may increase both incentives and the ability to introduce innovations, such as when there are synergies and increases in appropriability arising from the merger (Shapiro, 2012, p. 364-365).<sup>30</sup>

The second observation is related to the interaction of price and innovation effects. Federico, Scott Morton, & Shapiro, (2020, p. 162-165) alert to the fact that mergers involving innovators result in both unilateral price and innovation effects and also that

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differentiation, rivals may be benefited. Bourreau, Jullien & Lefouili (2018) propose a variant of the Hotelling duopoly model in which R&D results in horizontal differentiation. They show that price competition is relaxed as consumers of the innovating firm which are less interested in the competitors' product are more attracted to the innovative product. As a result, the competitors increase profit by increasing sales and, potentially, prices (Jullien & Lefouili, p.13). As we discuss here innovation which results in vertical differentiation, we assume that externalities placed by innovating firms are negative and result in business-stealing effects.

<sup>30</sup> Synergies, such as making R&D efforts more efficient by getting together complementary capabilities (Bena & Li, 2014, p.195) or the transfer of technology between firms (Federico, Scott Morton, & Shapiro, 2020, p.134) can increase the ability to innovate, but need to be merger specific in order to be considered as countervailing efficiencies in merger assessment. Increases in appropriability do not have a clear-cut effect on innovation incentives, they may increase innovation incentives for the merging parties, (see Federico, Scott Morton, Shapiro, 2020, p. 133), while reducing innovation incentives to rivals (Baker, 2008; Gilbert & Rubinfeld, 2010).

these effects interact. How this interaction occurs depends on the model used, but their general conclusion is that these effects being accounted for together are likely to be harmful to consumers.<sup>31</sup> However, the assessment of unilateral price effects for cases in which the innovation efforts being assessed in the merger have not reached the market or have not finished development is hard due to: (i) uncertainty about market launch and (ii) lack of data on substitution patterns (Federico, Scott Morton, Shapiro, 2020, p. 137). Jullien & Lefouili (2018) also make an effort in discussing the interaction between price and innovation effects by discussing the different effects of mergers on innovation. Besides the Innovation Diversion Effect, similar to the assessment of the effects on innovation incentives of the internalization of the business stealing effects and which we consider in this paper to be negative, they also present the Demand Expansion Effect (the post-innovation ease of price competition results in greater margins, and therefore, increases the incentives to innovate to increase demand) – a positive effect on innovation incentives – and the Margin Expansion Effect (the post-innovation ease of price competition results in less production and, therefore, reduces incentives to innovate in margin-enhancing innovation) – a negative effect on innovation incentives. The latter two effects go in different directions and the net effect will depend on which one dominates the other.

For the rest of the paper, given the difficulties in estimating unilateral price effects mentioned above and the lack of a clear net effect of the effects mentioned by Jullien & Lefouili (2018) in the cases mentioned above we will consider only innovation effects.<sup>32</sup> Federico, Scott Morton, & Shapiro (2020, p. 163) also emphasize that given the difficulties of estimation, the theoretical literature can be useful to directly address innovation effects. So, using the business-stealing mechanism or principle is an important first step in assessing harm to innovation, but fully addressing these situations in merger procedure require that the analyst consider the specificities of the different cases in which such effect may occur. The next section looks at the different situations in which there may be harm to innovation, arising from the existence of innovation-related business-stealing effects.

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<sup>31</sup> Check Federico, Scott Morton, & Shapiro (2020, p. 162-165) for models that simulate the interaction between these effects.

<sup>32</sup> Which are the ongoing innovation efforts cases which have not finished product development and the innovation competition through future innovation efforts cases.

#### **4. The different faces of innovation competition and the theories of harm to innovation**

There are different situations in which innovation competition is at stake and, therefore, need different merger enforcement. Baker (2007) list types of markets which demand enforcement to protect innovation.<sup>33</sup> Katz & Shelanski (2007) make an effort in proposing canonical situations representing the idea that depending on how close innovation is to market launch, there will be differences in the enforcement itself. Federico, Scott Morton & Shapiro (2020) apply the mechanism described in the last section. i.e., there are innovation-related business-stealing effects and list three distinct patterns identified in practice. These contributions form the basis of our discussion and will be revisited throughout this section.

The situations where innovation competition occurs exemplified before for relevant market definition's debate purposes are also useful to show different situations in which innovation-related business-stealing effects may be identified. The first one is when firms compete in the product market while engaging on innovation efforts to improve its product to capture sales from its competitors (continuous innovation efforts). The second situation - when two or more companies are in a race to enter a new market and are simultaneously undertaking competing innovation efforts – represents a case of an overlap between ongoing innovation efforts towards developing a new product. We can also add to this category another possibility: a merger in which one of the merging parties is engaging on innovation efforts to create a new product and enter an existing product market explored already by the other merging parties. In this category we need to consider both cases in which such efforts are close to market launch and in earlier stages, which will be assessed differently. An additional third situation is when two or more companies have similar capabilities and lines of research and, therefore, are likely to be rivals in future innovation efforts, even when they are not competing in a product market or in a race to develop competing products. In this last case, the existence of

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<sup>33</sup> Which are: (i) winner-take-all or winner-take-most markets; (ii) industries where technological or regulatory developments determine future competition; (iii) rapidly growing industries. For more details, see Baker (2007).

different firms with the necessary capabilities and similar lines of research (a necessary condition for engaging in innovation efforts) provide competitive pressure on each other. The three examples represent what we will call the different faces of innovation competition: through continuous innovation efforts in the product markets, through ongoing innovation efforts for new products and through future innovation efforts.<sup>34</sup> In the same merger, all three faces of innovation competition may be at stake, demanding assessment from potential innovation effects by Competition Policy, but with different approaches, as we will argue.

Although innovation competition may occur in diverse ways, harm to innovation occurs through two channels. Following Kokkoris & Valletti (2020, p. 233-234), we may list post-merger reductions in innovation incentives: (i) related to a specific innovation effort, resulting in a possible delay and/or interruption of such effort and (ii) related to new innovation efforts, resulting in less innovation efforts in the future. As we will discuss, in each of the faces of innovation competition either one of these two channels will be the source of harm to innovation.

The following subsections addresses each of the three faces of innovation competition, presenting each one's main features and adequate assessment, including the theories of harm of these situations as well as possible evidence and practical issues and

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<sup>34</sup> The typology for the faces of innovation competition follows mostly Federico, Scott Morton, & Shapiro (2020), but also Katz & Shelanski (2007) and Baker (2007) to some extent, but with important differences. The first canonical case in Katz & Shelanski (2007) is the one in which innovation is well underway to create or improve defined products and processes. By understanding that improved products, i.e., achieved through incremental innovation, need a specific assessment, we added the innovation competition through continuous innovation efforts category by understanding that it is characterized by competition within the product market and, therefore, demanded a conventional assessment with minor changes, unlike the two other categories. The innovation competition through ongoing innovation efforts to develop new products category is similar to the first canonical case in Katz & Shelanski (2007), in the situation in which a new product is created, and also similar to the pipeline overlaps category in Federico, Scott Morton, & Shapiro (2020) but we include here the situations in which innovation does not occur through a well-defined pipeline procedure. The specific case in which two firms are racing to the market with competing innovation efforts matches the winner-take-all/winner-take-most case in Baker (2007) and Katz & Shelanski (2007). Finally, the innovation competition through future innovation efforts is very similar to the overlaps in capabilities category in Federico, Scott Morton, & Shapiro (2020). It is important to notice that Federico, Scott Morton & Shapiro (2020) add a third pattern which is the acquisition of potential competitors by dominant firms. They argue that a target firm with a pipeline project and capabilities to grow into a rival to a dominant firm could be acquired by the latter without a proper assessment of its capabilities due to the lack of past overlaps. Even though the concerns presented by the authors are reasonable, this specific situation fits the faces of innovation competition framework we present here, when there is ongoing or future innovation efforts. Section 5 contributes to the debate on the assessment of competitive significance which could be useful to assessing these cases.

challenges that must be overcome. We will also include cases from the international case law to illustrate when it is possible.

#### **4.1. Innovation competition through continuous innovation efforts in the product market**

In some product markets, innovation efforts may be undertaken towards creating newer and better versions of existing products. Whenever there are continuous innovation efforts in a product market as a strategy for competing, we can say that this market presents traditional competition and innovation competition simultaneously. It is important to add that we are not including under this category radical innovations which create an entirely new product or market, but rather situations in which at least one of the firms in the market engages in continuous innovation efforts, towards both incremental and radical innovations as long as they are not being undertaken towards creating a new product market.<sup>35</sup>

As there is competition in the product market, the relevant market definition may be undertaken through the traditional analysis as we argued in section 2. Following Katz & Shelanski (2007), the notion here is at their first canonical case when innovation is well underway to create or improve defined products and processes (as this subsection discusses mostly incremental innovation, the object here is just the improvement of products). They argue that competition is focused on the product market and the results of innovation are tangible, what makes a traditional assessment adequate. In the competitive assessment, as innovation efforts are being undertaken toward improving incumbent products, the effects of the merger on innovation in this market needs to be considered, as it may result in lower innovation incentives. Section 2 presented arguments towards the discussion of effects in differentiated product markets which can be applied here: if two product market competitors merge and the competitive pressure is reduced,

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<sup>35</sup> According to Schilling (2013, p. 46-47) incremental innovations are relatively minor changes, while radical innovations are very new and different from prior products. Here we are discussing the innovative behavior of firms so both types may be at stake as long as they do not create a new market. However, as incremental innovations are more frequent and less likely to create a new product market, it will be addressed more often in this face of innovation competition.

they may be less willing to improve their products, in our case, by engaging on innovation efforts. Individual or resulting shares and concentration variation may be not as relevant just as in differentiated products markets.

Thus, the traditional price effect assessment would be insufficient here. The possible harm to innovation is the reduction and the interruption in the introduction of innovation within the product market in the future. Harm occurs through the second channel listed by Kokkoris & Valletti (2020), as the concern is related to future innovation efforts instead of a specific ongoing product development. Considering the business-stealing effect mechanism, the substitutability between the parties' product is an important evidence, as close substitutes tend to impose higher business-stealing effects on each other (Federico, Scott Morton, & Shapiro, 2020, p. 129). Another important evidence is whether one of the merging parties is a frequent innovator, as the source of harm is the removal of a continuous innovator and given that harm to innovation tends to be higher if the frequent innovator places larger business-stealing effects on the other merging party. In this case, the more frequently the firm introduces innovation in the market, the greater the competitive pressure exerted by the firm is, as more sales are expected to be diverted (otherwise the other players will need to reduce price or improve their products). We can call a frequent and disruptive innovator as an innovation maverick.<sup>36</sup> Evidence on the profitability of the parties' diverted sales to the innovator (current and expected) also provides an indicator of harm (p. 141). Finally, in the absence of effective rivalry, i.e., if the merger gets together two out of a few competing firms engaging in innovation efforts, harm to innovation tends to be higher.<sup>37</sup>

Some practical issues must be added here. First, the merging parties' history of bringing innovations to the market (such as new versions or new features to existing products) is important evidence for this analysis. Second, incremental innovation, frequent in these cases, is more often the result of internal learning and accumulation of capabilities and knowledge than through R&D efforts (Malerba, 1992, p. 857). So, in

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<sup>36</sup> A maverick is a firm which plays a disruptive role in the market. In this hypothetical case, we call it innovation maverick as the firm exerts its aggressive behavior through introducing frequent innovations and in a pioneering way than its rivals. The usual effect of the elimination of mavericks is that it may facilitate collusion (European Commission, 2004b; Department of Justice & Federal Trade Commission, 2010; Bundeskartellamt, 2012; CADE, 2016a).

<sup>37</sup> The reasoning for such an effect lies in the notion that a firm which engages in continuous innovation efforts is likely to capture more sales as a result of its innovation effort when there is a reduced number of other firms undertaking such effort.

these cases, the authorities' concerns are frequently not related to specific pipeline projects and the effect of post-merger reduced incentives on them, but rather on the removal of a player which has a strategy and ability of bringing continuous innovations to the market. As we are considering innovation in all cases in which there is no creation of a new market or product, the firms may need to incur in some cost or risk to innovate in this direction (i.e., it is not a result of their established routines), otherwise there will be no reason to believe that the merged firm would be able or would have incentives to diminish innovation.

One example is the AT&T/T-Mobile case<sup>38</sup> in the United States. The attempted acquisition of T-Mobile by AT&T (both mobile wireless telecommunication services provider) caught the attention due to T-Mobile's market behavior. The company was known for its aggressive strategies both on prices and on innovation in a market particularly favorable for coordination.<sup>39</sup> The company introduced frequent innovation as part of its strategy to challenge US top 3 firms (by the time of the procedure, T-Mobile was the fourth largest mobile wireless telecommunication services provider) (Department of Justice, 2011). The pricing and innovation strategy of T-Mobile may characterize it as an important frequent innovator.<sup>40</sup> In *AT&T/T-Mobile*, the DoJ considered that the merger would not only result in higher prices and less investment, but also less innovation and variety.<sup>41</sup>

#### **4.2. Innovation competition through ongoing innovation efforts for developing new products**

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<sup>38</sup> Case 1:11-cv-01560.

<sup>39</sup> According to the DoJ complaint, aspects such as transparent pricing, little buyer-side market power and high barriers to entry and expansion make the mobile wireless telecommunication services markets more conducive to coordination (Department of Justice, 2011).

<sup>40</sup> The DoJ presented two internal documents of T-Mobile that supported the claim. The first one emphasizes the role of the company in bringing innovation to the market, listing several successful introductions of innovations. The second one showed plan for keeping the pace in bringing innovations in the market in the future (Department of Justice, 2011).

<sup>41</sup> The DoJ announced that it would seek to block the acquisition in August 2011, and the bid ended up being abandoned by AT&T in December of the same year.



When in a merger there is an overlap between the ongoing innovation efforts for developing a new product of one of the parties with the other parties' innovation efforts or incumbent products, authorities need to assess how the merger may affect innovation incentives related to those innovation efforts. Harm to innovation may occur through the second channel cited by Kokkoris & Valletti (2020), a delay and/or interruption of a specific innovation effort.

Before discussing these situations, an important disclaimer must be made. To match the definition used by Federico, Scott Morton & Shapiro (2020) and for simplification, we will call the ongoing innovation efforts for developing a new product as pipeline projects. However, some industries may develop new products without a strict step-by-step pipeline process and the idea here is to capture a broad set of innovation efforts destined to new products. By using the pipeline terminology, we are not reducing this face of innovation to the situations where there is a well-structured R&D procedure, although we know that these two different forms of innovation have different practical consequences and challenges.

Going back to the first canonical case of Katz & Shelanski (2007), when innovation is well underway to create or improve defined products and processes, the authors argue that in mergers involving pipeline projects near market launch, the agencies' enforcement must be focused on traditional assessment, as the introduction of the new product is just a matter of time and the firm is already a potential competitor, so there is no possible harm to innovation<sup>42</sup> (Katz & Shelanski, 2007, p. 65-66). The determining factors are not only the imminence of market launch, but also if most of the cost to develop the product have already been undertaken (Federico, Scott Morton, & Shapiro, 2020, p. 139). Earlier pipeline projects must be enforced and assessed in a different way, as there are significant innovation efforts still needed to successfully enter product market and authorities must ensure that the merged firm will have proper incentives to keep carrying them on and avoid harm, i.e., a delay and/or interruption in these efforts. The key factor to decide whether the case can be scrutinized through the conventional assessment used in traditional competition or not is precisely whether proper innovation incentives are needed to finish the development of the product. For the rest of

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<sup>42</sup> It is important to add that if there are continuous innovation efforts in the relevant product market in which the new product ready for launch will compete, there may be innovation effects related to the first face of innovation competition.

this subsection, we will focus our analysis on harm through a possible delay and/or interruption of specific innovation efforts.

Before moving on, a specific type of case in which different faces of innovation competition are at stake is worth mentioning. Suppose a merger in which the parties have ongoing innovation efforts for new products not close to market launch. There are differences in products which do not demand further innovation efforts to compete in the market after being launched (e.g., specific medicines) and products which demand persistent innovation efforts to keep the product competitive (e.g., smartphones). In the latter case, the authorities need to not only ensure that there are proper innovation incentives to guarantee that the pipeline product will be launched, but also that there is enough competitive pressure post-market launch to provide the necessary incentives to ensure that continuous innovation efforts will be undertaken.

When it comes to the assessment itself, this face of innovation competition may be divided into two categories: when there is an existent product market and when the overlapping ongoing innovation efforts are directed towards creating a new product market. In both, considering that innovation incentives are needed to finish product development, a capabilities-based relevant market definition and assessment of competitive significance is necessary to accurately analyze merger effects, as there is competition in innovation outside the product market. In practical terms, the competitive pressure exerted by alternative sources of R&D - i.e., other pipeline projects considered as possible substitutes in a future product market or firms with lines of research and capabilities to successfully engage in competing innovation efforts needs to be considered. When a product market exists, the innovation market will exist in parallel and both price and innovation effects will have to be addressed. The innovation market must consider all these participants and the competitive significance of such alternative sources of R&D should be taken by the ability of firms in successfully bringing such pipeline projects to the market. Also, the risks and costs of developing the necessary capabilities to innovate in a given area are examples of sources of barriers to entry in the innovation market.

In those cases, some factors are decisive to assess the effects of the merger on ongoing innovation efforts, i.e., in the incentives to bring the pipeline project to the market and are important evidence for assessing potential harm. The first two are the

substitutability between the parties' products in the future product market and the time to market launch, both are positively correlated with the existence of business-stealing effects. Besides, another decisive factor for the need of enforcement is the absence of effective rivalry, i.e., other players capable of representing a threat to the merging parties, by having competing innovation efforts or the necessary capabilities to successfully engage in competing innovation efforts (Solidoro, 2019, p. 2; Federico, Scott Morton, & Shapiro, 2020, p. 139-140). We will now consider the two categories separately.

#### A) Existent product markets

When the innovation efforts at stake are related to an existent product market we may have either a *product-to-pipeline overlap*, in which one of the merging parties has a product already in the product market and the other one is undertaking innovation efforts to enter in this market or a *pipeline-to-pipeline overlap*, a case in which both of the merging parties have ongoing innovation efforts to develop products which will be competitors in the product market in the future in case they are successfully introduced (Federico, Scott Morton, & Shapiro, 2020, p. 140-142).

Suppose that a firm is undertaking innovation efforts to develop a new product, for instance a pharmaceutical drug, to compete against a drug already being sold by another firm, a product-to-pipeline overlap. The perspective of market launch of the new drug places business-stealing effects for the incumbent, as it could expect to lose sales in the future. If a merger occurs between the two firms, the merged entity could have incentives to slow or even shut down the pipeline project, as it would cannibalize sales from the launched drug. The higher the profitability of the sales of the current incumbent product that would be diverted to the innovation are, the higher the business-stealing effects are and the less incentive the merging entity has to continue developing the pipeline project. The profitability of these sales can be assessed by looking at evidence (i) on both current and expected future profitability of the incumbent product, along with the (ii) closeness between this incumbent product and the pipeline project, (iii) expected duration of the overlap in the product market when the pipeline reaches the market and

(iv) the remaining time of patent protection (when applicable). Furthermore, it is important to notice that a more concentrated product market implies that diverted sales to the innovation are more profitable, increasing business-stealing effects. At the same time, the existence of rivalry pressure of other players within the innovation market and their time and costs necessary to the product launch matter (Federico, Scott Morton, & Shapiro, 2020, p. 140-142). As mentioned, the time to market and the absence of effective rivalry are also decisive factors to assess innovation effects in this case. It is important to recall that as there is a product market, the authorities need to also consider price effects.

An example is the Pfizer/Hospira case (the acquisition of Hospira would make it a subsidiary of Pfizer) involves the overlap of a few drugs, but three of them were product-to-pipeline overlaps, each one subject to different enforcement. First, there was a pipeline drug being developed by Pfizer, infliximab biosimilar drug (on Phase III clinical trials), which would be a competitor to Hospira's product, already in the market. The European Commission expressed concerns about the effects of the merger in the incentives to develop the drug, as there was only one Phase III pipeline competitor, and it was facing challenges to develop the drug (European Commission, 2015b, p. 9-15). Second, Hospira had a pipeline generic drug, linezolid, which would be a future competitor to Pfizer's Zyvox, the original drug. In that case, the Commission considered that there were a great number of players developing generic drugs, as Pfizer's patent was about to end. Last, as in the linezolid case, Pfizer was the producer of an original drug, voriconazole, with its patent about to end in the moment of the transaction, and Hospira had a pipeline generic drug. Hospira's drug already had finished development and had already obtained marketing authorization. This market has the specificity capability concern as the drug needs a specialized solubilizer which Pfizer produces and Hospira had already entered in an agreement with Pfizer to ensure the supply, but other competitors did not make similar moves to guarantee the input needed to fully commercialize competitors (p. 47-49). In all the cases presented above, the products were close substitutes, as we are dealing with generic and biosimilar drugs, considered to be equivalent in efficacy to the original drugs. The closeness of market launch differed in the cases, as Pfizer's infliximab pipeline drug was in Phase III clinical trials and Hospira's generic voriconazole was already ready for launch. Even though there were differences in the time perspectives for market launch, both cases had divestment remedies. What made both require divestments was the lack of strong rivals capable of exerting competitive pressure: there was only one Phase III

competitor pipeline drug in the infliximab case, and it was facing challenges to develop its product, while there was not any competitor moving to ensure the supply of the necessary inputs to develop the voriconazole generic. On the other hand, the linezolid market had plenty of rivalry, reason that made the Commission require no remedies in that case (European Commission, 2015b).

## B) Non-existent product markets

As in the previous case, assessment of pipeline-to-pipeline overlaps towards creating a new product market will depend on how developed the pipeline projects are. If significant investments are needed, the authorities need to check whether the merger may create incentives to slowdown or interrupt the firms' innovation efforts. In this specific situation, there are no incumbent products sold by a third party in the market which could compete with the overlapping pipeline projects. Once again, the three factors mentioned above (the substitutability between the parties' products in the future product market, the time to market and the absence of effective rivalry) have important roles in assessing the innovation effects of these cases. However, in this situation the authorities will not need to account for price effects, as there may be only innovation effects. A special situation in this category – following the second canonical case presented by Katz & Shelanski (2007) - is the innovation-based race to market dominance.<sup>43</sup>

An example of a pipeline-to-pipeline overlap is the 2001 acquisition of Novazyme, a pharmaceutical startup, by Genzyme, a large company in the industry (FTC File No. 021-0026). Novazyme was developing a drug for treating Pompe Disease, while Genzyme had three pipeline projects destined to same disease. The two firms were the only two developing treatments for Pompe in the world. Even though the FTC decided to close investigations and not to challenge the merger the debate was centered on a possible

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<sup>43</sup> Also known as winner-take-all (or winner-take-most in some cases) markets, as due to the IP rights regime, economies of scale, network effects and lack of strong buyer preferences the first firm to enter to achieve market launch captures all (or most) sales (Baker, 2007, p. 593-594; Katz & Shelanski, 2007, p. 66).

anticompetitive effect involving the slowdown or complete shutdown of the innovation project, just as the theories of harm concerning pipeline overlaps usually do.

About the two categories mentioned in this subsection, there are important difficulties for implementation in these cases concerning pipeline projects. The common factor on both product-to-pipeline and pipeline-to-pipeline overlaps examples presented from the case law is the fact that they are on the pharmaceutical sector, which has a very particular specificity: The R&D process is a step-by-step well-defined procedure due to regulatory requirements. Other sectors such as medical devices and chemicals may also present a structured R&D procedure, when it is easier to check the three decisive factors for enforcement: (i) the degree of substitutability between the parties' product in the future product market is mostly known because the future use of this product is known throughout the pipeline phases; (ii) there can be estimates of time to market based on the phase of the R&D process; and finally, (iii) it is easier to know not only which other competitors there are, but also the phase in which their pipeline projects are. So, building a theory of harm to innovation based on pipelines projects is easier on certain industries.<sup>44</sup> However, as discussed in the beginning of the subsection, the effects of mergers on ongoing non-pipeline innovation efforts also need to be assessed. In cases in which R&D is not structured and/or there is not easily available information about the pipeline projects of the parties, the authorities could demand that firms present a list of the ongoing innovation efforts. In case there are overlaps, the authority will face a hard task in finding evidentiary proxies, but an alternative for merger assessment is requesting an expert's testimony on the stage of development of the projects. However, uncertainties about the expected success to be reached by the project is hard to overcome. Section 5 briefly discusses some alternatives for such evidence.

Besides, it is possible that the overlaps identified are not only when the innovation efforts are in pipeline stages (or equivalent stages for other sectors), but in earlier phases. This type of analysis was applied in the EC assessment of Dow Dupont (2017), in which it is presented the notion of competition over innovation spaces, which are discovery targets pursued by the firms. To adequately assess this competition the authorities must also look at early-stage innovation efforts, e.g., the discovery of new active ingredients

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<sup>44</sup> Digital innovations are frequently not developed through a well-structured R&D process as Crémer, Montjoye, & Schweitzer (2019, p. 120) argue.

(AIs) which may be used as inputs to downstream product markets and at the firms' lines of research (European Commission, 2017, p. 314; Petit, 2018b, p. 5-6; Jung & Sinclair, 2019, p. 271). We can understand the notion of competition over innovation spaces as broadening the scope of the assessment of cases in which there are overlaps involving ongoing innovation efforts, including competition in the steps which precede pipeline stages. In this way, the assessment of the effect of a merger on ongoing innovation efforts for new products, must not only consider the effects in incentives related to close-to-market pipeline projects and to earlier stages of the pipeline, but also in stages that precede the pipeline.<sup>45</sup>

Concluding, in both cases in which there are overlaps between ongoing innovation efforts, when there is and when there is no existent product market, if the merging parties' pipeline projects are close to being launched in the product market, and all the significant costs related to the innovation efforts have already been undertaken, the case can be assessed through the conventional approach as there is no significant risk of discontinuation of the pipeline project and short-run price effects (or other effects, including continuous innovation if it is the case in the product market competition) turns into the analysis' main question. However, if there is a risk of interrupting the development of the product, i.e., the pipeline project is not close to market launch, competition is occurring in the innovation dimension and needs to be assessed with a capabilities-based assessment to protect incentives to innovate, i.e., relevant market definition needs to include all firms with competing pipelines and capabilities directed to the development of that particular product. In the existent product market case, the effects of the product market need to be considered, as the profitability of the diverted sales to the innovator makes it more likely that the merger results in reduced innovation incentives (Federico, Scott Morton & Shapiro, 2020, p. 141). Harm to innovation may occur through the reduction of innovation incentives, which may result in the delay or interruption of ongoing innovation efforts, the first channel of harm to innovation listed by Kokkoris & Valletti (2020). Harm to specific ongoing innovation efforts also needs to be assessed in

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<sup>45</sup> It is important to add that by steps which precede pipeline stages we are still referring to overlaps in specific innovation efforts, which demand assessment to avoid post-merger reduced incentives to keep the development of the project. We are not referring to the effect of overlaps in lines of research which could reduce innovation incentives related to all the line of research. The latter effect is discussed in subsection 4.3.

the steps which precede pipeline stages, when it is relevant to the case. Finally, as stated before, there are relevant practical issues when there is no structured R&D procedure.

### **4.3. Innovation competition through future innovation efforts**

When firms have overlapping capabilities, even when they are not currently undertaking innovation efforts or competing in the product market, there are business-stealing effects placed by the firms on each other, as they face the perspective of losing sales to rivals when they introduce new products in the future (Federico, Scott Morton, & Shapiro, 2020, p. 146-147). A merger between two or more of those firms is often undertaken to acquire capabilities and competences which could be procompetitive. However, by internalizing these business-stealing effects, may lead to a lessening of overall innovation incentives of the merged firm and its rivals, without a link to a specific product market or ongoing innovation effort.<sup>46</sup> By reducing generic innovation incentives, but underlined by the capabilities of a specific area, the merger diminishes incentives related to innovation efforts which are not being undertaken at the moment and could be started in the future if there are enough incentives to do so, i.e., future innovation efforts, as in the first channel of harm to innovation by Kokkoris & Valletti (2020). However, unlike in the continuous innovation efforts in the product market case, firms are not product market competitors. Reduced incentives for both of the merging parties and their competitors in engaging in new innovation efforts is more likely to occur when firms have overlapping lines of research as there is a greater probability that firms engage in competing innovation efforts. This is first important evidence to build the theory of harm of the case.

The traditional step-by-step assessment is not appropriate to assess the effects of mergers on incentives related to future innovation efforts, as there is not a product market that may be defined yet. Also, the competitive pressure in these cases arise from the existence of other firms with similar capabilities and lines of research, so a capabilities-

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<sup>46</sup> This theory of harm was explored in Dow/Dupont (2017). Check Petit (2018b) and Todino, Walle, Stoican, (2019) for the literature which discusses this case and its theories of harm.



based merger assessment is recommended to properly capture the competitive pressure related to incentives to undertake future innovation efforts.

Merger assessment related to future innovation efforts due to overlaps in capabilities may sound esepculative at first, as there is a lot of uncertainty regarding innovation efforts that could be undertaken in the future, but there are reasons to assume that in specific cases a merger may significantly reduce the likeliness that innovations would be introduced in the future. To begin with, a first necessary condition is whether the merger brings together firms with overlapping capabilities and lines of research. There may be a reduction in incentives to engage in future innovation efforts if the merging firms: (i) are two of a limited number of firms with the necessary capabilities to innovate in certain areas; (ii) have a history in bringing new products in that area (specially in sectors in which innovation requires expertise and experience makes innovation more likely); (iii) have past and current product and pipeline overlaps as well as patent portfolios, which may indicate that firms have overlaps in capabilities; (iv) and other possible players are limited by the existence of durable barriers to entry or if there is low rivalry in the innovation market in question (Federico, Scott Morton & Shapiro, 2020, p. 147-148). However, some of these evidences for overlapping capabilities are available mostly in sectors which have structured R&D procedures, as in the ongoing innovation efforts analysis, namely current pipeline overlaps and, often, patent portfolios. In the next section we will discuss alternatives for other cases in which innovaiton does not occur through a structured R&D process, but the assessment will only succeed in finding evidence of harm regarding future innovation efforts in sectors in which the past provides a good overview of the firms' ability in engaging in innovation efforts.

*Dow/Dupont* (2017) is an important case to the discussion of innovation competition through future innovation efforts. It adds to the debate not only by introducing the concept of innovation spaces, discovery targets pursued by the firms, to the assessment, but also by bringing an intense discussion regarding the effects of mergers in the innovation incentives related to future innovation efforts.<sup>47 48</sup>

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<sup>47</sup> The European Commission (2017, p. 485) states: “The concern here is that in the medium and long-term, because of the lack of rivalry incentives to innovate, the merged entity would pursue less discovery work, less lines of research, less development and registration work and ultimately bring less innovative AIs to the market than the merging parties would have done absent the transaction.”

<sup>48</sup> According to Todino, Walle, & Stoican (2019), the EC merger procedure went through a process of gradual change from its usual assessment of harm to innovation, based on an overlap of an incumbent product and a close-to-market pipeline project, to the assessment presented in *Dow/Dupont*.

Assessing the effects of mergers in future innovation efforts is a hard task, but one that must be faced as not assessing such effects leaves a risk that important harm to innovation arising from mergers is overlooked, affecting innovation incentives over a long period of time. One might argue that such assessment could be not only speculative, but out of the competition authorities' reach, as it looks to the effects of a merger on a very long time frame, more specifically, to an unforeseeable time horizon. However, it is important to recall that competition policy intervention itself is justified by the inefficiencies which arise from excessive market power. As Motta (2004) argues, market power may generate allocative, productive and dynamic inefficiencies. The last one is often presented as an alternative to static allocative efficiency, which is an optimal intertemporal Pareto-efficient allocation of resources (Baumol & Ordover, 1992). Assessing dynamic inefficiencies partially solves the inadequacy of short run allocative efficiency to address innovation competition cases by capturing the effect of the merger on a longer period, which includes the finishing the development of ongoing innovation efforts. Some authors go further and consider that this approach does not capture the effect of mergers in incentives to undertake future innovation efforts: as Possas (2004, p. 88) argue, some mergers may affect innovation in an unknown and unforeseeable time horizon by the time of the merger, due to the uncertainty of future outcomes. Possas suggests the adoption of the concept of selective efficiency<sup>49</sup>, in which a broader goal of protecting the role of the market as a selector of innovations may substitute the normative goal of allocative efficiency pursued by traditional merger assessment (Possas, 2004, p. 91-93).

As discussed throughout this section, continuous innovation efforts in the product market and close-to-market overlapping product-to-pipeline or pipeline-to-pipeline cases can be assessed through the traditional assessment. In the first situation competition occurs naturally in the product market and in the second the innovation efforts are no longer under the risk of being interrupted and already exert pricing pressure on incumbent rivals, as market launch is a matter of time. On the other hand, overlapping pipeline-to-pipeline and product-to-pipeline cases in which products being developed still need innovation efforts, as well as the assessment of the effects of merger in incentives related

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<sup>49</sup> Selective efficiency can be defined as "...the hierarchical capacity of the selection process, reflecting the degree to which the filtering of innovations by the market correlates with its ordering, as far as possible objective, in terms of progress indicators along an innovative trajectory." (Possas, 2004, p. 91). Free translation of the original quote in Portuguese.

to future innovation efforts, need to be scrutinized under a capabilities-based assessment, including delimitating innovation markets in the case as well, as the business-stealing effects in these assessments comes also from other sources than product market competitors: firms with enough capabilities to place such rivalry through innovation. Finally, when there are continuous innovation efforts in the product market and a product-to-pipeline overlap regarding an existent product market, both price and innovation effects will need to be assessed.

## **5. Capabilities-based merger assessment**

As the traditional assessment is inadequate to assess competition in innovation markets, starting from the relevant market definition<sup>50</sup>, authors such as Gilbert & Sunshine (1995), Katz & Shelanski (2007), Sidak & Teece (2009) and Kerber (2017) argue in favor of using capabilities in the whole competitive assessment, changing traditional steps in merger analysis. The IMA is a first effort on such an assessment but has limitations. First, for market definition, it includes in the innovation markets firms which have overlapping R&D activities and firms with capabilities to supply competing products. Second, as briefly discussed in subsection 2.2, the use of concentration in R&D expenditure is not an adequate measure for the ability of the firm. A proper capabilities-based assessment needs to undertake an innovation market definition includes non-R&D innovation efforts and, more importantly, includes firms which not only have capabilities to engage in competing innovation efforts, but that can viably do so in order to screen which firms actually exert competitive pressure on the parties and assess their competitive significance.

Following Kerber (2017, p. 13), and closely related to the basic idea of the IMA, we need to discuss how to identify viable players which compose the innovation market and assess their competitive significance. To do so, it is necessary to understand: (i) which are the lines of research in which the merging parties are capable of developing

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<sup>50</sup> The Hypothetical Monopolist Test could not be used correctly as there is no product market yet and uncertainty regarding future outcomes of innovation efforts.

innovation; (ii) which other firms are also capable of developing innovations in the same lines of research; and (iii) how capable are these firms in developing innovations in the defined lines of research. It is also important to develop a framework which addresses the challenges identified throughout the text, namely assessing the competitive significance and evidence to build the theory of harm in industries which innovation is not generated by a well-structured R&D procedure. These are the challenges for building a capabilities-based assessment.

This section rediscusses relevant market definition and the assessment of competitive significance under a capabilities-based framework by undertaking a theoretical discussion about an alternative theory of the firm to provide insights for the assessment. We suggest using specific concepts taken from the literature to identify competitors and their significance. Furthermore, we also debate the challenges of practical application by discussing the Dow/Dupont case.

### **5.1. Resource-based theory and the capabilities-based assessment**

The resource-based approach, based on the early work of Edith Penrose (1959), considers that firms are heterogeneous in many dimensions and can be defined as bundles of resources and those represent their ability: a firm which has more resources to enter a specific market than others is more competitive. Some call these resources as *capabilities* (Sidak & Teece, 2009, p. 38; Kerber, 2017, p. 10).

Other authors take Penrose's approach further and in different directions. Richard Nelson (1991) explores the concept of core capabilities, i.e. what a firm can do well and concludes that in technology-based industries, a firm needs a set of R&D core capabilities which define the R&D projects that a firm can undertake with confidence and success and the ones that it cannot. David Teece (2007) discusses the ability of a firm to adapt to a changing environment and technological opportunities, its dynamic capabilities. All

these contributions explore the resources and features that makes a firm capable of undertaking innovation efforts and succeeding in bringing innovation to the market.<sup>51</sup>

Penrose's contributions represent important theoretical foundations for research in the strategic management literature and evolutionary theory. All of the contributions presented above provide insights to the process of identifying competitors and assessing their ability to innovate, but Nelson's findings invite a closer look. Core capabilities in R&D represents what kinds of innovation efforts the firm can viably engage. A firm which its core capabilities are related to markets A and B is unlikely to undertake R&D efforts to enter market C, even though it may have the technical capabilities to do so. Some specificities are responsible for defining those capabilities, as “[t]hese capabilities will be defined and constrained by the skills experience, and knowledge of the personnel in the R&D department, the nature of the extant teams and procedures for forming new ones, the character of the decision making process, the links between R&D and production and marketing, etc.” (Nelson, 1991, p. 68)

Besides core capabilities, a somewhat similar notion, the concept of core competences is present in the resource-based strategic management literature.<sup>52</sup> Prahalad & Hamel (1990, p. 4-6) consider it as a combination of skills and resources that make the firm idiosyncratic. Schilling (2013) define it as: “A core competency arises from a firm’s ability to combine and harmonize multiple primary abilities in which the firm excels into a few key building blocks of specialized expertise.” (Schilling, 2013, p. 118). From these expertises, firms can produce different business and products.<sup>53</sup>

So, if identifying the resources/capabilities necessary to innovate in a given market helps the analyst understand which firms are capable of innovating, finding similar core capabilities/competences explains how likely a firm is to engage into innovation efforts on the same lines of research as the merging parties. Prahalad & Hamel suggest looking at three factors to identify core competences: it must provide access to a

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<sup>51</sup> For a review on the discussions on the theory of the firm and the innovative firm, see Paranhos & Hasenclever (2017).

<sup>52</sup> See Schilling (2013) for conceptual discussion.

<sup>53</sup> Prahalad & Hamel (1990) use the example of Casio, which has the core competence to produce displays, from which it was able to successfully introduce different businesses such as calculators, laptop monitors and car dashboards (Prahalad & Hamel, 1990, p. 4-5).

wide variety of markets, be a source of differentiation and hard to imitate (Prahalad & Hamel, 1990, p. 7).

Another important factor to understand the likeliness not only of initiating innovation efforts but also of succeeding in introducing innovation is the cumulative technology case. As Dosi & Nelson (2010, p. 73) argue, there may be dynamic increasing returns to knowledge, i.e. successes may generate other successes. Firms with a history of successfully introducing technologies may be in a better position to create new products and processes in a given market.

From the point of view of merger assessment, identifying if companies have clear core competences/capabilities and if they fit the cumulative technology case may help the analyst understand if the companies' lines of research are more likely to be successful in developing future products when there are overlaps in capabilities and the past provides a good overview of the firms' ability in innovating. Therefore, we find that such assessment may: (i) help identify which external rivals may exert competitive pressure in the ongoing innovation efforts for new products and future innovation efforts cases; (ii) constitute specially important evidences of the firm's competitive significance in cases in which innovation does not occur through a structured R&D procedure; (iii) represent evidence of possible harm in the future innovation efforts cases, through the identification of overlapping capabilities. Besides, core competences may be complementary, i.e. one of the merging parties' competences or capabilities may fit the other parties' core competences, creating a synergy which could be a possible countervailing efficiency. An expert's testimony may be helpful for assessing these informations. However, it is important to notice that the enhanced harm to innovation when there is cumulateness occurs at firm level. Dosi & Nelson (2010, p. 73-74) argue that cumulateness may also occur at industry level.

Analyzing the conditions of entry in the innovation market is a key issue for evaluating the likeliness that there will be actual competitive pressure on innovation competition cases. Successfully engaging on innovation efforts depends on a number of capabilities in many sectors, so the authorities must carefully investigate which ones are necessary, how quickly and on which terms they may be obtained to conclude whether entry is easy or not. Switching costs, transaction and learning costs, as well as network

effects are important factors (OECD, 2002, p. 27-28).<sup>54</sup> More generally, the necessary capabilities for initiating innovation efforts vary among sectors and industries and they may potentially make entry harder.<sup>55</sup> Furthermore, in industries in which firms have a cumulative technology regime, entry in the innovation market is less likely than the alternative case, as a greater expertise is necessary for conducting innovation efforts and the established firms have greater know-how.

Thus, when it comes to practical application, the capabilities approach may struggle, as identifying capabilities is by no means an easy task. However, using specialized literature on strategic management or business is a way to do so (Sidak & Teece, 2009, p. 36).

## **5.2. Challenges of practical application: Dow/Dupont (2017)**

In *Dow/Dupont*, the European Commission identified competitors in a relatively easy way. Patenting is frequently done in this industry and there is public information on patent requests. Request on ISO names and presentation to investors are also cited as information which helps acknowledging competitors. Those factors make finding overlapping capabilities easier when compared to other sectors which do not present well-defined R&D procedure.

Also, the EC investigated how the process of R&D work in the crop protection business. They concluded that before market launch, the R&D processes have two main phases: discovery and development. The EC found that there are five large-scaled companies which act not only in discovery and development, but in the whole value chain

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<sup>54</sup> For instance, the availability of a knowledge base may be an important factor to assess the conditions of entry, as in sectors in which the technologies developed are based on public knowledge bases (such as the results of research undertaken by universities or government labs) are easier to engage on innovation efforts when compared to the ones which depend on proprietary knowledge (Jorde & Teece, 1990, p. 38).

<sup>55</sup> Federico, Scott Morton & Shapiro (2020) suggests which assets could be included in an assessment: "...intellectual property; access to technology; human capital, such as skilled scientists or engineers; R&D facilities, such as laboratories and specialized equipment; specialized regulatory, distribution, and commercialization assets; intangible assets such as track record with customers; and access to an installed base of existing customers who can be upgraded to a new technology." (Federico, Scott Morton, & Shapiro, 2020, p. 146). As an example, the necessary capabilities in the digital sector may include data, engineering skills, high computing power and venture capital (Bourreau & de Streel, 2019, p. 26).

of crop protection business. Other players act only in R&D and need to partner up to bring the new products to markets or work in small scales. Only those five companies have the necessary capabilities to successfully bring a new product to market in a sufficiently large scale (European Commission, 2017, p. 358).

Regarding the assessment of competitive significance, the EC proposed two measures to identify the strength of companies in both stages of R&D (discovery and development): (i) patent shares and (ii) new active ingredient shares. The first one measures the number of citations of patents in the companies' portfolio. The logic here is that competitive firms in discovery are able to introduce highly cited patents.<sup>56</sup> The new active ingredients share is the number of AIs produced by R&D players weighted by the turnover generated by each AI. This measurement captures not only the capabilities to developing the AI itself but also to produce in large scale and successfully commercialize it.

So, in *Dow/Dupont*, the EC was able to find proxies for the ability of firms mainly due to the fact that the sector has public availability of data and the R&D process is structured, i.e., there is a well-defined step-by-step procedure, therefore analysts may identify the strength of the merging parties and its competitors in each step. However, as mentioned throughout the text, in other sectors such as the ones in which R&D occurs in a less structured way or innovation is less R&D-intensive, an analysis in the same grounds may be unfeasible. In these cases, the analysis of the core capabilities/competences and the cumulativeness of the firm's technology regime may represent alternatives to identifying the strength of the merging parties and its competitors. Even in the cases in which the results of the core capabilities/competences and cumulativeness analysis do not give a precise answer on the ability of the firms, it may be used as a screening tool to select which firms are capable of exerting competitive pressure for future innovation efforts. The assessment presented in this case is also applied to Bayer/Monsanto (2018) and AbbVie/Allergan (2020) and under the name of four-layer competitive assessment.

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<sup>56</sup> As companies are more likely to cite their own patents, the EC decided to consider only external citations. However, total citations (external and internal) are used as sensitivity tests.



## 6. Concluding Remarks

Throughout this paper we aimed to build a scheme for the choice of framework to be applied to the assessment of horizontal mergers in which there is innovation competition. We pursued this goal by looking for a mechanism to identify the different faces of innovation competition, as well as proper relevant market definition and assessment of competitive significance for each face, stating when the conventional approach to merger analysis could be used and when an alternative approach is needed, which means when it is necessary to define innovation markets and the ability to compete through innovation is not derived from higher market shares. We also presented the appropriate theories of harm to innovation for each case and discussed under the innovation incentives literature, including the business-stealing effects mechanism, the resource-based theory, and evolutionary contributions to build a list of possible relevant evidence for the analysis.

Horizontal harm through post-merger reductions of innovation incentives are concrete threats in some identified cases and need to be investigated. These situations, which may be at stake in the same merger, represent the different faces of innovation competition: through continuous innovation efforts in the product market, through ongoing efforts to develop new products (existent and non-existent product market cases) and through future innovation efforts, respectively. Thus, we proposed a taxonomy of the three faces of innovation competition taking the contributions of Federico, Scott Morton & Shapiro (2020), Katz & Shelanski (2007) and Baker (2007) as a starting point.<sup>57</sup> These three faces may be present in a single merger case. A practical example of looking at different categories of harm to innovation is the four-layer competitive assessment presented in Dow/Dupont (2017): besides the two price-related layers of assessment, the EC looks at innovation competition related to pipelines and overlaps in capabilities. It is important to add that even in the case that the authorities consider that there is harm to

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<sup>57</sup> We classified those cases, from the examination of sort of cases where the innovation-related business-stealing effects mechanism is at stake (Federico, Scott Morton, & Shapiro, 2020, p. 128-130), which are: (i) when the merging parties are competitors in the product market and at least one of them engages in continuous innovation efforts; (ii) when the merging parties present overlaps in ongoing innovation efforts for developing new products with other ongoing innovation efforts or incumbent products; and (iii) when the merging parties present overlaps in capabilities and future innovations efforts may be harmed.

innovation, possible synergies arising from the merger need to be assessed as they may countervail such harm when looking at the net merger effect on innovation.

Furthermore, on one hand we argued that some of these cases may be assessed through the traditional analysis: when innovation competition occurs in the product market (through continuous innovation efforts) or when new products are close to market launch. In the latter case there is no expected negative effects on innovation if there is no continuous innovation efforts needed as well: given that the product is ready for market launch and does not demand further innovation incentives to finish product development, a possible discontinuation of the product as a result of the merger may generate another effect, such as a price effect or even a reduction of diversity in the market. Challenges faced by the agency in these cases are similar to the ones in differentiated products mergers. On the other hand, we also argue that when there are ongoing innovation efforts for new products not close to market launch and when there are overlaps in capabilities, a different assessment is needed as the conventional approach is both unfeasible and inadequate. Thus, we proposed using a capabilities-based assessment in these cases, as it will be necessary to define an innovation market as well. By capabilities-based assessment we are calling not only the contributions in the direction of defining innovation markets (as in the IMA), but also including some insights taken from the literature to suggest new elements for the assessment of these cases, specially to help the identification of relevant competitors, the competitive significance and pressure they and the merging firms may impose through innovation competition. The careful examination of the assets and attributes that configure the capabilities to innovate that are relevant in each market and observed in a firm-specific level.

Table 1 - Faces of innovation competition and potential harm to innovation assessment

Face of Innovation Competition	Source of innovation-related business-stealing effects	Market definition and Assessment of Competitive Significance	Channel of Harm to Innovation	Evidence
Continuous Innovation Efforts in the product market	Overlap in the product market and at least one of the parties undertakes continuous innovation efforts	Traditional	Less innovation efforts in the future	Substitutability degree between the parties' products Evidence on current and expected profitability of diverted sales between the merging parties History in bringing innovation in markets Frequent Innovator or innovation maverick Absence of effective rivalry (engaging in innovation efforts)
Ongoing efforts to create new products	Overlap between efforts to develop new products from one of the parties with other innovation efforts or incumbent products	Traditional (if close to market launch)	<b>No Innovation effect</b> , unless the market demands further innovation efforts	In the case in which the market demands further innovation efforts, evidence is similar to the continuous innovation case
	<b>Existent product market:</b> Overlap between efforts to develop new products from one of the parties with other innovation efforts or incumbent products	Capabilities-based (if not close to market launch) + traditional	Delay and/or interruption of innovation efforts	Substitutability degree between the parties' products Absence of effective rivalry (rivals engaging in competing innovation efforts and/or with similar Core Capabilities and Core Competences and cumulative innovative successes) Time to market Evidence on current and future profitability of the incumbent product (if product-to-pipeline) Expected duration of the overlap between the two products in the market (if product-to-pipeline) Remaining time of patent protection (if product-to-pipeline)
	<b>Non-existent product market:</b> Overlap between efforts to develop new products	Capabilities-based (if not close to market launch)	Delay and/or interruption of innovation efforts	
Future Innovation Efforts	Overlap in capabilities	Capabilities-based	Less innovation efforts in the future	Overlapping lines of research History in bringing innovation in the area Absence of effective rivalry Past and current product and pipeline overlaps Patent portfolios Durable barriers to entry Cumulative innovative successes Similar Core Capabilities and Core Competences

Source: own elaboration

Table 1 presents an overview of the results of the paper. It also must be read by permitting different conditions to assess innovation competition as the same merger may present different combinations of these overlaps and, therefore, different assessments are needed.<sup>58</sup>

The uncertainty of innovation outcomes and the specificities of different industries and cases are examples of the challenges faced by authorities assessing these cases. Without the ambition to provide final answers to the debate, we attempted in this paper to propose different faces of that innovation competition, while providing insights for how to better assess and build the theory of harm of each case. As propositions for a research agenda, we can list: (i) further developing the capabilities-based assessment, especially regarding evidence for assessing competitive significance of firms, for innovation capabilities and for building theory of harm to innovation; (ii) examining sectoral specificities and innovation patterns, understanding that innovation processes are different between sectors and firms, also including the possible synergies to be expected in each case. These would be a necessary next step for a viable implementation of the scheme we have presented along in the paper.

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<sup>58</sup> E.g., the merging parties 1 and 2 may (i) be competitors in product market A and 1 has a strategy of bringing continuous improvements to its product A1; (ii) be engaging in early innovation efforts to enter in market B and (iii) have overlapping capabilities that make it possible that the merging parties engage in competing innovation efforts. In market A, the authorities would need to conduct a traditional step-by-step assessment to check possible anticompetitive effects in the product market, including not only price effects but also possible harm to innovation in the form of reduced incentives to undertake continuous innovation efforts. In (ii), considering that both pipeline projects are not close to market launch, assessment must ensure that post-merger innovation incentives would not result in slowing or interrupting the development of the new products by examining the competitive pressure exerted by competitors. Finally, authorities would need to check if firms 1 and 2 have similar lines of research and both their strength and their competitor's in bringing innovation to the market in that area to justify assessing whether innovation incentives related to future innovation efforts would be diminished.

## **II. INNOVATION COMPETITION AND INNOVATION EFFECTS IN HORIZONTAL MERGERS: US AND EUROPEAN SELECTED CASE STUDIES**

**Abstract:** This paper discusses the assessment of negative innovation effects or innovation harm in horizontal mergers in the US and European Commission Merger Control. The goal is to investigate how the analysis of such effects has been undertaken, discussing the mechanisms used, the theories of harm and evidence applied. We review the theoretical principles that apply to innovation competition, as well as proposals for assessment taken by the literature. We then critically assess the US and EC experiences by looking at their past and recent experiences related to both their guidelines and case law. Finally, we undertake case studies connecting to the theoretical principles and the jurisdictions' experiences: (i) Takeda/Shire (EC – 2018); (ii) AbbVie/Allergan (EC – 2020); and (iii) Sabre/Farelogix (DoJ – 2019). We conclude that both jurisdictions have changed their assessment to address innovation competition to some extent, more in the case law than in the guidelines, but further improvements are needed.

**Keywords:** Competition Policy, Mergers, Innovation, United States, European Commission

**JEL:** L40

**Resumo:** Este artigo discute a avaliação de efeitos em inovação negativos ou dano à inovação em fusões horizontais no controle de fusões dos EUA e Comissão Europeia. O Objetivo é investigar como a análise de tais efeitos foi realizada, discutindo os mecanismos utilizados, as teorias de dano e evidências utilizadas. Nós revisamos os princípios teóricos que se aplicam à concorrência em inovação, bem como propostas de avaliação retiradas da literatura. Em seguida, avaliamos de forma crítica as experiências dos EUA e Comissão Europeia ao analisar suas experiências passadas e recentes relacionadas aos seus guias e jurisprudência. Finalmente, realizamos estudos de caso conectando os princípios teóricos e experiência das jurisdições: (i) Takeda/Shire (CE –

2018); (ii) AbbVie/Allergan (CE – 2020); e (iii) Sabre/Farelogix (DoJ – 2019). Concluimos que ambas as jurisdições modificaram suas avaliações para endereçar concorrência em inovação até certo ponto, mais na jurisprudência do que nos guias, mas são necessárias melhorias adicionais.

**Palavras-chave: Defesa da Concorrência, Fusões, Inovação, Estados Unidos, Comissão Europeia**

## 1. Introduction

Competition is a multi-dimensional process. In other words, firms undertake efforts to offset its competitors through several variables, such as decreasing prices, increasing quantities, introducing product differentiation, improving the products' quality, and introducing innovations. The innovation dimension of competition can be called as innovation competition.

The notion of competing through innovation can be seen as a departure from a price-based static competition towards a more dynamic view of competition. Schumpeter (1942) considered that if on one hand competition has a passive static side, in which firms compete through prices, on the other hand competition has an active dynamic side, in which firms engage in innovation efforts to surpass their rivals. The contrast between the two sides of competition is often reflected in competition policy, especially when it comes to merger control.

The assessment of mergers by competition authorities has a well-defined procedure when it comes to traditional product market competition, i.e., cases in which the dimension of competition through price and within the market is the main one. When it comes to the assessment of innovation competition mergers and their potential effects on innovation, authorities have tried different approaches as merger control evolved, but although many advances have been made a standardized and consensual procedure is still to be found. The challenges begin in how innovation competition unfolds in each case: it is a diverse and heterogeneous process, and a unique procedure would not adequately capture harm to innovation in each case.

Despite being a hard task, the US, and European jurisdictions<sup>59</sup> have changed their merger assessment both through official guidelines such as their Horizontal Merger Guidelines and in practice. The gradual changes to address innovation effects have been discussed by authors such as Gilbert & Tom (2001), Glader (2006), Katz & Shelanski (2007), Kerber & Kern (2014) and Kerber (2017) - for the US - and Glader (2006), Petit

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<sup>59</sup> In this paper, when we refer to the European or European Union jurisdiction or experience, we are specifically referring to the European Commission and not the national competition authorities within the European Union.

(2018b) and Chadha (2019) -for the EC. In this paper, we will take a step further by looking at how the assessments applied by the jurisdictions connect to the theoretical background of innovation competition - its basic principles - and assessment proposals taken from the literature, with a special look on both the gradual changes over time in these jurisdictions' merger control and recent cases.

The goal of this paper is to investigate how the assessment of negative innovation effects (or innovation harm) has been undertaken in both US agencies – The Federal Trade Commission and the Antitrust Division of the Department of Justice – and the European Commission, by looking at the mechanisms applied to assess these cases, as well as the theories of harm and the evidence usually applied. We first define the main theoretical principles applied to assess innovation competition and potential harm to innovation in horizontal mergers, and consider different propositions for assessing innovation effects in the antitrust literature– such as Gilbert & Sunshine (1995), Katz & Shelanski (2007), Federico, Scott Morton & Shapiro (2020) and the faces of innovation competition framework, which we presented in the first essay of this dissertation - in order to critically assess how the agencies have analyzed innovation effects. Despite the important role of efficiencies in merger assessment, we focus our discussion in potential negative effects on innovation and the theories of harm to innovation to be potentially applied in horizontal mergers cases.<sup>60</sup> At the end, we seek to provide recommendations for further improvements in the assessment by connecting conclusions taken from the theoretical background and the actual practice.

The paper is organized in six sections. The next section discusses the theoretical aspects of innovation competition and harm in horizontal mergers, looking at both the main principles and concepts that guide these cases and the assessment proposals. The third section is dedicated to an overview of the evolution of the assessment of innovation competition cases in both jurisdictions. The fourth section presents an overview of the proposals taken from the literature and practice for assessing innovation effects. The fifth section presents the case studies in light of the theoretical and practical background

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<sup>60</sup> Innovation effects, negative innovation effects, harm to innovation will be used as synonyms. Another important disclaimer is that we are considering in this paper innovation efforts which result in vertical differentiation, i.e., new, or improved products which differ in terms of their quality.



presented in the previous sections. The sixth and final section presents the concluding remarks.

By the end, we find that innovation competition in horizontal mergers can be assessed through three different principles: business-stealing, capabilities, and dynamic effects. On one hand, the US Horizontal Merger Guidelines addresses innovation effects while its European counterpart does not, considering the role of innovation only in the assessment of price effects. On the other hand, the EC came up with a procedure in the case law which investigates different forms of innovation competition and applies the three principles to some extent. We conclude that despite the fact that neither of the guidelines presented a definitive procedure to address innovation effects, in the case law both jurisdictions applied different assessments dedicated to analyzing such outcomes, as corroborated by the case studies. Assessing innovation effects is a relevant concern, so we defend that jurisdictions need to be less timid on the subject and include proper assessment in their guidelines.

## **2. Innovation Competition and harm in horizontal mergers: theoretical aspects**

The intrinsic complexity of innovation competition makes assessment harder when compared to traditional price/product competition. Considering how innovation and, therefore, innovation competition are not only complex but also heterogeneous, we need to discuss the theoretical aspects of these processes in the context of horizontal mergers before we dive into the discussion on how jurisdictions assessed mergers in which innovation was at stake.

This section is divided in two subsections. We begin discussing the main principles and concepts of innovation competition in horizontal mergers, addressing the differences from product market competition and challenges for assessment. In the second subsection we discuss proposals for the assessment of these cases taken from the literature.

## **2.1. Innovation Competition in Horizontal Mergers: main challenges, principles, and concepts**

When we look at innovation competition in horizontal mergers, we are particularly interested in if and how the merger would affect innovation, i.e., whether there would be innovation effects and the extent of these effects. It is important to state that in this paper, we will look at potential post-merger lessening of innovation incentives as potential innovation effects. In this subsection, we discuss the concepts and principles that guide the evaluation of the impact of mergers on innovation incentives, mainly the business-stealing, capabilities, and dynamic effects principles, which are relevant to understand the challenges imposed to merger analyses in assessing innovation effects. This is especially important when we assume the heterogeneity of innovation competition among different markets and industries.

Structural factors, such as market concentration, play an important role as screenings in the widely accepted merger procedure for assessing the likelihood of price effects of mergers. Post-merger markets, if significantly more concentrated, are likely to present higher prices.<sup>61</sup> So a first question when it comes to innovation would be whether the same relation would work. The Arrow-Schumpeter controversy presents different views on the subject: Arrow (1962) considers that firms in perfect competition markets would have greater innovation incentives when compared to the other extreme on the concentration spectrum, monopolists. However, Schumpeter (1942) considered that large firms (and highly concentrated markets) would in a better position to innovate than small firms (and less concentrated markets). A proposition that combines both views is the inverted U hypothesis, presented by Scherer (1965): increases in concentration would be more conducive to innovation up to a certain point, after which further increases in concentration would reduce innovation. Even though there are empirical works testing different scenarios, no overall conclusion on the sign of the relation of concentration and

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<sup>61</sup> As mentioned in the 2010 US Horizontal Merger Guidelines, larger firms would be more reluctant in decreasing prices (Department of Justice, Federal Trade Commission, 2010, p. 15). However, it is worth mentioning that a deeper analysis of the competitive dynamics, including other factors beyond concentration, are the usual procedure in antitrust analyses (Department of Justice, Federal Trade Commission, 2010; European Commission, 2004b). Furthermore, as discussed further ahead, the role of concentration indexes as screening is weakened when product differentiation is at stake.

innovation was found, especially one that would be applicable to several different markets.<sup>62</sup>

Even when innovation competition is not at stake, the role of structural factors in determining the overall effect in prices may be diminished when there is product differentiation. The jurisdictions usually look at other variables instead of concentration indexes, such as substitutability between products, diversion ratios and markup of diverted sales, as well as applying tools to assess unilateral price effects such as the GUPPI and UPP indexes.<sup>63</sup> When we look at these factors, the analyst will give a greater emphasis on the effect of the merger on process of gaining sales and profit at the expense of the firms' rivals: whenever firms place a negative externality on each other which may be internalized in the merger, the process of diverting sales will be eased and, therefore, there will be less incentives to compete in price. The existence of a threat of losing sales to rivals is known as business-stealing effects (Federico, Scott Morton & Shapiro, 2020, p. 128). When it comes to innovation, a process analogous to the estimation of unilateral price effects may be applied given the lack of a clear relation between structure and innovation.

The *business-stealing principle* is a broad notion which is not limited to price competition. Federico, Scott Morton & Shapiro (2020, p. 128) characterize business-stealing as the process of gaining and protecting sales from rivals by providing value to consumers through different means, including not only price, but innovation as well. So, the internalization of innovation-related business stealing effects, placed by the firms on each other through their innovation efforts (or existence of similar capabilities and lines of research as well, as we will discuss further ahead), would reduce innovation incentives, as innovation efforts towards one of the merging parties' products (previously owned by independent firm A) would cannibalize the firms' sales of the other product (previously owned by independent firm B), resulting in innovation effects. The closer (more

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<sup>62</sup> Aghion et al (2005) presents the most relevant empirical work on the inverted U relation between innovation and concentration. Kerber & Kern (2014) provide an overview on the empirical literature. Among the limits to the applicability of the models are the number of hypotheses which they depend on (Kerber, 2017, p.7), the fact that they are not easy to estimate (Gilbert, 2006, p.191-200) and the great variability between sectors in many factors (Cohen, 2010, p. 194).

<sup>63</sup> GUPPI and UPP are indexes which measure the pressure towards post-merger price increases. The first one considers only anticompetitive effects while the second one also considers countervailing efficiencies. Check Farrell & Shapiro (2010a), Farrell & Shapiro (2010b) and Salop & Moresi (2009).

substitutable) the firms' innovation efforts are, the higher the business-stealing effects are and, therefore, results in greater harm to innovation.

The assessment of innovation effects by a process analogous to the estimation of unilateral price effects can also be found in other previous works, with a similar mechanism to the business-stealing effects. Farrell & Shapiro (2010a, p. 33-34) propose the innovation diversion ratio, an index which captures the diversion of a firms' profit when a competitor innovates<sup>64</sup>, which may be an indicator of the extent of the business-stealing effects between the parties. Shapiro (2012), when studying the relation between competition and innovation lists three guiding principles. Similar to the business stealing concept, Shapiro's Contestability Principle<sup>65</sup> defines that the perspective of gaining or protecting sales through greater value generates innovation incentives.

Furthermore, considering that whenever there is innovation-related business-stealing effects between firms, innovation competition is at stake, there are relevant situations when innovation competition cases are not fully covered by the product market-oriented merger effect assessment, especially: (i) *when there is no product market yet* (e.g. parties are engaging in competing innovation efforts towards products which will create a new product market); or even (ii) *when there is a product market but at least one of the parties may be outside it and engaging in innovation efforts to enter it* (innovation competition itself occurs in different ways, as we will discuss in the next subsection).

In these cases, other elements from the traditional product market assessment are less applicable for assessing the likelihood of innovation effects, making the business stealing principle not enough to deal alone with four main challenges. First, in these situations, the traditional procedure to define relevant market, based on the Hypothetical Monopolist Test<sup>66</sup>, is either inadequate (no product market yet) or insufficient (there is a product market, but significative innovation efforts are being undertaken to enter the market by firms outside it, creating a perspective of significantly changing market

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<sup>64</sup> Formally, the authors define the innovation diversion ratio: "The innovation diversion ratio to Firm A from Firm B is the fraction  $\frac{AB}{I}$  of the extra gross profits earned by Firm A when it devotes more resources to innovation that come at the expense of Firm B" (Farrell & Shapiro, 2010a, p.33).

<sup>65</sup> The other two guiding principles are Appropriability and Synergy.

<sup>66</sup> The Hypothetical Monopolist Test (HMT) is applied to define relevant markets. The authorities simulate a hypothetical monopoly and apply a small but significant non-transitory increase in price (SSNIP). If the SSNIP is profitable, the market is well defined (Department of Justice & Federal Trade Commission, 2010, p. 7-15). In the next subsection we will see that the Innovation Market Analysis proposal includes an alternative to market definition using R&D efforts in a similar way as the HMT.

structure). Second, although the assessment of competitive significance of product market cases is based on shares and concentration indexes such as the Herfindahl-Hirschman Index (HHI)<sup>67</sup>, for similar reasons as in relevant market definition, such measures are either not applicable (no product market case) or less relevant (there is a product market, but firms are still engaging in innovation efforts to enter it). Third, traditional merger assessment in product market focuses in short-run price effects, which is also either inadequate or insufficient for the same reasons as the two previous elements. Fourth, innovation may occur through different processes: through a linear process in which R&D generates a product or even in short innovation cycles as responses to customers' feedback, for example.<sup>68</sup> A framework for assessing innovation competition in merger control should account for these specificities, even though, this may be a hard task.

To address the first two challenges identified we can add another element: firms' *capabilities principle*. A capabilities-based assessment considers that the firms' capabilities to innovate would influence: (i) relevant market definition, as when innovation competition is at stake, firms with both innovation efforts and capabilities to engage in competing efforts exert competitive pressure on the parties and should be included in the innovation market; (ii) the competitive significance of firms (merger parties and their rivals), since the extent of the firms' capabilities would work as indicators of their ability to compete through innovation.<sup>69</sup> In the next subsection, we discuss what we will call the capabilities-based assessment proposals.

Finally, the third challenge drives us to another principle that may be applied to a merger case when discussing innovation effects: the *dynamic effects principle*. This means that it is necessary not only to shift the assessment away from short run price effects, but also to consider the effects on innovation of a merger in different time

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<sup>67</sup> The HHI is a concentration index which is the sum of the firms' shares squared, including all the firms in the relevant market. It is often presented multiplied by 10,000.

<sup>68</sup> In most writings on innovation and competition, innovation is considered as an output of R&D efforts, or in simple terms innovation as a result of R&D spending of a single firm. This relation of causation is considered in the linear model of innovation, more specifically the technology-push model, in which a firm makes a scientific discovery, incorporates it to its production and brings it to the market. According to Rothwell (1992, 1994), this model is considered as the first generation of industrial innovation, common in the 1950's and early 1960's. More recent models are non-linear and emphasize the role of other factors aside R&D spending, as the integration between R&D and manufacturing or marketing, interaction with suppliers, horizontal collaboration, among others. Rothwell's approach finds five different innovation models from the 1950's to the 1990's, with considerable changes between them. For more information check Rothwell (1992, 1994).

<sup>69</sup> There are some authors who suggest the use of capabilities in merger assessment, such as Gilbert & Sunshine (1995), Katz & Shelanski (2007), Sidak & Teece (2009), Kerber (2017).

horizons. A merger may result in harm to innovation in the short/middle run when a product development is interrupted as a result of a merger and in a long- and even unforeseeable-time horizon when innovation incentives related to a line of research is diminished and the likelihood of new innovation efforts in the future is lessened. As Kokkoris & Valletti (2020, p. 233-234) list, considering innovation effects as post-merger reductions in innovation incentives<sup>70</sup>, post-merger harm to innovation may occur through two channels. First, there may be less incentive to continue current product development, resulting in delaying and/or interrupting these innovation efforts. Second, incentives to begin new innovation efforts may be reduced, resulting in less innovation in the future.

## **2.2. Harm to innovation and assessment proposals: literature review**

So far, we discussed the principles and concepts that may be applied to merger case analysis when innovation competition is at stake and the main challenges for assessing their potential effects on incentives to innovate. Different propositions to address innovation competition mergers can be found in the literature. This subsection presents some of these proposals.

Gilbert & Sunshine (1995) brings a new look on the subject not only from the theoretical side, but also influencing the assessment of innovation competition cases in the US. The authors name their proposition as the *Innovation Market Analysis* (IMA). As indicated by the name of the proposition itself, the IMA is based on defining innovation markets, understood as a *locus* of competition which occurs through innovation. It is important to note that Gilbert & Sunshine's methodology is focused on the effects of a merger on R&D specifically, and adapts the Hypothetical Monopolist Test to the context of R&D:

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<sup>70</sup> Although we are only considering post-merger reductions in innovation incentives as innovation effects, it is worth mentioning that harm to innovation may occur through the elimination of parallel innovation efforts, as the maintenance of a greater number of distinct innovation efforts as it increases the probability that at least one of them reaches the market and is fundamental for preserving the role of the market as a selector of the most successful innovations. This argument, taken from the evolutionary approach is called as the Diversity Argument (Jorde & Teece, 1990; Farrell, 2006; Sidak & Teece, 2009). Furthermore, Farrell (2006) argues that a diversity of approaches is beneficial for competition on its own.

“In general terms, an innovation market is defined as a set of activities and a geographical area in which a hypothetical monopolist would impose at least a small but significant and nontransitory reduction in R&D effort” (Gilbert & Sunshine, 1995, p. 594).

The authors present a step-by-step procedure with five phases. The first one is to identify overlapping R&D activities of the merging firms. Second, the analyst needs to identify alternative sources of R&D, i.e., substitutes close enough to constrain the exercise of market power. Here, the authors also include firms which could acquire the necessary assets for R&D in a short period of time. Third, assess the competitive pressure exerted by downstream incumbent and potential products. Fourth, the analyst must assess the effect of the merger in R&D. To do so, the authors suggest considering whether the merged firm’s share of R&D is significant to the total R&D in that market and any other possible factor which could have an impact in competition.<sup>71</sup> Finally, the last step is looking at possible R&D efficiencies which could increase the likelihood or value of innovation (Gilbert & Sunshine, 1995, p. 594-597).

By looking at the step-by-step procedure we can conclude that the IMA is a proposal for assessing innovation competition focused on pipelines. It presents advances in the assessment of innovation competition, shifting the focus of the assessment away from product markets and introducing a look on the firms’ capabilities when looking for substitutes which could constrain the exercise of market power by the merged entity. We can say that the IMA is a first effort towards a capabilities-based assessment.

Despite its advances, the IMA was subject to criticism, as listed by Katz & Shelanski (2007) and Kerber & Kern (2014). First, some authors consider that such approach is not necessary, as there is the assessment of potential competition, which could consider innovation effects (Rapp, 1995; Hay, 1995) and future goods market analysis (Bernard, 2011). Second, critics emphasize the presumption of negative effects on innovation taken by the IMA (Rapp, 1995; Hay, 1995, Davis 2003). Third, enforcement would be less predictable (Carlton, 1995). Fourth, effects on non-price variables would

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<sup>71</sup> The authors consider that the proper measure of the firms’ share on innovation efforts will vary (e.g., expenditures in R&D or the level of activities and assets) (Gilbert & Sunshine, 1995, p. 597).

not have a legal basis (Hoerner, 1995, Davis, 2003). As we discuss deeper in the next section, the IMA influences the assessment undertaken by competition authorities.

Some proposals are dedicated to list different scenarios of innovation competition and provide recommendations to assess innovation effects. Katz & Shelanski (2007) define *three canonical situations* as reference for assessment. First, when innovation is well underway to create or improve defined products and processes, firms are either product market competitors engaging in R&D efforts to improve their products in the market or are not competing in the product market yet but will do so in the future when the development of products for which they currently have R&D efforts being undertaken are finished. In this situation, competition is focused on the product market, however, when innovation efforts are well underway but are not completed and have not yet resulted in a tangible product, the innovation efforts may be used as evidence to characterize the firms as potential competitors. The focus of the assessment here is on traditional product market competition and not innovation. Second, when there is an innovation-based race to market dominance, i.e., competition is focused on the innovation efforts themselves and distant from the product market. Here, winner-take-all markets are examples presented by the authors: firms are engaging in competing innovation efforts to enter the market and the first one to complete product development becomes a monopolist (due to factors such as patent or network effects). As the post-innovation scenario is one of a monopoly in the product market, authorities must focus their assessment in preserving R&D competition and avoiding a reduction in innovation incentives which could delay market launch or results in a product with less benefits. Unlike the previous case, the focus of the assessment is in preserving innovation incentives, not conventional product/price effects (Katz & Shelanski, 2007, p. 64-66).

The two cases are considered by the authors as opposite ends on a continuum of possibilities, as the first one has no innovation concerns and is focused on the product market while the second is purely innovation-based. Many cases will be somewhere between those two canonical situations. The key to define the focus of assessment is how close the innovations are to market launch. In mergers in which the product is in its final stages of development and ready to enter the market the assessment will focus on traditional relevant market definition and concerns such as prices and quality. Cases in which the innovation is farther away from reaching the market, the assessment will focus



on the likelihood and level of R&D efforts as measures of firms' capabilities (Katz & Shelanski, 2007, p. 64-66).

Finally, the third canonical situation refers to the specific case in which innovation is not protected from imitation or replication and a waiting game takes place instead of a race to reach the market, with all firms expecting their rivals to undertake innovation efforts to imitate shortly after. A merger presents a tradeoff for the authorities between static and dynamic factors, as approving it would internalize the free-riding problem but would concentrate the product market, resulting in static price effects while blocking the merger would maintain product market competition but keep the waiting game as it was (Katz & Shelanski, 2007, p. 66-67).

Based on the business-stealing effects principle, Federico, Scott Morton & Shapiro (2020) lists patterns of mergers which demand specific assessment. First, when there is an overlap which involves at least one pipeline project (either product-to-pipeline or pipeline-to-pipeline overlaps), the authors emphasize that enforcement is different depending on the stage of product development. Like Katz & Shelanski (2007), if the pipeline is close to market launch, the assessment should be undertaken focused on product market competition, as the results of innovation are tangible. Furthermore, if the pipeline still needs to be further developed and innovation incentives are needed, the assessment must preserve such incentives (Federico, Scott Morton & Shapiro, 2020, p. 138-146).

Second, if the parties have overlapping capabilities, they place business-stealing effects on each other related to new innovative efforts in similar areas. The merger internalizes such effects and may reduce innovation incentives to undertaken R&D efforts in the future (Federico, Scott Morton & Shapiro, 2020, p. 146-150).

The third pattern identified by the authors is less general than the previous two, discussing the specific cases in which a dominant firm acquires a smaller firm that has capabilities to innovate which could turn it into a threat to the dominant firms. This category is particularly directed to acquisition in digital markets, namely the ones in which the acquire is a dominant platform such as Google, Facebook, Apple, and Microsoft. An acquisition may harm consumers through the loss of a competitive pressure

to the dominant platform and the loss of an innovative product (Federico, Scott Morton & Shapiro, 2020, p. 150-153).

Finally, as presented in the first essay of this dissertation, the faces of innovation competition is another proposal for the assessment of these cases. This approach takes the proposals of Katz & Shelanski (2007) and Federico, Scott Morton & Shapiro (2020) as starting points, uses the: (i) business-stealing; (ii) capabilities; and (iii) dynamic effects principles to come up with a framework to assess innovation effects considering the different ways in which innovation competition occurs. In other words, this approach is based on the existence of innovation-related business-stealing effects: whenever firms place innovation-related business stealing effects on each other, innovation competition is at stake and mergers demand proper innovation effects assessment by the authorities. Furthermore, an effort is undertaken towards using a capabilities-based assessment when needed. Another feature of the approach is that it looks at possible innovation effects and its impact in welfare in different time horizons. Finally, this proposal also tries to account for the different ways in which innovation occurs, not limiting itself to the cases, for instance, in which it is developed through well-structured pipeline phases.

There are in this proposal three forms of innovation competition – the *faces of innovation competition* – which demand specific assessments. First, innovation may be at stake in competition between incumbents in the product market in which at least one of them constantly innovates as part of their strategy to gain market shares by improving their own products (mostly incremental innovations) – innovation competition through continuous innovation efforts in the product market. Here, we are not including innovation that occur by the introduction of entirely new products or services, but continuous innovation efforts as part of the competitive strategy of a firm. Mergers may harm innovation not due to a possible delay or interruption of a specific innovation effort (such as a pipeline product) but through the elimination of a player which engages continuously in innovation efforts as part of its strategy. Rather than a specific product, potential harm is focused on the firms' innovative behavior and the reduction of incentives for new innovation efforts in that specific product market, as in the second channel of innovation effects in Kokkoris & Valletti (2020). This face of innovation competition will apply only in industries in which the innovation not only does not follow strict pipeline phases but also occur in faster cycles such as smartphones and digital

services. As competition is focused on the product market and the results of innovation are tangible, the standard definition of relevant product market is enough (following Katz & Shelanski, 2007), however with a closer look on innovation effects related to the removal of an innovative competitor. The likelihood of innovation effects is directly connected to the size of the business-stealing effects between the parties' products. Some evidence to be considered can be summarized into two groups related to: (i) the extent of the business-stealing effects between the parties; and (ii) the competitive pressure exerted by rivals. We will list examples of evidence on these two groups in section 4. As the product market exists, the merger will also result in price effects, which should also be assessed.

The second face of innovation competition – innovation competition through ongoing innovation efforts for developing new products - applies to situations in which there are overlaps between ongoing innovation efforts or between an ongoing innovation effort and an incumbent product. Following Federico, Scott Morton & Shapiro (2020) it is called as product-to-pipeline and/or pipeline-to-pipeline overlaps, but instead it considers cases in which innovation does not occur through pipeline phases. The difference from the previous category is the focus of the assessment in protecting the incentives to innovate related to a specific product development, the first channel of innovation effects to innovation in Kokkoris & Valletti (2020), and not incentives related to new innovation efforts. The possible harm here occurs through the delay or interruption of that specific innovation effort, resulting in less competitive pressure, reduced variety, and less intense price competition in the future. The step-by-step procedure will vary according to how close to market the innovation effort is, following Katz & Shelanski (2007) and Federico, Scott Morton & Shapiro (2020). If the product is ready for market launch and no significant costs need to be spent to complete development, the assessment may be undertaken through the traditional product market competition assessment, as market launch is a matter of time, and the product may be considered as a potential competitor. In this situation, the competitive effects of the merger are the traditional product market ones as there is no risk of eliminating an innovation effort. When innovation efforts are still needed, a capabilities-based assessment is also required, including elements such as the innovation relevant market being defined with all the firms with the necessary capabilities to exert competitive pressure and the extent of those capabilities as an indicator of their competitive significance. In this situation, there is a

possibility of innovation effects through the delay or interruption of the specific innovation effort. In the case in which innovation incentives are needed to complete product development, important evidence for the assessment can be gathered into three groups related to: (i) the extent of the business-stealing effects between the parties; (ii) the competitive pressure exerted by rivals; and (iii) time to market launch, which will be further debated in section 4.

This face may be subdivided in two different situations: when there is an existent product market and when there is not. When the product market is non-existent, i.e., there is a pipeline-to-pipeline overlap between products under development which will address a need not yet met by a marketed product, the authorities will have to address only innovation effects and undertake a capabilities-based assessment, as competition occurs only in the innovation market. When the product market exists, i.e., there is either a pipeline-to-pipeline between firms engaging in innovation efforts to enter a product market or a product-to-pipeline overlap between a firm with a marketed product and a firm engaging in innovation efforts to enter in that market, the authorities will address both innovation and price effects<sup>72</sup> and consider both traditional and capabilities-based assessment to account for the role of both product and innovation markets.

The third face of innovation competition - innovation competition through future innovation efforts - is at stake when there is an overlap between innovation capabilities and lines of research. Regardless of whether the merging parties are engaging in product market, pipeline competition or neither, similar capabilities and lines of research are enough to place business-stealing effects on each other related to future innovation efforts, as firms are likely to engage in competing innovation efforts at some point. A merger in this situation would lead to a lessening of innovation incentives related to these lines or research. A capabilities-based assessment would also be applicable, as the innovation relevant market (similar to the innovation space concept above) includes all firms with similar lines of research and capabilities. Harm would be a reduction of the merged entity's and rivals' incentives to undertake future innovation efforts due to the lessening of competitive pressure resulting in less innovation efforts in this line of

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<sup>72</sup> When a merger potentially results in both price and innovation effects, Federico, Scott Morton & Shapiro (2020, p. 162-165) state that these effects interact and present models that simulate such interactions. In the literature, these effects interact differently depending on the model but Federico, Scott Morton, & Shapiro (2020) conclude that the general net effect of this interaction is harmful to consumers. Check also Jullien & Lefouili (2018) for a deeper discussion of this interaction.

research in the future (the first channel in Kokkoris & Valletti, 2020) for both the parties and their competitors. Besides looking for overlapping lines of research, evidence could be gathered to assess: (i) the extent of business-stealing effects between the parties and; (ii) to consider whether there is effective rivalry capable of exerting competitive pressure related to that line of research. In section 4 evidence will be further discussed. It is important to notice that in both Federico, Scott Morton & Shapiro (2020) and the faces of innovation competition framework more than one pattern or face of innovation competition may be at stake in the same merger as multiple overlaps may occur. The authorities need to check the different possibilities of innovation effects and address them accordingly.

In this section we concluded that innovation competition in horizontal mergers can be analyzed by using three different principles: business-stealing, capabilities, and dynamic effects. The existence of innovation-related business-stealing between the parties indicates that innovation competition is at stake and allows the assessment of innovation effects in a process analogous to the estimation of unilateral price effects. The capabilities principle is helpful in situations in which the traditional step-by-step procedure is inadequate to assess innovation effects. By using a capabilities-based assessment, the authorities consider the parties' and rivals' capabilities to define the innovation relevant market and undertake the competitive assessment. The dynamic effects principle indicates that unlike in short-run price effects, when innovation is at stake the authorities need to investigate the effects of the mergers in multiple time horizons.

We also presented different proposals for the assessment of innovation effects, each one representing advances towards better addressing innovation competition cases. While the IMA (Gilbert & Sunshine, 1995) is an early pipeline-focused attempt of bringing capabilities elements into the analysis, Katz & Shelanski (2007) presents their canonical contributes by presenting two of their canonical cases as a continuum of possibilities in which innovation effects would be more or less relevant, showing that such effects may be at stake in different degrees depending on the specific case. Federico, Scott Morton & Shapiro (2020) provide advances by applying the business-stealing principle to present three patterns of innovation competition which results in different possibilities of innovation effects. Furthermore, the faces of innovation competition

framework is based on the business-stealing, capabilities, and dynamic effects principles; the proposition identifies three faces of innovation competition accounting for the specificities of each face to provide a framework for assessment addressing the three principles. Having discussed both the principles of innovation competition and the different assessment proposals, we now have the tools to critically investigate how the jurisdictions addressed in this paper - the US and the EU – have assessed innovation competition cases.

### **3. Innovation Competition and Harm assessment in US and European Horizontal Merger Control**

Assessing mergers in which innovation plays a major role is as complex as innovation itself. As discussed in the previous section, innovation competition occurs in different ways and enforcement must consider the specificities of each situation to properly assess innovation effects. This is by no means an easy task and authorities have changed their step-by-step procedure in different opportunities. In this section we discuss the European and US experiences in the assessment of innovation effects in horizontal merger analysis, considering the literature review, jurisprudence, and guidelines.

#### **3.1. USA**

The different editions of the Horizontal Merger Guidelines show how the importance of dynamic aspects in merger assessment is increasingly higher. The 1992 edition brought the first dynamic aspects to the assessment where it is mentioned that the inquiry is forward-looking, therefore there is a relativization of the role of the historical market shares when there is a recent adoption of a new technology or when a new technology adopted by a firm is not available to competitors (Department of Justice, Federal Trade Commission, 1992, p. 16; Glader, 2006, p. 68). The 1992 HMG is revised in 1997 and the role of efficiencies is changed. Among the possible outcomes of the

existence of countervailing efficiencies is the advent of innovation, even though the agencies consider R&D-related efficiencies harder to assess (Department of Justice, Federal Trade Commission, 1997, p. 27-29; Glader, 2006, p. 68-69).

The 1995 Antitrust Guidelines for the Licensing of Intellectual Property included substantial improvements when it comes to assessing innovation in competition policy: it distinguishes the product, technology, and innovation markets. The latter is very similar to the definition of innovation market of the Innovation Market Analysis (Gilbert & Sunshine, 1995) and represented a shift from the assessment of innovation concerns in US antitrust (Kerber & Kern, 2014, p.17).

The case law reinforces the impression that the mid-90s were a turning point for the assessment of innovation in mergers. In the pharmaceutical sector, the acquisition of Genentech by Roche (FTC - 1990) may be considered representative of such inflexion, as it is not only one of the first cases to consider innovation effects, but also to consider an overlap between pipeline projects (Gilbert & Tom, 2001, p.53; Katz & Shelanski, 2007, p. 67-68). A few years later, after the advent of the innovation market concept, the assessment of innovation effects would rise substantially.

Gilbert & Tom (2001, p. 44) show that while in the first half of the 90s only four cases were challenged based on innovation concerns, in the second half of the decade forty-seven cases had innovation as a reason for challenging the operation (3% and 17.5% of total mergers challenged by the agencies, respectively). In the second half of the decade, more pharmaceutical mergers with pipeline-to-pipeline overlaps were assessed, such as Glaxo/Wellcome (FTC - 1995), Upjohn/Pharmacia (FTC - 1996), Baxter/Immuno (FTC - 1997), American Home Products (FTC - 1995) (p. 54). According to the authors, these cases would not have been assessed during the 1984 HMG regime, as the only cases involving parties without incumbent products that were considered as susceptible to merger assessment were the ones in which an incumbent and a potential entrant got together, as in the potential competition doctrine.<sup>73</sup>

Innovation played a major role in the assessment of mergers in different sectors besides the pharmaceutical as well. The proposed (and later abandoned) acquisition of

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<sup>73</sup> Roche/Genentech was an exception but was considered a potential competition case rather than an innovation market one (Gilbert & Tom, 2001, p. 53).

the Allison division of General Motors by ZF Friedrichshafen (DOJ - 1993) presented both price and innovation effects. About the latter, the merged entity would have controlled most of the global assets which are necessary for innovating in heavy duty trucks and bus transmissions. Sunshine (1994), emphasizes that the concern was not related to specific products but innovation in the whole line of research: “In this manner, our complaint captured the scope of the feared anticompetitive effect -- innovation over the entire line of heavy-duty truck and bus transmissions, not just those few product lines that had been the subject of direct sales competition in the past.” (Sunshine, 1994, p.3).<sup>74</sup>

Generally speaking, the post-1995 and pre-2010 HMG had relevant assessment of innovation concerns. Kerber & Kern (2014) find that in the 1995-2008 period, the US agencies considered innovation aspects in 34% of mergers.<sup>75</sup> The 2000s had important innovation cases such as Pfizer/Warner-Lambert (FTC – 2000) and Genzyme/Novazyme (FTC – 2004),

The growing importance of innovation in the merger assessment is represented in the 2010 HMG. Although the Guidelines focus its assessment on product markets and not in innovation markets (Kerber, 2017, p.17), it includes elements such as briefly discussing the role of innovation in coordinated effects (Department of Justice, Federal Trade Commission, 2010, p. 26) and presenting a subsection entirely dedicated to assessing innovation aspects (section 6.4 – Innovation and Product Variety) in the unilateral effects section. The HMG divide innovation effects in two categories: (i) when at least one of the firms is engaging in innovation efforts which could capture sales from the other merging party and (ii) a longer-term effect related to the existence of capabilities to develop products in the future which could also capture sales from the other merging party (Department of Justice, Federal Trade Commission, 2010, p. 23-24). A few observations can be made. First, the business-stealing effects or Contestability mechanism is present here, as in both effects the source of harm is the removal of a competitive threat that could result in less innovation incentives. Shapiro (2010, p. 84) emphasizes how this mechanism is similar to the one applied when the HMG discusses unilateral effects

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<sup>74</sup> Other examples of non-pharmaceutical merger assessed on innovation grounds were Sensormatic/Knogo (FTC – 1995) and Lockheed/Northrop (DOJ – 1998). Check Gilbert & Tom (2001, p. 52), Glader (2006, p. 131-132), Katz & Shelanski (2007, p. 70-71).

<sup>75</sup> The authors consider as innovation concerns when innovation play a role in either relevant market definition or competitive assessment.



regarding pricing of differentiated products and bargaining/auctions: focusing on diversion and cannibalization of profits.

Second, both categories express concerns presented in assessment proposals presented in the previous section. One is closely related to the pipeline overlaps in Federico, Scott Morton, and Shapiro (2020) and to the innovation competition through ongoing innovation efforts to develop new products category in the faces of innovation competition framework, as there is an overlap of ongoing innovation efforts with either innovation efforts or incumbent products. Furthermore, this concern goes also way back to the IMA. The other category is concerned with “...whether a merger will diminish innovation competition by combining two of a very small number of firms with the strongest capabilities to successfully innovate in a specific direction” (Department of Justice, Federal Trade Commission, 2010, p. 23). As seen, this is the capabilities overlap case and the innovation competition through future innovation efforts category in the faces of innovation competition framework. As discussed previously, there are cases which occurred before the publication of the 2010 HMG which assessed both innovation effects: mergers with pipeline overlaps and between parties with similar innovation capabilities. However, this edition of the guidelines makes such assessment clearer, even though it lacks a deeper discussion on the set of evidence necessary to support the theories of harm to innovation.<sup>76</sup> We now turn to the European experience.

## **3.2. European Union**

### **3.2.1. Guidelines and pre-Dow/Dupont case law**

The history of competition policy in the European Union goes way back to the Treaties of Paris (1951) and Rome (1957), but mergers and acquisitions were not assessed until the 1989 European Commission Merger Regulation (ECMR) (Motta, 2004). The

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<sup>76</sup> Under the new HMG, some important cases were assessed in the 2010s such as Nielsen/Arbitron (FTC – 2013) and Halliburton/Baker Hughes (DoJ – 2016).

latter does not present an explicit concern with innovation, apart from mentioning that the Commission would take into account the development of technical and economic progress (European Commission, 1989).

However, when it comes to innovation, Glader (2006, p. 75-79) lists some policy developments towards looking at innovation in the EU competition policy system before and after the 1989 ECMR, as the 1984 and 2000 R&D block exemptions<sup>77</sup> and, specially, the 2001 horizontal cooperation guidelines. The purpose of the latter is to provide the analytical principles and tools for the assessment of horizontal cooperation and brings important concepts which are related to the recent proposals for assessment presented in subsection 2. The EC not only mentions competition through innovation but distinguishes it from competition in existing markets (which are product and technology markets). The relevant market definition presents elements which are worth mentioning for our discussion, after all, according to Glader (2006, p.112) this guideline first introduced a clear definition of an innovation market in European competition policy. First, it mentions that “The key to defining the relevant market when assessing the effects of an R & D agreement is to identify those products, technologies or R & D efforts, that will act as a competitive constraint on the parties” (European Commission, 2001, p. 7). Recognizing that competitive constraint may come from different sources beyond incumbent products when innovation is at stake is a fundamental step towards assessing innovation effects considering the firm’s capabilities. Second, it does account for the different possibilities of innovation competition: (i) when discussing the product market, it considers cooperation concerning innovation efforts towards improvement of existing products, emphasizing that when such improvements generate significant changes, old and new products belong in different relevant markets; (ii) includes the assessment of technology markets (markets for intellectual property); (iii) competition in R&D efforts (named ‘competition in innovation’ in the guidelines), towards developing a product which may replace existing ones or creating a new market. In this last case, assessment is considered to be different when, like in the pharmaceutical cases, innovation occurs through a well-structured R&D process (and the commission recommends assessing the case and taking a closer look at the existence of competing R&D poles) and when it does not (case which,

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<sup>77</sup> Following article 81 (3) of the European Commission Treaty, which discusses exemptions from the prohibitions of certain trade practices which, among others, contributes to promoting technical or economic progress. Check Glader (2006 p. 75-77).

absent exceptional circumstances, will not be assessed by the Commission). Finally, the guidelines also make some considerations on the assessment of firms' market shares, mentioning that current shares may not be used as indicators when R&D efforts are directed to creating new markets (European Commission, 2001, p. 7-8).

When it comes to innovation specifically in merger control, we have to look at two documents published in 2004. The new ECMR is issued (European Commission, 2004a) along with specific guidelines for non-horizontal and horizontal mergers. Unlike in the 1989 ECMR, innovation is discussed in the Horizontal Merger Guidelines (European Commission, 2004b). First, the role of market shares as indicators of the competitive significance of mergers may be adjusted considering the context of the specific market, for instance when market structure is unstable due to innovation (European Commission, 2004b, p. 6). Second, when discussing unilateral effects (or non-coordinated, as in the guidelines) the HMG mentions that: (i) a merger may increase the incentive and ability to bring innovations to the market and (ii) a merger between innovators may impede effective competition (p. 9). This dual role of innovation presented in the HMG is a good illustration of the lack of a clear-cut relation between concentration and innovation mentioned in the previous section. Third, when discussing coordinated effects, the EC argues that in markets in which there is innovation, coordination may be more difficult as innovation allows the firm to gain a competitive advantage over its rivals (p. 10). Fourth, innovation and R&D may be a barrier to entry (p. 12). Fifth, when discussing possible countervailing efficiencies, the EC mentions efficiency gains in the field of R&D and innovation (p. 13). We can conclude that the European HMG, older than the current US HMG, does not directly discuss innovation effects, its principles, mechanisms, or the role of the firms' capabilities in the assessment as its US present counterpart.

When we look the European Commission case law, cases in which innovation competition is discussed go way back to the mid-1990s (Petit, 2018b, p. 9), simultaneously with the wave of assessment of innovation concerns in the USA. Glader (2006) and Petit (2018b) list some of these cases.<sup>78</sup>

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<sup>78</sup> In Pasteur-Mérieux/Merck (1994), Upjohn/Pharmacia (1995), Glaxo/Wellcome (1995), Ciba-Geigy/Sandoz (1996), Shell/Montecatini (1994), Crown Cork & Seal (1995), there were innovation concerns, the first four being from the pharmaceutical sector. With the arrival of the 2000s innovation

### **3.2.2. Dow/Dupont and the novel approach on innovation competition in EU Merger Control**

It is impossible to debate the assessment of merger with innovation concerns in the European Commission without taking a while to discuss the Dow/Dupont merger (2017)<sup>79</sup>. This case represents such a major shift in the EU merger control that it makes sense divide the EU Merger Control experience in two parts: pre and post Dow/Dupont and we have discussed only the first one so far.<sup>80</sup> Todino, Walle, Stoican (2019) consider that there was a traditional approach to mergers with innovation concerns and a new approach which was gradually being developed in a series of merger cases up to Dow/Dupont. According to the authors, the traditional approach would assess mergers on innovation grounds only in cases involving late-stage pipelines, developed enough to be considered as potential competitors. The pipeline products would have to either: (i) already be exerting constraints on the incumbent's behavior or (ii) be likely to enter the market in a relatively short period of time and then constrain the rival's behavior. Furthermore, an insufficient number of rivals would also be needed for the merger to be considered as presenting anticompetitive effects (p. 5-6). Still according to the authors, three cases represent the gradual change on the traditional merger assessment in innovation cases which led to the procedure applied in Dow/Dupont: Medtronic/Covidien (2014), Novartis/GlaxoSmithKline Oncology Business (2015) e Pfizer/Hospira (2015).

Dow/Dupont (2017) is the case in which the new approach is finally applied. This case represented such a shift to merger control that led to intense debate among academics, practitioners, and authorities.<sup>81</sup> This approach to the assessment of innovation effect is being referred as whether the merger results in Significant Impediment to

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concerns appeared in the case law before and after the publication of the 2004 ECMR and HMG, such as Pfizer/Pharmacia (2003), GlaxoWellcome/SmithKline Beecham (2004), Western Digital/Hitachi (2011), Deutsche Boerse/NYSE Euronext (2012), Medtronic/Covidien (2014), Pfizer/Hospira (2015), Novartis/GSK (2015), General Electric/Alstom (2015), J&J/Actelion (2017).

<sup>79</sup> Case COMP/M. 7932 (EC 2017).

<sup>80</sup> Authors such as Denicolò & Polo (2018, p. 2), Jung & Sinclair (2019, p. 268), Kokkoris & Valletti (2020, p. 9) emphasize how Dow/Dupont (2017) represents a change in EU Merger Control.

<sup>81</sup> Which led to a great number of publications either discussing this case specifically or its impact on EU Merger Control in general. We list here a few of them: Petit (2017, 2018a, 2018b), Denicolò & Polo (2018), Mosso (2018), Padilla (2019), Jung & Sinclair (2019), Chadha (2019), Seiler (2019), Kokkoris & Valletti (2020), Kokkoris (2020).

Effective Innovation Competition (SIEIC), name based on the well-known Significant Impediment to Effective Competition (SIEIC) test<sup>82</sup>, applied by the Commission to check whether a specific operation would be anticompetitive. Other authors also call it as the innovation theory of harm (IToH) and the procedure itself would later be called by the EC as the four-layer competitive assessment in Bayer/Monsanto (2018) and AbbVie/Allergan (2020). To discuss SIEIC itself we first need to discuss Dow/Dupont (2017).

The Dow Chemical Company and E.I. du Pont de Nemours and Company were US-based diversified chemicals companies which announced a merger and notified the EC on 22 June 2016. On the assessment, the Commission identified four types of overlaps: (i) between incumbent products on many markets; (ii) between incumbent and potential competitors; (iii) between early pipeline projects and lines of research; (iv) between global R&D-integrated organizations. Here, we focus on the latter two as they discuss innovation concerns (the first two involve discussions on price and product competition) (European Commission, 2017, p. 34-35).

The focus of innovation concerns in this case is the crop protection business and the Commission finds that: (i) rivalry is an important driver of innovation in this market; (ii) Dow and Dupont hold lines of research and early pipeline products that would compete with each other if brought to market; (iii) they are close competitors; (iv) there are barriers to entry and expansion at the level of discovery and development; (v) only five integrated players acted in the whole value chain (discovery, development, mixture/formulation and commercialization), while other rivals do not possess similar capabilities and incentives (European Commission, 2017, p. 313-321).<sup>83</sup>

To present the theories of harm to innovation, the Commission decides to look at possible overlaps in the different stages of product development, not only in pipeline stages but in previous steps as well, such as the discovery of new active ingredients. To do so, the EC uses the concept of innovation spaces - discovery targets pursued by the firms, so firms which compete over innovation spaces may be competing at the discovery and development stages, which precede pipeline phases – and finds the possibility of harm

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<sup>82</sup> For a discussion on the SIEIC test, check Petit (2018b, p. 5-7).

<sup>83</sup> The other three being Syngenta, Bayer, BASF (besides Dow and Dupont) (European Commission, 2017, p. 26).

as the parties have many overlaps in developing products, early pipeline projects and lines of research which could divert revenue from each other. In Dow/Dupont, the Commission finds overlaps between the firms' capabilities, lines of research and pipeline products and conclude that the reduced innovation efforts and capabilities to innovate would take the form of: (i) reduction of incentives to continue ongoing innovation efforts, possibly discontinuing, delaying, or redirecting early pipeline products and lines of research and (ii) reduced incentives to undertake future innovation efforts (European Commission, 2017, p. 322). The two channels of harm to innovation previously mentioned.<sup>84</sup>

We can make a few comments on the assessment. First, business-stealing effects are at stake in the competitive assessment, as the competitive pressure exerted by the firms on each other plays an important role and there is closeness of competition between the parties. Also, the role of the diversion of sales in providing incentives to innovate is emphasized:

“The Commission further notes that its theory of harm rests on the broader notion of innovation competition rather than on the notion of cannibalisation of existing products. This is because cannibalisation is often meant to refer to a diversion of sales from one or several existing products to an innovative product sold by the same firm. Innovation competition, instead, more broadly refers to the extent to which innovative products of one firm may divert sales and profits from both existing and other innovative future products of rival firms. Through innovation, rival firms therefore impose a negative externality on each other. Accordingly, the Commission notes that even if innovation were to involve no cannibalisation of the sales of existing products, a merger between two out of a limited number of innovators in a market could reduce innovation incentives, by leading to the partial internalisation of the

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<sup>84</sup> It worth noticing that the EC mentions not only post-merger reduced innovation efforts but reduced capabilities to innovate as post-merger harm to innovation. In this paper we focus our look on the reduction of innovation efforts. Anyway, both ways in which harm to innovation is mentioned in Dow/Dupont occur through the reduction of innovation incentives in the two channels presented by Kokkoris & Valletti (2020).

impact of innovation competition between the merging parties.”  
(European Commission, 2017, p. 335).

Second, the competitive significance of the parties and their rivals is measured by their capabilities in innovating. The proxies applied to assess such capabilities are patent shares and new active ingredients, which are indicators of the strength of those capabilities. We can conclude that the EC assessment is focused on the business-stealing effect mechanism as indicator of possible harm to innovation and the firm’s capabilities as indicators of the firms which can be included in the market the innovation spaces they compete into and their competitive significance. Furthermore, it is worth mentioning that the EC looked at internal documents from the parties as evidence to properly assess their capabilities.

The intense debate on Dow/Dupont is justified by the great shift it represents in EU merger control, the now called SIEIC. Chadha (2019, p. 4-5) argue that the European Union Merger Regulation (ECMR) (European Commission, 2004a) and the Horizontal Merger Guidelines (HMG) (European Commission, 2004b) set the roots for the SIEIC when they state: (i) that the notion of SIEIC should be applied to unilateral effects in the ECMR and (ii) that innovation effects should be assessed in merger control in the HMG. In fact, we could go even further and affirm that the SIEIC approach also follows the same mechanism applied to the assessment of unilateral price effects to some extent: the business-stealing effects, as the Dow/Dupont merger procedure made clear in the cannibalization debate. We can summarize the main features of the SIEIC approach: (i) extends the assessment of unilateral effects to innovation competition with a similar mechanism; (ii) changes the theory of cannibalization developed in Novartis/GSK (2015)<sup>85</sup> to include diversion related to innovation efforts and future products instead of only existing products; (iii) expands the possibilities of overlaps to pre-pipeline stages by looking to competition in innovation spaces; (iv) assesses harm by looking at the effects of the merger on incentives related to ongoing innovation efforts and on incentives to innovate in the industry as a whole of the merging parties and its rivals; (v) looks at the

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<sup>85</sup> In GSK/Novartis (2015) an innovation effect assessed was the possible interruption of the development of Novartis’ pipeline drug (European Commission, 2015a, p. 3-37). Todino, Walle, Stoican (2019, p. 9-10) argues that this case goes further away from the traditional one when it considers early-stage pipeline products and discusses harm to innovation in a broader level, i.e., mentioning incentives to innovation and innovation competition.

firms' capabilities as a mean to identify rivals and assess the merging parties and their rivals' competitive significance.<sup>86</sup>

Later, Bayer/Monsanto (2018)<sup>87</sup> and AbbVie/Allergan (2020)<sup>88</sup> are cases in which SIEIC was also applied, confirming the shift in the way innovation cases are assessed in EU Merger Control. In these two cases, the procedure is now called as the four-layer competitive assessment. The basic premise of the procedure is the simultaneous assessment of product/price effects related to marketed products and late-stage pipeline products, as well as innovation effects related to pipeline products in earlier steps of development and the need to define the innovation spaces. If the Innovation Market Analysis (Gilbert & Sunshine, 1995) and Katz & Shelanski's (2007) approach extends the scope of the assessment from the product market to pipeline/R&D efforts competition, with the four-layer competitive assessment, the EC is investigating whether there are innovation effects related to the product market, competition between pipeline projects and competition over innovation spaces, broadening the scope of the assessment itself. When it comes to innovation effects, the EC looks at the delay or interruption of ongoing innovation efforts as well as a general reduction of innovation incentives related in the industry, corresponding to the two channels of harm to innovation.

The name refers to the possibilities of horizontal effects checked by the EC: (i) product/price competition between incumbent products; (ii) product/price competition between actual and late-stage pipeline products or between late-stage pipeline products; (iii) innovation competition related to ongoing pipeline products, (iv) innovation competition related to incentives to innovate in the future (European Commission, 2019, p. 7-8). As mentioned in the previous section, given that innovation competition has different faces, the authorities need to investigate distinct possibilities of harm considering overlaps between the parties besides the ones in the product market. AbbVie/Allergan (2020) will be further discussed in the next section.

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<sup>86</sup> Chadha (2019, p. 8-12) list some of the criticism towards the SIEIC approach: (i) not being robust enough to analyze dynamic factors; (ii) potential over-reliance on patent data; (iii) effectiveness of remedies such as the ones applied in Dow/Dupont (2017); (iv) failing to balance appropriability and cannibalization, (v) difficulties to satisfy the EC high standard of proof; (vi) asymmetry in addressing positive and negative innovation effects.

<sup>87</sup> Case COMP/M. 8084 (EC 2018).

<sup>88</sup> Case COMP/M. 9461 (EC 2020).



Before moving to the next section, we can make a few observations. First, the US 2010 HMG regime and the four-layer competitive assessment apply the business-stealing principles for assessing innovation in a similar way to what they did when it comes to price effects. Kokkoris & Valletti (2020, p. 224-225) list cases from both jurisdictions in which contestability/cannibalization concerns were present.<sup>89</sup> Second, they also use the capabilities principle: the US 2010 HMG mentions a type of longer-term harm to innovation connected to the existence of specific capabilities while in the EC the four-layer competitive assessment apply a capabilities-based assessment. Third, both apply the dynamic effects principle when looking at effects in different time horizons. Fourth, Haucap (2017, p.16) mentions a difference between the two jurisdictions, as the US 2010 HMG only considers the effect of the merger in the merged entity's incentives to innovate and not in the competitors' incentives or in the industry's competition and innovation dynamics. Sixth, the US 2010 HMG discusses unilateral innovation effects, defining two possibilities of harm, but does not define a step-by-step procedure to assess innovation effects. Meanwhile, the 2004 European HMG only briefly discusses innovation without either defining harm to innovation or defining a procedure to be applied in practice. Fifth, the debate on innovation effects in horizontal mergers seems to have two turning points: the mid-1990s, especially in the US and in the 2010s with new US 2010 HMG and recently with the four-layer competitive assessment in the EU. The latter shows that the EU produced its own procedure to address merger effects in the direct application to the case law, attempting to address different forms of innovation competition. Finally, despite being harder to predict, mergers with early-stage pipeline overlaps, as well as overlaps in capabilities, may have detrimental effects on innovation competition and may harm consumers. As presented by both the literature and the case law, assessing such effects is feasible and has been pursued by the authorities, although there is not an established procedure of how to assess them.

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<sup>89</sup> Seagate/Samsung (EU – Case COMP/M. 6214), Western Digital/Viviti (EU – Case COMP/M.6203), Deutsche Boerse (EU – Case COMP/M.6166), Halliburton/Baker Hughes (EU – Case COMP/M.7477), Applied Materials/Tokyo Electron (DoJ), Dow/Dupont (EU – Case COMP/M. 7932).

#### 4. Innovation effects: an overview of the assessment propositions

Throughout the paper, we discussed different approaches for the assessment of innovation effects from both the literature and practice. Before we move to discuss selected cases in the next section, we need to summarize the different propositions to provide us the tools to critically assess such cases, emphasizing the similarities and differences between the approaches, grouping them, and unifying the evidence used to each type of innovation competition when it is possible.

We discussed five approaches to assess innovation effects in the previous sections: the Innovation Market Analysis (Gilbert & Sunshine, 1995), the three canonical cases (Katz & Shelanski, 2007), the four-layer competitive assessment (European Commission, 2017), the three patterns of innovation competition (Federico, Scott Morton & Shapiro, 2020) and the faces of innovation competition. As these propositions address different forms of innovation competition, Table 2 associates them with the type of innovation competition they address.

*Table 2 - Approaches to the assessment of Innovation Effects to innovation and the forms of innovation competition*

Approach	Form of Innovation Competition		
	Within the product market through continuous innovation efforts	Through ongoing innovation efforts for developing new products	Through future innovation efforts
Gilbert & Sunshine (1995)			
Katz & Shelanski (2007)			
European Commission (2017)			
Federico, Scott Morton & Shapiro (2020)			
Faces of Innovation Competition			

Source: own elaboration

Firms may engage continuously in innovation efforts to improve its marketed products. Authorities should be less concerned about the interruption of a specific product development and focus their gaze on the impact of the elimination of a firm which

engages continuously in innovation efforts if the innovator places business-stealing effects on their competitors and such effects are internalized when the merger takes place. The reduced competitive pressure within the product market may result in less innovation incentives to begin new innovation efforts, the channel of innovation effects in this case. As stated, this merger may be assessed through the traditional assessment of innovation effect within a product market as firms are product market competitors. Evidence on the extent of the business-stealing effects between the parties can be: (i) the substitutability degree between the parties' products; (ii) current and expected profitability of diverted sales between the merging parties; (iii) the parties' history in bringing innovations in markets, (iv) whether the parties are frequent innovators or even innovation mavericks.<sup>90</sup> The latter two may also be applied to assess the competitive pressure exerted by rivals.

Innovation competition through ongoing innovation efforts for developing new products is discussed in the five proposals of assessment. This category addresses merger between firms engaging in competing innovation efforts -including when there is an innovation-based race to market dominance, a situation in firms with competing R&D efforts engage in a dispute to reach the product market first (Katz & Shelanski, 2007). This implies the necessity of defining an innovation market considering their capabilities and of looking at how the merger impacts R&D (Gilbert and Sunshine, 1995). This scenario step away from using product market competition procedures towards the application of the capabilities principle.

The propositions to assess innovation competition through ongoing innovation efforts for developing new products cases apply the business-stealing, capabilities, and dynamic effects principles. A merger involving late-stage pipeline cases should be assessed only in price competition grounds as there is no risk of harm to innovation, while in cases in which pipeline products are in earlier stages the authorities should assess whether there could be a delay and/or interruption of innovation efforts due to less innovation incentives, the channel of innovation effects in this cases (European Commission, 2017; Federico, Scott Morton & Shapiro, 2020). The third layer in the four-layer competitive assessment is dedicated to the assessment of such cases, as well as the pipeline overlaps in Federico, Scott Morton & Shapiro (2020) and the second face of

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<sup>90</sup> Mavericks are firms which compete intensely in the market, making collusion harder. An innovation maverick is the specific case in which the aggressive behavior occurs through innovation efforts, i.e., the firm constantly offers new and/or improved products as its competitive strategy.

innovation competition - innovation competition through ongoing innovation efforts for developing new products. The latter also makes an effort to address cases in which innovation does not occur through well-defined pipeline stages. Both the four-layer competitive assessment and the faces of innovation competition typology make a greater effort to undertake a capabilities-based assessment when there is the possibility of harm to innovation, proposing identifying the firm in the innovation market and their competitive significance through the firms' capabilities. Federico, Scott Morton & Shapiro (2020) divide their analysis in product-to-pipeline and pipeline-to-pipeline overlaps, while in the faces of innovation competition framework, we discuss the difference between the situation in which the product market exists (case in which price effects should also be considered, as well as the interaction between the product and innovation markets) and when it does not.

When it comes to evidence, Federico, Scott Morton & Shapiro (2020) make suggestions, complemented by the ones we proposed in the first essay, in which three groups of evidence should be looked at: related to the extent of the business-stealing effects between the parties, to the competitive pressure exerted by rivals and to the time to market launch. The extent of business-stealing effects may be assessed by looking: (i) at the substitutability degree between the parties' products and also, for the cases in which there is an existent product market; (ii) evidence on current and future profitability of the incumbent product; (iii) expected duration of the overlap between the two products in the market; (iv) remaining time of patent protection. About the competitive pressure exerted by rivals and potential rivals we can look at: (i) the history of the parties in bringing innovations in the area; (ii) patent portfolios; (iii) durable barriers to entry; (iv) degree of cumulativeness of innovative successes; (v) similar core capabilities and competences.<sup>91</sup> Time to market launch may be considered by checking evidence related to how developed the product is and will vary depending on the process of innovation in each industry.

The third form of innovation competition is at stake when the merging parties have overlaps in their capabilities and could, therefore, compete in innovation efforts in the future, making a merger harmful to innovation in a long- and unforeseeable-time horizon, a pattern addressed by the four-layer competitive assessment (European

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<sup>91</sup> As defined by Nelson (1991, p. 68), core capabilities in R&D are innovation efforts which the firms can viably engage. Core competences are similar, representing the skills and resources which make the firm idiosyncratic (Prahalad & Hamel, 1990, p. 4-6).

Commission, 2017), Federico, Scott Morton & Shapiro (2020) and the faces of innovation competition framework. The fourth layer of the four-layer competitive assessment is dedicated to check whether firms with overlaps in capabilities compete in certain innovation spaces, similar to the capabilities overlaps in Federico, Scott Morton & Shapiro (2020) and the innovation competition through future innovation efforts in the faces of innovation competition framework. All the propositions look at the business-stealing effects generated by the similarities of the firms' capabilities to innovate and lines of research, while emphasizing the use of elements from a capabilities-based assessment to undertake merger procedure. In the first essay we also discussed how, in this face of innovation competition, the authorities have to look for the possibility of harm to innovation in a longer and unforeseeable time horizon, as there may be a reduction in incentives to begin future innovation efforts, the channel of innovation effects in this form of innovation competition, in a long time period. Evidence for these cases may be divided into two groups: (i): to assess the extent of business-stealing effects between the parties and (ii) whether there is effective rivalry capable of exerting competitive pressure related to that line of research. For both groups we can look at (i) the overlaps in capabilities and lines of research; (ii) history of the parties and competitors in bringing innovations in the area; (iii) past and current product and pipeline overlaps; (iv) patent portfolios; (v) durable barriers to entry; (vi) degree of cumulativeness of innovative successes; (vii) similar core capabilities and competences.

The five propositions bring contributions to the assessment of innovation competition cases, which we can gather into the three groups presented in this section. With such a division in mind, we can move to section 5 and look at how selected cases fit into these forms of innovation competition and discuss how the assessments were undertaken.

## **5. Selected Cases and Discussion**

In the previous sections, we debated both the theoretical aspects of the assessment of innovation competition cases and the US and European Merger Control experiences. Given that we now have a theoretical and institutional background, we have enough tools

to critically assess recent merger cases, decided after Dow/Dupont, in both jurisdictions. We selected, using the following criteria, cases that: (i) represent different industries; (ii) were not subject to simplified procedures when they were assessed by the authorities; (iii) present debates on innovation effects; (iv) represent different innovation processes and different innovation effects. We chose three case studies based on these criteria.

The first two are pharmaceutical cases assessed in the European Commission, both with innovation concerns regarding treatments for the same diseases. The first one was not assessed explicitly with the four-layer competitive assessment, while the second was. Both present concerns mainly related with pipeline projects, even though the first one represents a product-to-pipeline overlap with an existent product market and the second has a pipeline-to-pipeline overlap which potentially regards a non-existent product market. The third case was assessed by the US department of Justice in the sector of booking services to airlines. In this case, innovation does not occur in well-defined pipeline phases, and the overlap is in the product market without any pipelines involved, a case of innovation competition within the product market through continuous innovation efforts and the concern here is the removal of an important innovator.

### **5.1. Takeda/Shire (EC - 2018)**

In 2018, the Japanese Takeda Pharmaceutical Company Limited acquired Shire plc, an Irish-based pharmaceutical company.<sup>92</sup> Both are global companies, with similar size, with Takeda focusing on supplying treatments for Japan and developing countries and Shire targeting mainly the US market. While the main areas in which Takeda acts are oncology, gastroenterology, vaccines, neuroscience (being a major player in the first three), Shire is specialized in developing treatments for rare diseases (in fields such as immunology, hematology, neuroscience, gastroenterology, genetic diseases and ophthalmic) (European Commission, 2018b, p. 2). There are two fields in which both companies act: neuroscience and gastroenterology, although the EC considers that the

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<sup>92</sup> Case COMP/M. 8955 (EC 2018).

first one does not give rise to competitive concerns as both companies do not have marketed or pipeline products in the same disease areas.

When it comes to gastroenterology, some overlaps arise, specifically regarding treatments for: (i) inflammatory bowel diseases (IBDs) - including ulcerative colitis (UC) and Crohn's disease (CD); (ii) chronic idiopathic constipation (CIC); and (iii) esophagitis. The EC considers that the latter does not present competitive concerns as Takeda's incumbent products and Shire's pipeline project for the treatment of esophagitis are destined to different types of the disease and, therefore, would not belong to the same relevant market.

The treatment of UC and CD can be divided in three lines of treatment and the EC defines two relevant markets regarding the treatment of UC and DC in which the companies act: mesalazine (first line)<sup>93</sup> and anti-integrins (third line).<sup>94 95</sup> It is important to add that the EC considered as rivals or potential rivals both firms with incumbent products and pipeline projects. There is a product-to-pipeline overlap (therefore a case in which there is innovation competition through ongoing innovation efforts for developing new products in an existent product market) between anti-integrins (a biologic considered as a third-line treatment)<sup>96</sup>, once Takeda sells a drug called as Entyvio (vedolizumab) while Shire has a competing pipeline project (p. 3-11). Takeda's Entyvio has 100% share in this market definition in the EEA, as it is the only anti-integrin available. Meanwhile, there are two anti-integrins pipelines: besides Shire's, Roche is also developing a competing pipeline, both being in Phase III clinical trials.<sup>97</sup>

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<sup>93</sup> There is a horizontal product overlap as both Takeda and Shire supply mesalazine, a first-line treatment in which there is no innovation concerns. The EC concluded that the merger would not result in anticompetitive effects in any of the geographical markets (European Commission 2018, p. 12-13).

<sup>94</sup> It is worth mentioning that the EC considers that biologics, the third-line treatments, could be further divided into three markets: (i) anti-TNFs; (ii) anti-integrins and (iii) IL inhibitors, as they have different modes of action. As the biologics marketed (Takeda) and being developed (Shire) and anti-integrins, the EC considered as the market for anti-integrins. The next case study, AbbVie/Allergan discusses the division of biologics into different relevant markets deeper.

<sup>95</sup> When it comes to the geographic dimension of market dimension, the EC emphasizes that it usually considers pharmaceuticals as nation-wide when they are incumbents and EEA-wide when they are pipeline projects and repeats this procedure in this merger assessment. Furthermore, regarding the treatment of CIC, the EC leaves the precise market definition open as it considers that the mergers would not be harmful regardless of how the market is defined

<sup>96</sup> Biologics, as well as innovative small molecules are denominated as post-conventional treatments in the next case study, AbbVie/Allergan.

<sup>97</sup> The three products (Takeda's Entyvio and the two pipeline projects) have different molecules, but the overall effect is similar (p. 13).

The propositions studied in the last section state that the possibility of harm associated with innovation competition through ongoing innovation efforts for developing new products cases is the delay and/or interruption of product development as a result of less innovation incentives. Precisely, the EC concluded that the merger would result in harm to innovation as the merged entity would have incentives to discontinue or delay the development of Shire's pipeline project, resulting in less variety and a lessening in price competition.

Innovation competition through ongoing innovation efforts for developing new products cases, as discussed, need to be assessed under three groups of evidence: the extent of the business-stealing effects between the merging parties, the extent of the competitive pressure exerted by rivals and time to market launch. The Commission studied three categories of evidence according to the first two of these three groups to conclude that harm would be likely. First, as anti-integrins are the closest competitors to one another due to their superior safety profile and Mode of Action (MoA), the EC considered such closeness of competition already a first indicator of important business-stealing effects generated by Shire's pipeline. Second, also due to its safety, there is not enough competitive pressure from adjacent markets. This statement is also supported by the lack of effect in Entyvio's pricing of the introduction of biosimilars to Remicade (while Remicade's price fell considerably) and the fact that Entyvio is bought through bilateral negotiations with hospitals and not through tenders (such as the anti-TNFs). Third, supporting the existence of high business-stealing effects between the parties, the merged entity is likely to discontinue or delay Shire's pipeline project as it would cannibalize Entyvio's sales due to the first two reasons mentioned and because it would be difficult to differentiate one from the other in the same portfolio (p. 14-17).<sup>98</sup> The merger was approved subject to the divestiture of Shire's pipeline.<sup>99</sup>

Despite not explicitly applying the four-layer competitive assessment, the basic mechanism, which is assessing both price and innovation competition with a special look

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<sup>98</sup> The EC also discusses the duration of Entyvio's patent protection, but the data is not available in the public version of the document (p. 17).

<sup>99</sup> In May 2020, Takeda submitted a request to waive the divestiture of Shire's pipeline, due to: (i) the emergence of new drugs, with superior safety profile; (ii) some negative studies regarding Shire's pipeline and (iii) the management of the divestment business found difficulties in finding patients for the clinical trials. The request was accepted by the EC. Check: [https://ec.europa.eu/commission/presscorner/detail/en/IP\\_20\\_967](https://ec.europa.eu/commission/presscorner/detail/en/IP_20_967)



at pipeline projects, was applied. Regarding price competition, the EC found a horizontal overlap in the product market for mesalazine, but no anticompetitive effects were identified (first layer). The focus of the assessment was on the innovation competition through ongoing innovation efforts, as there was a product pipeline overlap (not on late stage), which generated innovation effects.

Finally, the third form of innovation competition – innovation competition through future innovation efforts or the fourth layer in the four-layer competitive assessment - was not assessed. As both firms had similar capabilities and lines of research, the merger could result in diminishing innovation incentives related to future innovation efforts. It is impossible to precisely affirm that such effects would take place without further investigation, however in the next case study, AbbVie/Allergan (2020), the firms also present overlaps related to the treatment of UC and CD and the EC mentions that no innovation concerns arise in the fourth layer of assessment as there are many sufficient competing R&D at the global level, offsetting innovation effects on this layer.

It is important to recall that in the beginning of the assessment, the EC mentions that both companies act in the field of neuroscience, but no competitive assessment was undertaken as they do not have product or pipeline overlaps. Given that capabilities and lines of research may be similar, innovation competition through future innovation efforts could be assessed for the field of neuroscience even though there are no other overlaps. The lines of research for treatments of chronic idiopathic constipation (the parties have an overlap in the product market) and esophagitis (Takeda has an incumbent product and Shire has a pipeline, but there no overlap as they are directed to different types of the disease) also could have been assessed on the grounds of innovation competition through future innovation efforts on those lines of research. The fact that this form of innovation competition was not assessed in any line of research within neuroscience, or the lines of research of CIC and esophagitis may be an indicator that, when applying the four-layer competitive assessment, the fourth layer is only assessed when there are competition concerns in the second or third layers (which regards pipelines). Despite not looking at the third pattern of innovation competition and not applying the capabilities principle, the case undertakes an assessment based on the existence of business-stealing effects between the parties and actually checks possible harm related to the delay or interruption of a pipeline product.

## 5.2. AbbVie/Allergan (EC - 2020)

The acquisition of 100% of the shares of the Irish-based Allergan by the US-based AbbVie was signed on 25 June 2019. The two pharmaceutical companies work in multiple areas. AbbVie acts in the fields of immunology, oncology, virology, neuroscience/central nervous system disorders, metabolic diseases, and pain associated with endometriosis. Allergan acts in medical aesthetics, eye care, neuroscience/central nervous system disorders and gastroenterology (European Commission, 2020, p. 1-2).

The European Commission applied the four-layer competitive assessment procedure, previously adopted in Dow/Dupont (2017) and Bayer/Monsanto (2018), and presented in the last section. Unlike in Takeda/Shire, the EC explicitly mentioned the adoption of this procedure. So, they checked possible overlaps regarding:

- (i) price/product competition involving marketed products
- (ii) price/product competition involving late-stage pipeline projects (both product-pipeline and pipeline-pipeline overlaps)
- (iii) innovation competition involving pipeline products in earlier stages (which depend on innovation incentives to finish developing)
- (iv) innovation competition related to capabilities to innovate in certain innovation spaces (p. 5-6)

In this case study, we will discuss both innovation competition layers - the third and the fourth - related to innovation competition through ongoing innovation efforts for developing new products and through future innovation efforts, due to overlaps in capabilities. We will begin with the third layer.

There is innovation competition through ongoing innovation efforts for developing new products regarding treatments for inflammatory bowel diseases (as in Takeda/Shire, includes ulcerative colitis – UC - and Crohn’s disease - CD)<sup>100</sup> (p. 6). The

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<sup>100</sup> There is also an horizontal product overlap in the treatment of uveitis but as the merging parties face a great number of competitors, there is no anticompetitive effects (European Commission, 2020, p. 21-23).

treatment for UC and CD can be divided into conventional and post-conventional treatments (applied when conventional treatments fail). Following the case law (including Takeda/Shire), the EC considered the two types of treatments as different relevant product markets.<sup>101</sup> As shown in Table 3, only Allergan had conventional treatment (so no competitive assessment is needed), while several overlaps appear when it comes to post-conventional treatments. Furthermore, the EC presented a discussion on whether the post-conventional should further divided <sup>102</sup> but the precise definition was left open as in all three possibilities of relevant market, the merger would result in anticompetitive effects (p. 7-13). As in Takeda/Shire, firms with incumbent and pipeline projects were included in the relevant market definition.

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<sup>101</sup> Even though the EC follows Takeda/Shire to some extent, we discussed previously that the EC considered then three lines of treatments, with the first two being the conventional treatments in AbbVie/Allergan and the third, biologics, being the post-conventional treatments along with other innovative treatments.

<sup>102</sup> The discussion on the further division of the post-conventional treatments into different relevant markets was considered as depending on the Mode of Action (MoA) of the treatment. Three possibilities were assessed: (i) including all post-conventional treatments; (ii) including all post-conventional treatments excluding anti-TNFs; (iii) only IL-23 inhibitors. On one hand, all treatments compete with each other regardless of the MoA, while on the other hand, they are not fully substitutable and IL-23 inhibitors are considered as superior treatments. Respondents to the EC Questionnaire considered the IL-23 inhibitors as superior in terms of efficacy, safety, sustainability of effects and speed of onset (European Commission, 2020, p. 12).

*Table 3 - AbbVie and Allergan's incumbent and pipeline products for the treatment of UC and DC*

	<b>Product</b>	<b>Indication</b>	<b>Line of Treatment</b>	<b>Mode of Action</b>	<b>Status</b>
<b>AbbVie</b>	Humira (adalimumab)	UC / CD	Post-conventional	anti-TNF (biologics)	Incumbent
	Skyrizy (risankizumab)	UC / CD	Post-conventional	IL-23 inhibitor (biologics)	Phase III
	Upadacitinib	UC / CD	Post-conventional	JAK inhibitor (innovative small molecule)	Phase III
	ABBV-323	UC	Post-conventional	CD40 antagonist (innovative small molecule)	Phase II
<b>Allergan</b>	Asacol (mesalazine)	UC / CD	Conventional	5-ASA	Incumbent
	Brazikumab	UC / CD	Post-conventional	IL-23 inhibitor (biologics)	Phase II (UC)  Phase II/III (CD)
	ABI-M201	UC	Post-conventional	Microbiome biologic drug	Phase I

Source: European Commission, 2020, p. 8

Regarding the competitive assessment, the EC investigates the three possibilities of relevant market definition left open, checking whether there would be innovation effects. Regarding the narrowest one (only IL-23 inhibitors), no product had reached the product market by the time the merger was assessed by the EC. There were four pipeline projects in development, with two of them involved in the operation. So, in this market definition we would have a pipeline-to-pipeline overlap related to a still non-existent product market and we could consider the market as an innovation market composed by all the firms with pipeline projects towards the same MoA.

The EC focused its assessment on the existence and stage of development of the merging parties' and competitors pipeline products as the necessary evidence for presuming harm. As shown in Table 3, AbbVie's pipeline project was in Phase III clinical trials while Allergan's was in Phase II for the treatment of UC and Phase II/III for the

treatment of DC. Furthermore, there were only two rivals with competing pipeline projects: Eli Lilly (Phase III) and Johnson & Johnson (Phase II for treating UC and Phase III for treating CD). The EC highlighted that having a variety of products would not only result in higher price competition in the future but also that KOLs consider important to have a variety of option for treating patients. Finally, the EC concluded that the transaction would represent a risk of discontinuation of Allergan's pipeline product (brazikumab), the channel of innovation effect associated with innovation competition through ongoing innovation efforts for developing new products cases (p. 13-15).

By looking at the discussion undertaken by the EC, we can connect to the three groups of evidence for innovation competition through ongoing innovation efforts for developing new products cases: related to the extent of the business-stealing effects between the parties, as well as the competitive pressure exerted by rivals and to the time to market launch. First, we can assume that there were strong business-stealing effects among the merging parties as they were close competitors when it comes to substitutability of their treatments. Second, the firms had similar time to market, as they were in similar stages of development. Third, they notice that there were few rivals capable of imposing competitive pressure as despite most of the pipeline projects being in Phase III (including their rivals'), the EC mentions that the parties' internal documents show that all of them may not reach the market, meaning that innovation incentives are needed to finish product development and that the merger may result in harm to innovation (if market launch was imminent, harm would be related to the product market).

When the EC expands its analysis to all treatments for UC and DC excluding anti-TNFs (broadening the market definition), other pipeline-to-pipeline overlaps arise, as shown in Table 3. The EC argued that a possible discontinuation of Allergan's brazikumab would still represent harm in this market definition (p. 15-21).<sup>103</sup> The third

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<sup>103</sup> Such harm would still be likely as: (i) most of the pipeline projects in this market are related to existing MoAs and new alternative treatments are needed to cover different patients' need; (ii) IL-23 inhibitors are considered superior (as previously discussed); (iii) brazikumab would represent an important constraint to rivals, given that Allergan adopted a strategy to differentiate its product by conducting head-to-head trials comparing its efficacy with rival products, providing useful data and a competitive advantage. One of the rival products tested was Humira (AbbVie's marketed anti-TNF and market leader for post-conventional treatments), which is included in the broadest market definition (all post-conventional treatments), so there is also a product-to-pipeline overlap in this case. In that case the discontinuation of brazikumab is still harmful, as the head-to-head trials were conducted also to show that Allergan's promising pipeline project would be superior to Humira, exerting an important competitive constraint to the latter (European Commission, 2020, p. 15-21).

and broadest market definition deserves a few words, as another overlap arises between the merging parties. The category of this case would no longer be pipeline-to-pipeline overlaps towards a new product market, as the relevant market which include all post-conventional treatments is already existent. Besides the evidence already presented in the narrowest market definition, other are worth considering. First, regarding the extent of business-stealing effects, evidence on current and future profitability is presented in the merger procedure, as suggested by the literature for product-to-pipeline overlaps with an existent product market.<sup>104</sup> Second, the overlap in the product market post-brazikumab launch is expected to last as Humira is unlikely to leave the market given its market position. Third, the lack of patent protection of Humira would attenuate the business-stealing effects between the products, however, given the strength of the other evidence, we can conclude that they are high enough to give rise to concerns regarding a possible discontinuation of brazikumab.

So far, we discussed the competitive concerns related to innovation competition through ongoing innovation efforts for developing new products. The third form of innovation competition (through future innovation efforts) and fourth layer of the four-layer competitive assessment discusses innovation competition related to capabilities to innovate in certain innovation spaces. The EC only discusses this layer in a footnote and argues that there are many R&D competing at global level in the field of autoimmune diseases, the main source of overlaps in the merging parties' activities, mentioning a report which indicated that 150 companies were developing 311 medicines and vaccines for patients with autoimmune diseases in 2016 (p. 6).<sup>105</sup> In Dow/Dupont, the EC undertakes a much longer investigation on this layer, mainly due to the fact that there were only five global players on the field, unlike in AbbVie/Allergan. However, to reach this number of players capable of exerting competitive pressure, the EC looked into other R&D players in the crop protection business and, by investigating the whole R&D process, concluded that only the Big Five were integrated and capable of acting in the whole chain. In AbbVie/Allergan the high level of innovation efforts is considered

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<sup>104</sup> Regarding Humira, even though shares began to drop as it lost its exclusivity in 2018 and biosimilars were launched, is still the market leader. Allergan's brazikumab, given its superiority, is expected to be profitable and, furthermore, divert some of Humira's profit (especially considering that the superiority to Humira was subject to the head-to-head test mentioned above). So, business-stealing effects are higher, the higher the profitability of the current sales that would be diverted to the innovation is.

<sup>105</sup> Interestingly, the EC mentions not only pharma and biotech companies, but also R&D undertaken in universities (p.6).

enough to offset any risk of a possible reduction in overall innovation incentives in the industry, without a deeper investigation.

Even though the EC dedicated only a footnote to check a possible reduction in overall innovation incentives, we may undertake an exercise to check whether the innovation competition due to overlaps in capabilities category would indicate harm to innovation on that level. First, the EC considered the field of autoimmune diseases as a whole in this level of assessment, but one could ask whether this is too broad for an innovation market. Would it be true that a firm which has capabilities in developing a specific line of treatment exerts competitive pressure on other firm which has capabilities to develop another type of treatment? Second, if we were to consider a narrower innovation market, we would need to check which lines of research the firms act, by looking at their history in bringing innovation, as well as past and current pipeline overlaps. Currently we know about their ongoing overlaps in UC and CD treatment. Like Dow/Dupont, a closer look to the types of active ingredients and patents would be a good starting point to answer. Third, after defining the innovation market, we would need to check which of the rivals would conduct R&D in similar lines of research to check whether there would be competitive pressure to offset reduction in innovation incentives related to future innovation efforts. A conclusion we may take from this case, is an indicative that the fourth layer of the four-layer assessment, which investigates possible reductions in overall innovation incentives in the industry may be applied without looking deeper into the specific lines of research affected, in a way that does not capture reduction in innovation incentives when it comes to future innovation efforts.

Despite not going deeper in the assessment of the fourth layer, the EC applies the business-stealing principle and concludes that there is a potential interruption of a product development, i.e., negative innovation effects. The merger was approved subject to a full divestiture of Allergan's brazikumab pipeline (p. 25). AstraZeneca was the purchaser of the divested pipeline.

### **5.3. Sabre/Farelogix (DoJ - 2019)**

In 2019, the US Department of Justice published a complaint regarding the proposed acquisition of Farelogix, Inc by Sabre Corporation, requesting that the US District Court for the District of Delaware blocked the acquisition. Both companies acted in the booking services to airlines market. While Sabre was the largest company in the market, Farelogix was a small but innovative player, threatening Sabre's position. As competition occurs within the product market, we can say that this case can fit the innovation competition within the product market through continuous innovation efforts category, given Farelogix's behavior in the market.

To discuss this market, we need to look on how the airline tickets are sold in the USA. Consumers may acquire tickets directly (online or through a call center) and through travel agencies (both online and traditional). The interaction between airlines and travel agencies is intermediated by the Global Distributions Systems, which provide the booking service through a software which allows the travel agencies to search and book flights through multiple airlines. The market is dominated by three GDS: Sabre (the leader), Amadeus and Travelport.<sup>106</sup> Farelogix is an innovative company which created the New Distribution Capability (NDC), a next-generation technology. Based on the NDC, Farelogix also created the Open Connect system (OC). This innovation was ground-breaking for the market, as it allows the airline companies to offer a more personalized offer to the customer, such as priority boarding, internet, and snacks (Department of Justice, 2019, p. 3). Farelogix's innovation not only improved the quality of service offered to the final customer but was also used by airlines to negotiate lower prices with traditional GDSs.

The GDSs tried to use their market power to shut down Farelogix, as shown by Sabre's internal documents and reported by Farelogix<sup>107</sup> (p. 3-4). While such practices were successful in limiting Farelogix's growth when it comes to traditional travel

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<sup>106</sup> As stated, Sabre is the largest, having over 50% shares on booking through traditional travel agencies (over 80% for large travel management companies) and over 50% for online travel agencies. The DoJ mentions that Sabre and the two other GDSs resist adopting new technologies and charge high prices to the airlines.

<sup>107</sup> In 2013, Sabre requested that the US Department of Transportation blocked the use of NDC. Farelogix also claimed that Sabre pressured and retaliated airlines that adopted the company's services as in 2011, Sabre retaliated against American Airlines for adopting Farelogix's system by making its flights less visible to travel agents. Finally, the three GDSs contractually restricted the airline's ability to use cheaper and more advanced service (DoJ, 2019, p. 3-12).



agencies, the company was able to grow in the segment of online travel agencies (p. 11-12).

As competition occurs within the product market, DoJ undertook a traditional product market assessment. First it defined two product markets<sup>108</sup> and no innovation markets were defined. Second, it looked at shares and concentration indexes, concluding that Farelogix has low market-shares, but the market has 3500 points in the HHI, which is considered very high, and acquisition would increase it in 350 points (p. 15-16). However, as it would be expected in this form of innovation competition, the DoJ also considers that the shares did not reflect the competitive significance of Farelogix, as the company is a disruptive player which not only was responsible for a downward pricing pressure but is also projected to increase its shares as the industry increasingly adopts NDC as standard technology. Furthermore, Farelogix led other companies to innovate. In 2017 Sabre began developing its own capabilities with a plan to surpass Farelogix in 2020, in case the acquisition failed.

The DoJ concluded that the acquisition would result in anticompetitive effects on both prices, quality, and innovation.<sup>109</sup> When it comes to innovation effects, the DoJ listed the reasons why the acquisition would reduce innovation. First, Farelogix has been the driving force of innovation in the market, especially with the creation of NDC and OC. Second, the threat imposed by Farelogix was responsible for the adoption of NDC by Sabre and its investment in new technology. Third, Sabre plans to increase innovation efforts to catch up with Farelogix in case the merger does not happen. Fourth, Farelogix would also have incentives to keep investing in innovation in order to appropriate the gains from its innovation (p. 18-19). Summing up, we can say that the incentive to innovate of both companies arise from the business-stealing effects from the parties.

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<sup>108</sup> The product markets defined were booking services for airline tickets sold through (i) traditional and (ii) online travel agencies. The geographical market was defined as the USA

<sup>109</sup> Regarding the price and quality effects, the DoJ: (i) reinforced the Farelogix's role in decreasing fare; (ii) presented statements and messages from executives which mentioned that the acquisition would allow prices to go up; (iii) stated that Sabre would have increased market power on the online travel agencies market, which was eroded by Farelogix (p. 17). As Sabre would have significant increase in market power, the DoJ also emphasized that US full-service airlines would be particularly harmed by the transaction as: (i) a great part of their revenue comes from sales made through travel agencies; (ii) their booking needs are more complex than other airlines; (iii) business travelers are important customers to those airlines, which make them especially dependent on travel agencies.

We can add other elements which signalize the presence of high business-stealing effects between the parties. First, their services are close substitutes. Second, Farelogix's innovation diverted sales from Sabre, pressuring prices down and increasing Sabre's innovation efforts. Third, the DoJ discusses that there is a perspective of intense growth in Farelogix's sales as the NDC becomes the industry standard. Fourth, the acquired firm has a recent history of bringing innovations in the market. Fourth, Farelogix has an innovation-intensive competitive strategy of going through innovation and considering how the traditional GDSs resist innovating and how Sabre was pushed to innovate due to Farelogix, we could even consider it as an innovation maverick.

When it comes to the competitive pressure placed by rivals, we can emphasize that Farelogix was the only firm engaging in innovation efforts when it developed NDC and its innovation efforts are the reason which its rivals (Sabre, at least) engage in innovation, so there is no external rivalry in innovate which could offset the innovation effects arising from this merger.

The innovation competition through continuous innovation efforts category is concerned with the withdrawal of a firm which engages in innovation efforts continuously. Even though the complaint is focused on the impact of the introduction of a particular innovation (NDC) in the market, the DoJ emphasizes how the introduction of the NDC pushed Sabre to engage in innovation efforts and how Farelogix would also have incentives to keep innovating to appropriate the gains from its innovation. In that sense, the removal of Farelogix generates precisely the innovation effect which this category is concerned: the reduction in incentives to begin new innovation efforts.

Besides presenting anticompetitive effects, the DoJ argued that there are significant barriers to entry in this market, such as: (i) technical difficulties and time to create an integrated IT system using NDC and (ii) contracting practices by the traditional GDSs to avoid that airlines look for new services. The DoJ also states that Farelogix invested over 100 million dollars to develop its solutions and persisted for 15 years to become a competitive threat to Sabre. Finally, the transaction would not result in merger-specific efficiencies (p. 19). As a result of significant anticompetitive effects, high barriers to entry and no efficiencies, the DoJ announced that it would seek to block the transaction.

The assessment of Sabre/Farelogix mostly followed the first form of innovation competition by undertaking a product market assessment, but with the presence of innovation diminishing the role of shares and concentration indexes. Although not explicitly, the business-stealing effects were applied and innovation effects were considered as in the second channel of innovation effects, resulting in possible reduction in innovation incentives to begin new innovation efforts.

## **6. Concluding Remarks**

The inadequate assessment of innovation competition in mergers may result in reductions in innovation incentives which could be avoided. Such innovation effects may harm not only the market at stake, but the development of economies as a whole. Despite its importance, the assessment of innovation competition horizontal mergers is a challenge for jurisdictions around the globe. The characteristics of innovation, an inherently diverse process which is also subject to uncertainty, makes the proper assessment harder as the traditional approach to product market cases have limited applicability.

The US agencies and the European Commission undertook efforts to improve their procedures, increasingly changing their guidelines and the way they assess these cases. When it comes to the Horizontal Merger Guidelines themselves, the 2004 European one does not address innovation effects, while the 2010 US version has a subsection dedicated entirely to unilateral innovation effects, based on the business-stealing and dynamic effects principles. The two HMG do not set a procedure specifically designed for the assessment of these effects. However, the European Commission introduced a new procedure in Dow/Dupont (2017) – the four-layer competitive assessment - applied to other cases as well, which address innovation competition including not only the business-stealing and dynamic effects principle but also elements from a capabilities-based assessment.

We concluded that the propositions for assessing innovation effects may be grouped into three forms – innovation competition through continuous innovation efforts, through ongoing innovation efforts for developing new products and through future innovation efforts. By grouping into forms of innovation competition we can recognize

similarities between the proposals, identifying similar groups of cases and principles applied by different authors. We were also able to group suggestions for evidence, which can be helpful for changing the guidelines applied by the jurisdictions. Each of these patterns need to be addressed differently and innovation effects may take place through different channels.

As seen, the case studies shows that the case law provides us examples of the assessment of innovation effects in mergers with different characteristics which can be associated to the different patterns of innovation competition. We can draw a few conclusions from them. First, given that the EC applied explicitly the four-layer competitive assessment in AbbVie/Allergan (2020), but not in Takeda/Shire (2018) despite the fact both mergers addressed similar treatments, the four-layer competitive assessment seems to be applied still with caution by the EC. Takeda/Shire was addressed earlier than AbbVie/Allergan, but its notification took place almost a year after Dow/Dupont (2017) was decided. Second, in both cases, the assessment of innovation competition through future innovation efforts is still timid, given that the EC only investigated it in one of the two cases (AbbVie/Allergan) and did it briefly, without going further than discarding it for the number of players with similar capabilities. Although a high number of players indicates the existence of competitive pressure, further investigation would be important, as the authorities need to check the specific lines of research in which the players act and the extent of post-merger rivalry in those lines. The lack of appropriate assessment on this form of innovation competition shows that harm to innovation in a long- and unforeseeable-time horizon is still a minor issue for the assessment. A proper application of the dynamic effects principle includes looking at harm in multiple time horizons. Third, the focus on innovation competition through ongoing innovation efforts shows that much of the focus of the EC on innovation effects is centered on the possible delay or interruption of pipeline projects. Fourth, the US jurisdictions, the DoJ at least, is concerned with the innovation competition within the product market, as it sought to block an acquisition which would eliminate a continuous innovator in the market. It properly addressed innovation competition through continuous innovation efforts in the product market, by applying traditional procedure for a product market competition assessment but with a closer look on innovation and not only price effects. Fifth, in all the cases the business-stealing principle is applied and is directly connected to the evidence used in the cases showing that it plays a major role in the

assessment. Finally, the capabilities principle still needs to be further as it did not play a major role in the assessment of these cases.

The three cases show that not only both agencies sought to change their guidelines and procedures, but also that innovation effects are being considered in cases with different faces of innovation competition. However, the three agencies still have some ground to cover, especially when it comes to the assessment of overlaps in capabilities and the effects of mergers in future innovation efforts. As recommendations of research agenda, we can suggest: (i) new case studies need to be done regarding recent cases in these agencies to properly investigate how innovation competition assessment is evolving; (ii) a deeper empirical exercise is also needed to investigate whether and how innovation effects are being increasingly assessed and the final results to innovation; (iii) look at similar movements towards assessing innovation competition in other jurisdictions; and (iv) changing the Horizontal Merger Guidelines towards better addressing innovation competition cases, considering the specificities of each case.

### **III. INNOVATION CONCERNS IN HORIZONTAL MERGERS: THE BRAZILIAN EXPERIENCE**

**Abstract:** This paper discusses the Brazilian Merger Control experience in addressing innovation concerns in the assessment of horizontal mergers. The goal is to investigate how CADE – the Brazilian antitrust authority – has discussed innovation concerns in merger assessment, taking the antitrust literature and the US and European Commission experiences as starting points. We consider as innovation concerns both: (i) cases that are assessed under the standard analysis (focused on product market competition) in which innovation issues are relevant for the assessment of innovation and other (prices mainly) unilateral effects; and (ii) cases assessed under an alternative procedure (“innovation-specific assessment”). To achieve our goal, we discuss the theoretical background of innovation concerns in merger analysis and debate the US and European Commission experiences. Then, we look at cases assessed by CADE between 2015 and 2021 which had a decision by the Administrative Tribunal and debate how innovation concerns are included in the analysis. We find that in 20 cases (22.2%) there were innovation concerns, in which 19 cases were assessed exclusively through the standard analysis and in Bayer/Monsanto (2018) an innovation-specific assessment was used, a limited experience when compared to the US and the European Commission. Although innovation concerns were part of the assessment to some extent, improvements are needed in both the Brazilian Horizontal Merger Guidelines and in the merger procedure itself.

**Keywords:** Competition Policy, Mergers, Innovation, Brazil, CADE

**JEL:** L40

**Resumo:** Este artigo discute a experiência do Controle de Fusões brasileiro na abordagem de questões de inovação na avaliação de fusões horizontais. O objetivo é investigar como o CADE – a autoridade antitruste brasileira – tem discutido as questões de inovação na avaliação de atos de concentração, tomando como ponto de partida a literatura antitruste

e as experiências dos EUA e da Comissão Europeia. Consideramos como questões de inovação tanto: (i) casos que são avaliados sob a análise padrão (focada na concorrência no mercado de produtos) em que questões de inovação são relevantes para a avaliação de efeitos unilaterais em inovação e outros (principalmente preços); e (ii) casos avaliados de acordo com um procedimento alternativo (“avaliação específica da inovação”). Para atingir nosso objetivo, discutimos os fundamentos teóricos das questões de inovação na análise de fusões e debatemos as experiências dos EUA e da Comissão Europeia. Em seguida, analisamos casos julgados pelo CADE entre 2015 e 2021 que tiveram decisão do Tribunal Administrativo e debatemos como as questões de inovação são incluídas na análise. Constatamos que em 20 casos (22,2%) havia questões de inovação, em que 19 casos foram avaliados exclusivamente por meio da análise padrão e em Bayer/Monsanto (2018) foi usada uma avaliação específica da inovação, uma experiência limitada quando comparada aos EUA e a CE. Embora as questões de inovação tenham feito parte da avaliação até certo ponto, são necessárias melhorias tanto Guia de Análise de Fusões Horizontais quanto na própria análise de fusões em si.

**Palavras-chave: Defesa da Concorrência, Fusões, Inovação, Brasil, CADE**

## 1. Introduction

Innovation competition in merger assessment is a challenge for antitrust authorities. From the attempt to define an innovation market by the US Merger Control<sup>110</sup> in the mid-1990s to the recent European four-layer competitive assessment<sup>111</sup>, the agencies applied new procedures in order to properly analyze these cases. However, interestingly, these different procedures are not presented in either of the jurisdictions' Horizontal Merger Guidelines (HMG). On one hand, the HMG in the US and EU<sup>112</sup> present what we call as the standard merger analysis, focused on product market competition. On the other hand, these jurisdictions have applied alternative assessments focused on innovation competition which depart from the standard analysis.

The challenges begin by whether the standard analysis applied in product market competition cases could be applied to innovation competition to assess whether an alternative assessment would be needed. If this procedure is applicable, does it need any changes? If not, what is the adequate alternative?<sup>113</sup> Innovation itself make the challenge harder: the outcomes are uncertain and competition through innovation occurs in many different ways, each one demanding a different approach by the authorities. Furthermore, the theoretical background on innovation competition indicates that concentration indexes and market shares, and even the traditional product market definition are less helpful when innovation is at stake.

Despite being a hard task, properly assessing innovation competition cases needs to be a relevant concern to the agencies, as inadequate assessment may undermine innovation incentives. Empirical works by Gilbert & Greene (2015) and Kern, Dewenter

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<sup>110</sup> Kern, Dewenter & Kerber (2016) argue that the Innovation Market Analysis (Gilbert & Sunshine, 1995) influenced the 1995 Antitrust Guidelines for the Licensing of Intellectual Property. Gilbert & Tom (2001, p.44) show that the cases challenged on innovation concerns grew from only 4 (3%) in the first half of the 1990s to 47 (17.5%).

<sup>111</sup> There is a great number of publications discussing Dow/Dupont (2017), the first case to be assessed under the four-layer competitive assessment, specifically or its impact on EU Merger Control in general. Check: Petit (2017, 2018a, 2018b), Denicolò & Polo (2018), Mosso (2018), Padilla (2019), Jung & Sinclair (2019), Chadha (2019), Seiler (2019), Kokkoris & Valletti (2020), Kokkoris (2020).

<sup>112</sup> In this paper, when we refer to the European or European Union jurisdiction or experience, we are specifically referring to the European Commission and not the national competition authorities within the European Union.

<sup>113</sup> Katz & Shelanski (2007) and Sidak & Teece (2009) discuss the limitations of the standard analysis when innovation is at stake.



& Kerber (2016) show that the US agencies are facing the task and considering innovation concerns – changes in the steps of the standard analysis due to the existence of innovation efforts in the market or the use of an alternative analysis designed to address innovation competition – in around a third of the mergers challenged between 1995 and 2014. The recent shift in European Merger Control after Dow/Dupont (2017)<sup>114</sup> also shows such efforts in the EU. Given that, to our knowledge, no similar empirical exercise has been made for Brazil, we ought to shed light on how Brazilian Merger Control is assessing such cases.

The main goal of this paper is to investigate whether and to what extent the Brazilian Merger Control is addressing innovation concerns in the assessment of horizontal mergers. By innovation concerns here we include not only the cases in which a different procedure from the standard merger analysis was applied to consider the innovation market, firms' ability to compete through innovation and the merger effect on innovation (we will call it “innovation specific-assessment”), but also those when innovation issues were considered to be relevant for the regular assessment of unilateral or coordinated effects. To achieve this goal, we: (i) present the standard analysis of mergers, as well as how innovation may influence each step, with a special look on the US, EC and Brazilian Horizontal Merger Guidelines; (ii) present the theoretical background on the relation between innovation and competition, emphasizing the basic principles which are helpful for the assessment; (iii) present proposals for alternative assessments designed to assess innovation competition from the literature and practice; (iv) present the US and EC Merger Control experiences in addressing innovation concerns, considering its institutional approach and case law, including empirical literature; (v) present the Brazilian institutional framework; and (vi) investigate innovation concerns in Brazilian merger assessment by doing an exercise such as Gilbert & Greene (2015) and Kern, Dewenter & Kerber (2016), but with important changes to adapt to the Brazilian context. For this exercise we chose to include only at cases decided between 2015 and 2021 as the new search tool for Brazilian antitrust case law presents only cases from 2015 on, which is suitable considering the evolution of the assessment of innovation concerns in the European Commission in that period.<sup>115</sup> Furthermore, given

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<sup>114</sup> Case COMP/M. 7932 (EC 2017).

<sup>115</sup> Todino, Walle, Stoican (2019) discuss how three cases from 2014 and 2015 show gradual changes which culminates in the four-layer competitive assessment in Dow/Dupont. For an overview of how the assessment of innovation concerns evolved in EC Merger Control, check our discussion in the second essay.

that Gilbert & Greene (2015) and Kern, Dewenter & Kerber (2016) investigate the frequency of innovation concerns among the cases challenged in the US, we consider only cases decided by the CADE's Tribunal (CADE – the Administrative Council for Economic Defense – is the Brazilian competition authority), given that for all these cases there either a recommendation (from CADE's General-Superintendence) or a final decision (from CADE's Tribunal) for blocking or approving subject to remedies.<sup>116</sup>

The next section discusses the theoretical background of innovation concerns in Horizontal Merger Control, addressing the standard analysis and innovation-specific assessments, as well as briefly debating the US and EU experiences. The third section discusses the empirical exercises undertaken on the frequency of innovation concerns, mostly in the US but in the EU as well. The fourth section presents the methodology and our results on the investigation on the assessment of innovation in Brazilian Merger Control, also briefly discussing its institutional framework. Finally, the fifth and last section presents the concluding remarks.

By the end, we find that innovation concerns were addressed in only 20 cases assessed by the Tribunal in recent Brazilian Merger Control (22.2% of total cases addressed by the Tribunal), with only one being assessed on an innovation-specific assessment and the other 19 being assessed exclusively through the standard analysis, a limited experience when compared to the US and EU. Even the ones assessed in the standard analysis presented timid innovation concerns. Recommendations towards both improving the assessment of innovation concerns in the standard analysis and developing an innovation-specific assessment which considers the specificities of the Brazilian economy are some of the final thoughts presented by the end of the paper.

## **2. Innovation Concerns in Horizontal Merger Control: theory and international experience**

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<sup>116</sup> As better discussed in section 4, many cases are approved by the General Superintendence (SG), the investigative body of CADE and are not addressed by the Tribunal.

Competition is a complex subject and to have a proper overview on how this process takes place we have to consider the firms' behavior in the market, considering its strategies beyond setting prices and/or quantities, such as increasing (or even decreasing) the quality of a product, offering a larger variety of colors, bundling, or tying the product with another one, etc. Among the many decisions a firm may take to offset their competitors, a fundamental one is engaging in innovation efforts, which may result in developing new or improved processes and products, resulting in higher demand and/or profit margins for the successful innovator. For Schumpeter, competition has a passive side, the static price competition, in which firms adjust their prices to increase their profits and an active side, the dynamic innovation competition, responsible for changing the economic structure itself (Schumpeter, 1942).

Innovation concerns plays a dual role in merger analysis: (i) innovation can affect the assessment of a merger when the merging parties compete within a product market, affecting the assessment of merger effects on prices, quantity, quality (and innovation), etc. by creating barriers to entry, lowering production costs, or diminishing the ability to coordinate on prices, for example. It may include or not merger effects on innovation within the product relevant market; and (ii) innovation competition also appears in merger analysis in a way that it may be necessary to delimitate an innovation relevant market, consider the firms with the capabilities to compete through innovation, and evaluating the merger effect on innovation ("innovation specific-assessment"). For instance, suppose that two firms engage in innovation efforts towards developing a product which addresses a need not yet met, i.e., creating a new product market.

### **2.1. Standard analysis of horizontal mergers: innovation concerns in the step-by step procedures of merger effect**

The standard analysis of horizontal mergers focuses its assessment on competition within a relevant product market, i.e., a market composed by firms supplying competing goods and services. The current paradigm that guides competition policy assessment – the post-Chicago approach – focuses its procedures in Merger Control on whether there would be short-run price increases in the post-merger scenario: short-run price effects. The focus on price competition is supported by the goal pursued by competition authorities of maximizing economic efficiency, frequently understood as static allocative

efficiency<sup>117</sup>: the farther prices are from the perfect competition equilibrium, the greater the deadweight loss is and, therefore, welfare is diminished. The authorities look at the net effect of the merger by counterbalancing the potential anticompetitive effects and countervailing efficiencies, the negative and positive effects on welfare, respectively. Although the authorities consider other mergers effects, such as quality and innovation, price effects are the main concern to most antitrust authorities (Budzinski, 2008, p. 301). However, even when undertaking the standard analysis and addressing price effects, innovation concerns may appear in different phases of the assessment.

Regarding the standard procedure itself, we can discuss the steps jurisdictions usually take. CADE divides its merger procedure into six steps: (i) relevant market definition, (ii) level of concentration, (iii) unilateral effects (including assessment of entry, rivalry, and portfolio power), (iv) buyer power, (v) coordinated effects and (vi) efficiency gains (CADE, 2016a). It is possible to say that the Brazilian Horizontal Merger Guidelines, the US, and EU HMG follows similar standards of analysis when considering price effects, so we will present these steps and how innovation concerns may appear in their standard analysis.

Relevant market definition is usually the first step in merger assessment. This process is usually undertaken through the Hypothetical Monopolist Test (HMT) to check if a hypothetical monopolist would be able to profitably apply a small but significant non-transitory increase in price (SSNIP) – if the answer is yes, the market is well defined, if not, the test is remade adding other products/geographic areas to the hypothetical monopolist until the price increase is profitable (Department of Justice & Federal Trade Commission, 2010, p. 7-15).

The analysis of the level of concentration is undertaken with screening purposes, by assessing the market power of merging parties and the increase of market concentration due to the merger. In most cases the authorities look at the firms' market shares and concentration indexes such as the Herfindahl-Hirschman Index (HHI)<sup>118</sup> as

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<sup>117</sup> Static allocative efficiency is a concept based on a Pareto criterion: an allocation of resources is considered Pareto-efficient if there is no other allocation possible in which at least another agent is worse off (Hovenkamp, 1994, p. 75). Although other efficiency criteria may be discussed such as productive or dynamic (Motta, 2004), Budzinski (2008, p. 301) emphasizes static allocative efficiency as the main goal in the current post-Chicago approach.

<sup>118</sup> The Herfindahl-Hirschman Index is calculated by summing the squared markets shares of all firms in the product market and used as an indicative of the level of concentration in that product market.

larger firms in more concentrated markets would be less likely to reduce prices or increase quality. Higher shares also indicate cost advantages or attractiveness of the firm's product in non-price factors (Department of Justice & Federal Trade Commission, 2010, p. 15-19).

However, this relation between structural factors and prices is weaker when differentiated products are at stake. With homogenous products, there is a direct relation in the Cournot model (which is based on homogenous products) between market power and the HHI which supports the screening role of structural factors. When we discuss differentiated products, other factors are considered related to the substitutability between the parties' products, such as the cross elasticity of demand and diversion ratios<sup>119</sup> (CADE, 2016a, p. 36-37).

As when product differentiation is at stake, the existence of innovation efforts in the market also downsizes the role of concentration and market shares in determining the merger effect, as they can be volatile and with low explicative power of firm's ability to compete and market power when firms are highly innovative. Furthermore, the relation between concentration and innovation is not definitive in the literature.<sup>120</sup> The most recent version of the US and European Horizontal Merger Guidelines mention that the role of shares needs to be adjusted when there is innovation, often referred in the guidelines as the situation in which there is the adoption of a new technology (Department of Justice & Federal Trade Commission, 2010, p. 16-17; European Commission, 2004b, p. 6).

The next step in merger analysis is addressing unilateral effects, related to the increased ability of the firm in exercising its market power individually. Such market power can be exercised through higher prices, less innovation (which we will focus in the next section) and quality. As discussed, authorities usually focus their assessment on short run price effects. In this step of merger assessment, factors such as rivalry (the intensity of competition between firms) and entry (the conditions of entry in the relevant product market) are investigated by the authorities and play an important role, as the existence of

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<sup>119</sup> The diversion ratio is a fraction of sales diverted to another producer due to a price increase (Department of Justice & Federal Trade Commission, 2010, p. 21).

<sup>120</sup> The well-known Arrow-Schumpeter controversy indicates two different positions on the relation between structure and innovation, as Arrow (1962) presents a model which indicates that competitive firms have higher incentives to engage in innovation efforts to escape competition than monopolists, while Schumpeter (1942) emphasizes that larger firms would be more likely to innovate. This debate has both theoretical and empirical work, but the latter did not provide a definitive answer to this debate.

significant barriers to entry and low rivalry may facilitate exercising market power both individually and in a coordinated way. Innovation may be at stake when considering entry conditions, such as when a high volume of investment is needed to entry in R&D (European Commission, 2004b, p. 12; CADE, 2016a, p. 27) and when discussing rivalry, as firms may compete more or less intensely regarding innovation, such as firms which continuously challenge the market by bringing innovation. As we will discuss in the next subsection, the US HMG also debates and lists unilateral innovation effects.

As there is no discussion of innovation concerns when looking at the existence of powerful buyers, we can move to the assessment of coordinated effects, the fifth step, which investigates whether there would be incentives for firms to engage post-merger in coordinated interaction in the relevant market. Innovation concerns are at stake here as coordination is considered to be less likely if the market is characterized by innovation (European Commission, 2004b, p. 10; Department of Justice & Federal Trade Commission, 2010, p. 26). There is also the argument that coordinated behavior may reduce innovation (CADE, 2016a, p. 40).

Finally, the last step of the traditional merger procedure is looking at possible countervailing efficiencies, which can offset or attenuate anticompetitive effects. They are the procompetitive side of mergers, as the merged entity may face increased incentives and ability to compete by combining their activities. Incremental cost reductions may reduce or reverse unilateral effects, as well as making coordination less likely or effective when it creates a maverick<sup>121</sup> firm or provides incentives for an existing maverick to lower prices. It is important that they are merger-specific, i.e., would not be achievable without the merger (Department of Justice, Federal Trade Commission, 2010, p. 29-31). Innovation-related efficiencies may be considered as increases in the ability to innovate due to synergies when complementary capabilities get together, making R&D efforts more efficient (Bena & Li, 2014, p. 195), or when there is a transfer of technology between firms (Federico, Scott Morton, & Shapiro, 2020, p. 134).

It is important to add that CADE also discusses the elimination of a maverick, defined as firms which “...usually have low production costs and prices, pushing market

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<sup>121</sup> A maverick is a firm with disruptive behavior, regarding prices or other variables, including innovation (CADE, 2016a, p. 47).

prices down, or are inventive firms that foster ongoing innovation in their industry” (CADE, 2016a, p. 47) which may, among other effects, reduce innovation.

After discussing the steps of the standard merger analysis and the innovation concerns present on each step, we can conclude that the Brazilian Horizontal Merger Guidelines discusses innovation concerns in only few steps. First, innovation effects are considered as the agency mentions slower pace of innovation as a possibility of innovation effects. Second, when discussing entry conditions, a high level of investment needed in R&D is considered a barrier to entry (CADE, 2016a, p. 27). Third, regarding coordinated effects, CADE expresses concerns that a merger might reduce innovation due to coordinated behavior (p.40). Fourth, among the types of efficiencies considered by the authority, innovation being introduced into a product or process is considered (p. 44). Fifth, the elimination of a maverick may lessen innovation (p. 47). The EU 2004 Horizontal Merger Guidelines is also timid when it comes to innovation concerns, including elements such as: (i) considering less innovation as anticompetitive effects; (ii) the revision of the role of market shares as indicators of competitive significance; (iii) a discussion on a dual effect of mergers on innovation when debating innovation effects, pointing out that innovation makes coordination harder; (iv) innovation and R&D as barriers to entry, and; (v) R&D and innovation-related countervailing efficiencies (European Commission, 2004b). The US 2010 HMG discusses innovation when: (i) relativizing the role of shares and concentration indexes; (ii) discussing that enhanced market power may be manifested through less innovation; (iii) presenting unilateral innovation effects (better addressed in the next subsection); (iv) discussing that coordination may be less likely, (v) debating countervailing efficiencies (Department of Justice & Federal Trade Commission, 2010).

## **2.2. Innovation Concerns in Horizontal mergers and innovation-specific assessments: basic principles and the US and EU experiences**

Whenever firms compete through innovation efforts to bring new or improved products, services, and processes to capture away and protect sales from each other, we can consider that there is innovation competition (Federico, 2017, p. 671). This form of competition can occur in different ways, as innovation itself is a multi-sided process, with

different faces. First, as discussed in the previous subsection, firms which compete in the same product market may engage in innovation efforts. Second, innovation competition is also at stake when there is no product market and firms are engaging in competing innovation efforts. The first case may be addressed by the standard analysis, while the second needs a different approach. There are a few proposals for assessing innovation competition departing from the standard analysis, taken from the literature and practice. We will refer to them as *innovation-specific assessments*.

In this subsection we will discuss how the US and EU experiences address these cases which would demand an innovation-specific assessment regarding both their guidelines and practice, as well as briefly presenting proposals for innovation-specific assessment. However, we first need to make some comments about innovation competition, especially regarding its basic principles for assessment.

First, we need to define harm to innovation, also called as *negative innovation effects*. In this paper we will consider it as post-merger reduction in innovation incentives, i.e., if after the merger, the merged entity and/or its rivals are less likely to engage in innovation efforts, we can consider that the merger is harmful to innovation<sup>122</sup> and the authorities need to intervene, either blocking the merger or imposing antitrust remedies.<sup>123</sup> However, arriving at such conclusion is not an easy task.

Second, when innovation competition is at stake, we can investigate the existence of negative innovation effects in a similar way as the assessment of increases in pricing pressure through the *business-stealing principle*. The existence of a perspective of losing profitable sales to a successful innovator places innovation-related business-stealing effects between the two rivals. The more substitutable the products are and the higher the price/cost margin is, the higher are the business-stealing effects (Federico, Scott Morton, Shapiro 2020, p. 128-129). This perspective of losing sales to a successful innovator may provide firms incentives to innovate. When merger takes place, such innovation externalities are internalized and, therefore, innovation incentives are diminished,

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<sup>122</sup> Another way of assessing harm to innovation is the through the elimination of parallel research efforts, the Diversity Argument, connected to the evolutionary approach (Jorde & Teece, 1990; Farrell, 2006; Sidak & Teece, 2009). A greater number of innovation efforts increases the probability of at least one getting to the market, allowing a better functioning of the role of the market as a selector of innovation and, as Farrell (2006) states, a diversity of approaches is beneficial in itself.

<sup>123</sup> Antitrust remedies are conditions imposed by the authorities to approve a merger.



resulting in unilateral innovation effects (Federico, Scott Morton & Shapiro, 2020, p. 130-132).<sup>124</sup>

Third, Kokkoris & Valletti (2020, p. 233-234) list two channels in which negative innovation effects may occur: (i) less incentives to continue product development, possibly delaying and/or interrupting these innovation efforts; and (ii) less incentives to begin new innovation efforts, resulting in less innovation in the future. These channels are similar to the unilateral innovation effects present in the 2010 US Horizontal Merger Guidelines, as the HMG includes a subsection dedicated to innovation on the unilateral effects section, mentioning two channels of innovation effects: (i) if a merging party is engaging in innovation efforts that could divert sales from the other and (ii) when firms have similar innovation capabilities which could capture sales from each other, resulting in a longer-term innovation harm (Department of Justice & Federal Trade Commission, 2010, p. 23-24). We will discuss innovation effects more deeply in the next subsection, after presenting the basic principles of innovation competition, but it is important to state that even in a standard analysis regarding product market competition, unilateral effects may be addressed.

Fourth, proceeding to the innovation-specific assessments, we can start by discussing relevant market definition. As discussed, the standard analysis focuses its assessments on product market competition. To build an assessment which investigates innovation competition outside the product market, an alternative is to define an *innovation market*, composed of the firms which have the necessary innovation efforts and/or capabilities to be considered as rivals. Furthermore, the assessment of competitive significance in this innovation market would need to be done by considering the extent of the firms' capabilities, indicators of the strength of the firms in an innovation market. Using the firms' capabilities in steps of merger assessment may be referred as the *capabilities* principle. Authors such as Gilbert & Sunshine (1995), Katz & Shelanski (2007), Sidak & Teece (2009), Kerber (2017) may be associated with the use of this principle, favoring a Capabilities Approach. In Dow/Dupont (2017), the EC proxied the

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<sup>124</sup> The use of a mechanism similar to the estimation of unilateral price effects for innovation can be also found in Farrell & Shapiro (2010, p. 33-34) and Shapiro (2012, p. 363-365). In the first paper the authors introduce the innovation diversion ratio, measuring the extent of the diversion of the firms' profits after their rivals' innovation. This index may be applied to measure the extent of the innovation related business-stealing effects between the parties. In the second paper, Shapiro list the principles which guide the relation between innovation and competition, Contestability, Appropriability and Synergies. According to the Contestability Principle, innovation incentives are connected to the perspective of gaining or protecting sales.

competitive significance of the merging parties through patents and new active ingredients, indicators of the firms' capabilities.

Fifth, the assessment of innovation effects also needs to differ from short run price effects when it comes to the time horizon of merger effects. When innovation incentives are diminished, welfare may be affected in multiple time horizons as the interruption of a pipeline product can have a medium to long run effect and the reduced incentives to engage in innovation efforts in the future may harm welfare in a long- and unforeseeable-time horizon. The need to address innovation effects in multiple time horizons can be referred as the *dynamic effects principle*.

We can now turn to discuss the US experience with innovation-specific assessment. Even though there were innovation concerns way back in *Dynamics/United Electric Coal Companies* (1974)<sup>125</sup>, the first dynamic aspects of merger assessment in the US appeared in the 1992 edition of the *Horizontal Merger Guidelines* (Glader, 2006, p. 60-68). Furthermore, the mid-90s were a turning point for innovation concerns for US competition policy as shown by Gilbert & Tom (2001, p. 44): in the first half of the decade only four cases were challenges by the US agencies with innovation concerns (3% of all cases challenged by the agencies), rising up to forty-seven in the second half (17.5% of all cases). This increase in the assessment of innovation concerns is connected to the *Innovation Market Analysis* (Gilbert & Sunshine, 1995).

The *Innovation Market Analysis* is an early proposal of merger assessment connected to the capabilities principle, an alternative step-by-step procedure applicable to competition between R&D efforts, such as pipeline competition, and presents some advances towards considering the firms' capabilities in the assessment. The five steps of assessment begin with: (i) identifying the firms' overlapping R&D activities; followed by (ii) considering alternatives sources for such R&D and (iii) downstream marketed and potential products capable of exerting competitive pressure on the merging parties. Then (iv) the analyst needs to look at the effects of the merger in R&D and should do so by considering the share of the merged entity in the total R&D expenditure in that innovation market and any other evidence of impact in competition. As in product market cases, the assessment ends by (v) discussing countervailing efficiencies, although here they need to

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<sup>125</sup> *US v. General Dynamics Corps.*, 415 U.S. 468 (1974).

be related to R&D and increase the likelihood or value of innovation (Gilbert & Sunshine, 1995, p. 594-597). The IMA would be applied in the specific situation in which firms have rival R&D efforts being undertaken and proposes an alternative step-by-step procedure so that relevant markets would include firms which engage in alternative R&D activities that constrain the merging parties' exercise of market power, as well as firms which could acquire the necessary assets for R&D in short notice. Its influence in the US Merger Control may be seen in the inclusion of innovation markets, in a very similar fashion to the proposition of Gilbert & Sunshine (1995), in the 1995 Antitrust Guidelines for the Licensing of Intellectual Property. In 2010, the US released a new edition of its Horizontal Merger Guidelines and innovation plays a large role in merger assessment in the standard analysis, as discussed in the previous subsection, but there is no innovation-specific assessment described in the guidelines despite the inclusion of innovation markets in the Guidelines for Licensing IP.

Since the creation of the 1989 European Commission Merger Regulation, innovation played a minor role in merger assessment in the EC.<sup>126</sup> As discussed, the 2004 Horizontal Merger Guidelines introduces a few elements related to innovation, but the great shift occurred when the EC came up with a new procedure when assessing Dow/Dupont (2017): the four-layer competitive assessment.<sup>127</sup> This assessment considers the different ways in which there is innovation competition and analyses the firms' capabilities in some steps of the procedure. The EC looks at four sources of overlaps between the firms, regarding: (i) price/product competition involving incumbent products; (ii) price/product competition considering late-stage pipeline projects (an overlap between a marketed product and a late-stage pipeline product or between late-stage pipeline products); (iii) innovation competition involving pipeline products in earlier stages (which depend on innovation incentives to finish developing); (iv) innovation competition related to capabilities to innovate in certain innovation spaces<sup>128</sup> (European Commission, 2020, p. 5-6). In Dow/Dupont (2017), besides the traditional product market overlaps, the EC also found overlaps between: (i) early pipeline projects

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<sup>126</sup> Glader (2006) presents an overview of the assessment of innovation concerns in the European Commission.

<sup>127</sup> The Commission did not use the term four-layer competitive assessment in Dow/Dupont but used it in other two cases assessed under this framework: Bayer/Monsanto (2018) and AbbVie/Allergan (2020).

<sup>128</sup> We can understand the notion of competition over innovation spaces as competing over discovery targets, i.e., widening the reach of the analysis of overlaps involving pipeline competition to look at competition in steps before pipeline stages, such as the discovery and development phases (Petit, 2018b, p. 5-6).

and lines of research and (ii) global R&D integrated organizations, i.e., firms with the necessary capabilities to exert competitive pressure.

Besides the IMA, a proposal from the literature which influenced the US Merger Control, and the four-layer competitive assessment, directly applied by the EU, we can take a moment to list two innovation-specific assessments which apply the principles listed in this subsection and take a step further towards properly addressing innovation effects, including accounting for the specificities of the different patterns of innovation competition. Federico, Scott Morton & Shapiro (2020) identify three patterns of innovation competition: (i) when there are pipeline overlaps - either a product-to-pipeline (a merging party has a marketed product and the other has a pipeline competitor) or a pipeline-to-pipeline overlap (both merging parties have pipeline products towards creating products which will be competitors if they get to the market); (ii) overlaps in capabilities (merging parties have similar capabilities) and; (iii) acquisition of potential competitors by dominant firms. The first two patterns are similar to the third and fourth layer of the European four-layer competitive assessment.

In the faces of innovation competition framework, we also present a (i) category related to pipeline competition – innovation competition through ongoing innovation efforts for developing new products – however including innovation efforts which do not occur through pipeline stages. Furthermore, they also discuss a category related to similar (ii) overlaps in capabilities. Unlike the previous framework, we also add (iii) a category for innovation competition within the product market through continuous innovation efforts.

Some observations about the four-layer competitive assessment and the proposals of Federico, Scott Morton & Shapiro (2020) and the faces of innovation competition framework can be made. First, as in Katz & Shelanski (2007, p. 65-66), the three propositions consider that when pipeline products are close to market launch, there is no innovation effects, as there is no risk of discontinuation of the pipeline projects, so authorities should focus on price effects. Second, the three propositions consider the business-stealing and dynamic effects principle, as they assess unilateral innovation effects through a similar mechanism to the assessment of unilateral price effects and consider such effects in different time horizons. Third, the faces of innovation competition framework also try to advance in using the capabilities principle in the

assessment, advocating for the use of capabilities in different steps of the assessment. Fourth, the four-layer competitive assessment does not seem to be applicable for cases in which there is innovation competition within the product market, through continuously engaging in innovation efforts, as in one of the faces of innovation competition. Fifth, I third and fourth layers in the four-layer competitive assessment, as well as two categories in Federico, Scott Morton & Shapiro (2020) and in the faces of innovation competition framework consider innovation competition involving pipeline products and capabilities/lines of research. and, as in the US case, the innovation effects fit in the two channels mentioned by Kokkoris and Valletti (2020). When the EC looks at pipeline products which are not close to market launch, the concern is related to a possible discontinuation and/or interruption of a specific innovation effort. When they consider possible overlaps related to similar capabilities to innovation, there is a general concern that the merger could bring together two (or more) out of a few firms capable of investing in innovation in an industry, resulting in less innovation efforts in the future.

In this section we had a brief overview of the theoretical and practical aspects of the assessment of innovation competition in horizontal mergers in which competition occurs outside the product market and, therefore, demands an innovation-specific assessment. We discussed the basic principles of the assessment of such innovation competition cases, presented assessments which influenced the US and EU Merger Control and other two frameworks taken from the literature. By looking at the HMG from the two jurisdictions, we can conclude that an appropriate assessment is lacking. In the next section we discuss the empirical assessment of innovation concerns in Merger Control in order to provide inputs for the debate of the Brazilian assessment of innovation concerns in mergers in section 4.

### **3. Empirical Assessment of Innovation Concerns in Merger Control: Literature Review**

Recently, some studies regarding the frequency of innovation-based concerns in mergers were published. Gilbert & Greene (2015) looks at the frequency of merger challenges by both US competition authorities - the Federal Trade Commission (FTC)

and the Antitrust Division of the Department of Justice (DoJ) - and their relation to harm to innovation between 2004 and 2014. They undertake their assessment of the frequency of innovation-related challenges by considering whether the terms “innovation” or “research and development” were mentioned to describe either the marketplace or competitive effects, which is their criteria for having innovation-based concerns. The authors also mention that the US agencies do not always use these two terms and may refer to harm to product development or design without explicitly referring to innovation or R&D. Their algorithm excludes these cases to avoid including cases not related to innovation or R&D (p. 1932 – 1934). They are also not concerned on whether the case was assessed under an innovation-specific assessment or under the standard analysis but include both cases as innovation concerns may be either at relevant market definition (present only in innovation-specific assessment, as it would be an innovation market) and competitive effects (present in both types of assessment). When it comes evaluating whether harm to innovation was mentioned or discussed, the authors use the following criteria: if the agency states that the decrease in competition would harm innovation without elaborating the nature of such harm, innovation is only mentioned. If the agency elaborates on the nature of that harm, it is discussed. In the latter, the authorities mention that innovation benefitted from competition in that market (p. 1940-1941). They find that from the 250 mergers challenged by the authorities, in 84 of them harm to innovation was alleged (33.6%) (p. 1932-1933).<sup>129</sup> In roughly half of these 84 cases, the agency merely mentions that the merger would harm innovation and in the rest of them, they elaborate further on the nature of such harm (p. 1940-1941). The authors also study the relation between innovation-related challenges and R&D intensity, finding that the higher the R&D intensity is, the higher is the rate of mergers challenged based on innovation concerns (p. 1935). Furthermore, they also study the relation between R&D intensity and the mentioning or discussing of harm to innovation and the differences between the agencies.

Kern, Dewenter & Kerber (2016), similarly, investigate how often the DoJ and the FTC investigated innovation concerns in merger assessment between 1995 and 2008. As in Gilbert & Greene (2015), Kern, Dewenter & Kerber (2016) consider cases in which

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<sup>129</sup> The authors also discuss the differences between the two agencies in several topics. Regarding the frequency of innovation concerns, the FTC challenged 164 mergers in this period, with 54 of them alleging harm to innovation (around 32.9%). The DoJ challenged only 86 cases, with 30 alleging harm to innovation (around 34.9%) (Gilbert & Greene, 2015, p. 1933).

innovation was mentioned at either market definition and/or competitive assessment. For market definition, they mention that typical words are “the research, development, manufacture and sale of...” and for competitive assessment they consider explicitly claimed innovation effects (p. 377). However, unlike, Gilbert & Greene (2015) the authors also investigate whether despite the criticism of the IMA, innovation-specific assessments were applied. Their criteria for an innovation-specific assessment is the presence of innovation concerns in relevant market definition. They investigate not only the frequency of innovation concerns but associate it with innovation intensity (low, moderate, and high R&D intensity). Both Gilbert & Greene (2015) and Kern, Dewenter & Kerber (2016) mention that the main source of data were the FTC and DoJ’s complaints, although other documents were also investigated. They find that from the 399 mergers challenged during that period considering both agencies, 135 had innovation aspects mentioned at relevant market definition and/or anticompetitive effects, around 33.8%. In those 135 cases, 341 markets were analyzed, with 18 of them having only price concerns. So, in 323 relevant markets innovation aspects were considered, of which 222 had innovation aspects in relevant market definition or innovation markets (around 68.8%) and 255 in anticompetitive effects (around 78.9%). In 105 relevant markets out of the 323 with innovation aspects there were innovation incentives arguments (around 32.5%) and in 23 markets diversity arguments were mentioned (around 7.1 %).<sup>130</sup> Furthermore, in only 162 markets (around 50.2%) HHI and/or market shares were considered as concentration measures, while in 124 markets (around 38.4%) the number of firms was considered (according to the authors a more adequate measure of concentration for innovation) and non-quantitative concentration measures were present in 81 relevant markets (around 25.1%) (p. 377-389).<sup>131</sup>

Mosso (2018) discusses innovation in the EU Merger Control. The paper discusses different aspects of the EC framework for innovation competition cases, along with discussing specific mergers in a qualitative way. However, the author briefly mentions some statistics for the 2015-2017 period. During these three years, the EC received more than 1070 merger notifications, intervening in only 73 cases (around 6.8%). Innovation concerns were present in 10 of these cases (around 13.7% of the cases in which there was

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<sup>130</sup> For a brief presentation of the diversity argument, check *supra* note 122

<sup>131</sup> The authors also discuss: (i) the differences between both US Agencies in all the issues assessed; (ii) difference of the topics assessed over time (comparing the 1995-2003 and 2004-2008 periods) and (iii) the relation of innovation concerns and R&D intensity.

intervention) (p. 6). They refer to two common types of cases with innovation concerns among the ten identified: merger with pipeline products and with innovation at earlier stages (p. 6-7). It is interesting to point out that this period ends in 2017, year in which Dow/Dupont took place and represents a shift in the assessment of innovation effects in the EU with the introduction of the four-layer competitive assessment.

#### **4. Innovation Concerns in Brazilian Merger Control**

As discussed throughout the paper, the US, EU, and Brazilian Horizontal Merger Guidelines use only the standard analysis and, to some extent, address innovation concerns, with the first one going further than the others by defining unilateral innovation effects. However, practice shows a different scenario for the US and the EU, as Kern, Dewenter & Kerber (2016) identify that innovation-specific assessments were applied in the US Merger Control, while the four-layer competitive assessment applied by the European Commission in Dow/Dupont (2017), Bayer/Monsanto (2018) and AbbVie/Allergan (2020) is also an innovation specific assessment (as we discussed in the second essay). As far as we know, there are no works investigating the assessment of innovation concerns for the Brazilian Merger Control. In this section, we will undertake such task.

The first subsection will briefly present the main features of the Brazilian Merger Control institutional framework, while the second one will present the methodology and the third presents the results and discussion.

##### **4.1. Brazilian Merger Control Framework**

The role of the Administrative Council of Economic Defense – CADE – as the Brazilian Competition authority is currently defined by law 12,529/2011, which came into force in May 2012. Its framework is also supported by several documents, including



the Guide for Horizontal Merger Review (2016), the Brazilian Horizontal Merger Guidelines (HMG).

The assessment of mergers is first undertaken by its investigative body, the General Superintendence (SG), which first defines whether the merger should be assessed under the simplified or ordinary procedure. According to Resolution n. 2/2012<sup>132</sup>, cases with minor potential to undermine competition may be subject to the simplified procedure, with a faster decision by the SG. The cases not considered eligible to be assessed under the simplified procedure will be analyzed under the ordinary procedure, which includes a deeper investigation of the potential effects of the merger on competition. The SG may approve the cases without remedies, recommend blocking the case or recommend its approval under conditions. The last two options implies that the case needs to have the final decision by the CADE's Tribunal, an administrative body composed by six commissioners and the president. Furthermore, even when the SG decides that a merger should be approved, the case may still go to the CADE's Tribunal ("Tribunal") if either another player (or a regulatory agency) appeals or upon application by one of the commissioners.<sup>133</sup>

## 4.2. Methodology

As discussed in section 2, the Brazilian HMG indicates that innovation takes part in merger assessment through the standard analysis in the discussion of entry conditions, coordinated effects, efficiencies and elimination of maverick firms, and there is no

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<sup>132</sup> The resolution explains that the possibility of assessing a case under the simplified procedure is dedicated to cases with minor potential to harm competition. The decision to apply this procedure is discretionary, but need to fit cases such as when: (i) a joint venture is formed to act in a market in which there is no horizontal or vertical relation to the parties; (ii) when the acquirer did not previously act in the markets affected by the merger or the ones vertically related; (iii) the merged entity would have 20% or less market share when there is a horizontal overlap; (iv) the merged entity would have 30% or less market share in any of the affected markets when there is vertical integration.; (v) mergers which result is a variation of less than 200 point in the HHI (if the resulting market share is less than 50%); and (vi) other cases not addressed by the previous criteria but considered simple enough by the SG (CADE, 2012, p. 3-5).

<sup>133</sup> According to the Statutes of CADE, if the SG approves a merger, within 15 days another player (or a regulatory agency if the sector is regulated) may appeal and a member of the Tribunal may request that the case is sent to the Tribunal (CADE, 2021, p. 41)

discussion of innovation-specific assessments. Furthermore, innovation effects are mentioned in the beginning of the HMG, as a slower pace of innovation is considered as one type of anticompetitive effect. Finally, it is worth mentioning that Law 12,529/2011 considers that, among the conditions for approving a merger, is pursuing technical development, a goal which could be associated with innovation.

In this paper, we will investigate whether and to what extent innovation concerns were considered in the merger analysis, searching for cases in which there were innovation specific assessments or in which innovation was discussed for each step of the traditional assessment, including innovation effects and innovations concerns that affected the analysis of price (and other) effects of the merger.

Thus, our research will be different from the ones found in the literature for the US and EU jurisdictions, as we expected that innovation will be at stake in only a small number of cases and that innovation-specific assessment will rarely be used. Therefore, instead of looking just at the frequency of cases with innovation concerns, we will dig deeper how innovation issues were considered in each step of the assessment, being that innovation-specific assessment or not. We apply a broader criterion than the one applied by Gilbert & Greene (2015), which considers innovation concerns in market definition and in the competitive effects and similar to Kern, Dewenter & Kerber (2016), which consider it in market definition and competitive assessment.

So, to find out the cases in which innovation concerns were considered by CADE, we searched for innovation terms in CADE's recent jurisprudence.<sup>134</sup> We considered every case in which a final decision was taken up from 2015 to 16 November 2021, the time frame available when this data was gathered, which is suitable considering the evolution of the innovation concerns in the Europe Commission.<sup>135</sup> The following terms in Portuguese were searched: “innovation”, “innovator”, “innovative”, “research and development”, “pipelines”, “patent”, “patented” along with its plural and gender variations.<sup>136</sup> The documents considered were commissioners' votes and the cases reports

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<sup>134</sup> We based our research in the recently created case law search tool, through which it is possible to search for terms. See <https://jurisprudencia.cade.gov.br/pesquisa>

<sup>135</sup> Check *supra* note 115

<sup>136</sup> The exact terms searched in Portuguese are: *inovação, inovações, inovador, inovadores, inovadora, inovadoras, inovativo, inovativos, inovativa, inovativas, pesquisa e desenvolvimento, pipeline, pipelines, patente, patentes, patenteado, patenteados, patenteada, patenteadas.*

made by the General Superintendence. We added a filter to include only mergers decided in the Tribunal.

Furthermore, as briefly discussed in the introduction, given that both Gilbert & Greene (2015) and Kern, Dewenter & Kerber (2016) explore the frequency of innovation concerns only among the cases which were challenged in the US, we consider that it makes sense to discuss only cases assessed by the Administrative Tribunal. These cases are the ones which demanded further investigation and had not been approved on a first round by the SG. Although the Brazilian Merger Control system is different from the US, this methodological choice makes the choice of cases similar to these two works. Summing up, we considered the cases in which either the General-Superintendence or the Tribunal recommended or decided to impose restrictions to the merger. We are also including few cases which were sent to the Tribunal upon application by one of the commissioners and under an accepted appeal to assess the case by another player.<sup>137</sup>

After this process we opened the documents to manually discard all the ones in which despite mentioning one of the terms, they were not considered in the assessment. A frequent situation for discarding the case was the word innovation appearing in a generic description of which are the possible outcomes of an increase in concentration in the beginning of the analysis of the likelihood of anticompetitive effects section, without considering innovation after all.<sup>138</sup> By applying these criteria, we ended up with 38 cases after this first filter.

As in 18 out of the 38 cases the term “innovation” was briefly mentioned without playing a role in the standard procedure, we can also take out these cases from the discussion. In 12 of them innovation is only briefly mentioned without having a role in any step of the assessment, such as: (i) when the parties’ description includes innovation (the company declares that it is an innovative player or that it engages in R&D or has R&D centers); (ii) when the market is considered as innovative, being based on innovation or having potential to grow based on innovation; or (iii) when the motivation

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<sup>137</sup> For the cases which went to the Tribunal due to being contested, we included the ones which the court considered the appeal and assessed it in its merits (even the cases in which the final decision was the same as the one presented by the SG).

<sup>138</sup> Of the 38 cases, 6 were assessed by the Tribunal due to an appeal of a player and 5 were sent to the Tribunal after a commissioner requested. We also discarded a case in which the assessment occurred before 2015 and the case was reopened.

for the mergers, as alleged by the parties, is related to innovation (such as improving its R&D).<sup>139</sup> The 18 cases represent situations where, despite mentioning innovation which could mean that assessing innovation concerns were potentially important, the authority did not actually consider innovation in any step of the assessment. This is a first indication that the Brazilian agency has still some ground to cover when it comes to innovation-related mergers. In the other 6 cases, innovation is cited in either relevant market definition or entry analysis just to mention that there are no innovation concerns. In one of them it is stated that there is no innovation in the relevant market, while in five of them, that there are no patent-related barriers to entry.

The next subsection discusses the 20 cases left<sup>140</sup> (presented below in Table 4), the ones in which there were innovation concerns.

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<sup>139</sup>One of these twelve cases - Capsugel/Genix (2015 – Case 08700.009711/2014-78) - does not meet any of these three criteria, however it is almost a merger to monopoly and such level of concentration could, among other effects, reduce R&D (even though such harm is not investigated), so we included in this first group.

<sup>140</sup> Among the 20 cases, only Brink's/Rodoban (2018) was assessed by the Tribunal due to an appeal by a rival. The other nineteen either the SG recommended blocking/approving under conditions or called to the Tribunal by a commissioner.

*Table 4 - Mergers with innovation concerns decided by CADE's Administrative Tribunal (2015-2021) - Parties, Case Number, Year and Sector*

<b>Parties</b>	<b>Year</b>	<b>Case Number</b>	<b>Sector</b>
Dabi Atlante/Gnatus	2015	08700.001437/2015-70	Dental Products
Tigre/Condor	2015	08700.009988/2014-09	PVC Solutions
Continental/Veyance	2015	08700.004185/2014-50	Automotive
GSK/Novartis	2015	08700.008607/2014-66	Pharmaceutical
SBT/Record/Rede TV!	2016	08700.006723/2015-21	Media and entertainment
Reckitt Benckiser/Hypermarcas	2016	08700.003462/2016-79	Sexual Welfare
Saint-Gobain/SICBRAS	2016	08700.010266/2015-70	Construction Materials
Halliburton/Baker Hughes	2016	08700.007191/2015-40	Oil and Gas
Bradesco/Banco do Brasil/Santander/Caixa Econômica/Itaú	2016	08700.002792/2016-47	Financial
Itaú/Citibank	2017	08700.001642/2017-05	Financial
Ipiranga/Alesat	2017	08700.006444/2016-49	Oil and Gas
John Deere/Monsanto	2017	08700.000723/2016-07	Agricultural Machinery
Brink's/Rodoban	2018	08700.000166/2018-88	Logistics and Security
Itaú/XP	2018	08700.004431/2017-16	Financial
Bayer/Monsanto	2018	08700.001097/2017-49	Biotechnology
International Business Machines Corporation (IBM)/Red Hat	2019	08700.001908/2019-73	Software
Disney/Fox	2019	08700.004494/2018-53	Media and entertainment
Stone/Linx	2021	08700.003969/2020-17	Financial Services
Danfoss/Eaton	2021	08700.003307/2020-39	Hydraulic components
Hypera/Takeda	2021	08700.003553/2020-91	Pharmaceutical

Source: own elaboration

As we can see from the table, the cases represent different sectors, indicating that innovation concerns may be at stake in different situations including both the sectors which innovation traditionally occurs through pipeline stages such as Pharmaceutical and Biotechnology and potentially in innovation markets and sectors that innovation occurs in non-formal channels, such as media and entertainment.

### **4.3. Results and Discussion**

We now proceed to investigate the other 20 cases. In that period, the Tribunal judged a total of 90 cases, so these 20 cases represent around 22.2% of all cases assessed by the Tribunal. We need to be careful, however, when comparing to the empirical

exercises presented in the last subsection, as our criteria is broader. We include here both the cases in which there was an innovation-specific assessment and when there were only innovation issues considered in the steps of analysis of unilateral or coordinated effects (in price mostly).

We found one case in which an innovation-specific assessment was applied: Bayer/Monsanto (2018).<sup>141</sup> As discussed in section 2, an innovation-specific assessment is applied when in a merger there is competition outside the product market, in an innovation relevant market. The assessment departs from the standard analysis and looks at innovation effects in the given innovation market. It is the only case in which *the relevant market* was defined on innovation grounds, i.e., there were innovation markets defined besides traditional product markets.<sup>142</sup>

Innovation concerns related to innovation-specific assessment were also at stake in Bayer/Monsanto in the analysis of concentration indexes (the explanatory role of concentration indexes and shares is reduced), in entry conditions (when discussing the necessary time to enter in the market through R&D), in rivalry (when debating how rivalry occurs on innovation grounds and the share of R&D expenditures is mentioned as an indicator of the competitive significance of firms). Finally, in this case analysis, there is a debate on the existence of unilateral innovation effects, presenting a completely new approach in Brazilian case law. The General Superintendence mentions, in the report, four possible innovation effects related to soy and cotton seeds regarding: (i) specific ongoing innovation efforts, resulting in the possibility of discontinuation, interruption or redirecting such efforts; (ii) a long-term reduction of incentives for the firms to engage in new innovation efforts; (iii) a possible reduction in incentives for other players to engage in R&D efforts; (iv) a reduction in innovation incentives for other players enter in the market due to higher barriers to entry as result of the merged entity's dominant position.<sup>143</sup> The two channels of negative innovation effects listed by Kokkoris & Valletti (2020) were assessed, both the potential reduction in new innovation efforts in the future and the

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<sup>141</sup> Case 08700.001097/2017-49.

<sup>142</sup> The definition of many of the markets assessed in this case had words such as the “development of”, “improvement of” and “licensing of”.

<sup>143</sup> CADE (2017b) for the innovation effects related to biotechnology on soy seeds (p.99-108) and biotechnology on cotton seeds (p. 129-144).

potential delay and/or interruption in product development. Finally, countervailing efficiencies were debated in Bayer/Monsanto.

It is worth mentioning that Bayer/Monsanto was assessed by the European Commission using the four-layer competitive assessment, which addresses similar effects as the ones listed by the General Superintendence. Throughout its assessment, the SG discussed many innovation aspects due to an economic report presented by the parties which discussed the assessment of innovation competition for this case, including the need of a capabilities-based assessment (CADE, 2017b).

From now on, we look on whether innovation concerns were discussed in each step of the assessment for cases addressed exclusively through the standard analysis. We found that to be the case in the other 19 cases. Among those, negative unilateral innovation effects were discussed in 5 cases, all of them related to the second channel of Kokkoris & Valletti (2020): less incentives to begin new innovation efforts. We will briefly present them.

In *SBT/Record/Rede TV!* (2016)<sup>144</sup> three television networks created a joint-venture to license television channels to cable TV companies, and one commissioner<sup>145</sup> expressed concerns regarding the fact that the joint-venture was not considering the creation of new content and could reduce the introduction of innovation while another commissioner argued despite not mentioning that the joint-venture would invest in new content, the companies would need to engage in efforts towards creating new content anyway to challenge Globo, the market leader.

In *Disney/Fox* (2019)<sup>146</sup>, a global acquisition of Fox by Disney, movie theater chains argued that there could be a post-merger reduction in innovation regarding movies. It is important to notice that in both these cases the concerns were related to innovation in audio-visual which could be considered innovation towards horizontal differentiation. The effects investigated by the General Superintendence<sup>147</sup> would be related to a post-merger reduction in new innovation efforts within the product market.

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<sup>144</sup> Case 08700.006723/2015-21.

<sup>145</sup> Vote of Commissioner Cristiane Alkmin Junqueira Schmidt in Case n° 08700.006723/2015-2 (*SBT/Record/Rede TV!*) (Schmidt, 2016).

<sup>146</sup> Case 08700.004494/2018-53.

<sup>147</sup> Report No. 11/2018 in Merger Case n° 08700.004494/2018-53 (*Disney/Fox*) (CADE, 2018).

In *Itaú/XP* (2018)<sup>148</sup>, Itaú, a traditional Brazilian bank, acquired a minority shareholding of XP, a financial company, considered as a maverick (an innovative firm that contested the market with lower prices), working as a two-sided platform for investments. Its position as an innovative player limited the role of the HHI during the assessment and a commissioner<sup>149</sup> expressed concerns about a potential elimination of an innovative maverick, especially considering that the acquirer was a traditional bank, with a possible reduction of innovation after the merger. It is important to notice that throughout the assessment, the General Superintendence mentioned that it still lacked the proper tools to assess innovation concerns in mergers, stating that other jurisdictions were still developing such procedures.<sup>150</sup>

In *John Deere/Monsanto* (2017)<sup>151</sup>, John Deere acquired Precision Planting, a division of Monsanto. The General Superintendence debates how rivalry occurs through innovation when looking at the US DOJ's complaint on the case and their competitors concerns.<sup>152</sup> A possible outcome of the merger, according to CADE, would be a reduction in innovation.

In *Halliburton/Baker Hughes* (2016)<sup>153</sup>, the General Superintendence considers that there is innovation competition, and that the merger could reduce innovation efforts in the future.<sup>154</sup>

Countervailing efficiencies, positive innovation effects, are discussed in five cases: Stone/Linx (2021)<sup>155</sup>, John Deere/Monsanto (2017), Reckitt Benckiser/Hypermarcas (2016)<sup>156</sup>, Tigre/Condor (2015)<sup>157</sup>, Bradesco/Banco do Brasil/Santander/Caixa Econômica/Itaú (2016)<sup>158</sup>.

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<sup>148</sup> Case 08700.004431/2017-16.

<sup>149</sup> Vote of Commissioner Cristiane Alkmin Junqueira Schmidt in Case n° 08700.004431/2017-16 (*Itaú/XP*) (Schmidt, 2018).

<sup>150</sup> Annex to the Report No. 24/2017 in Merger Case n° 08700.001097/2017-49 (*Itaú/XP*) (CADE, 2017a, p. 57-60).

<sup>151</sup> Case 08700.000723/2016-07

<sup>152</sup> Report No. 13/2016 in Merger Case n° 08700.000723/2016-07 (*John Deere/Monsanto*) (CADE, 2016b).

<sup>153</sup> Case 08700.007191/2015-40.

<sup>154</sup> Technical Note No. 41/2015 in Merger Case n° 08700.007191/2015-40 (*Halliburton/Baker Hughes*) (CADE, 2015).

<sup>155</sup> Case 08700.003969/2020-17.

<sup>156</sup> Case 08700.003462/2016-79.

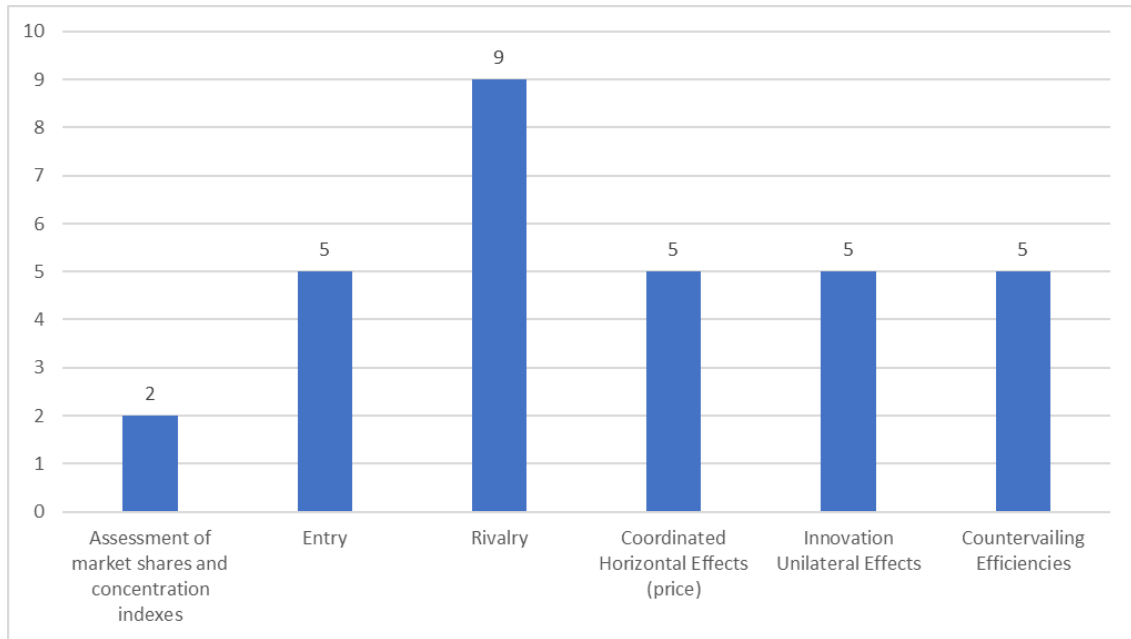
<sup>157</sup> Case 08700.009988/2014-09.

<sup>158</sup> Case 08700.002792/2016-47.



We can now proceed to discuss the steps in which there were innovation concerns in the standard analysis when considering for other merger potential effects (price mainly) for the nineteen cases assessed exclusively the standard analysis. Figure 1 represents the number of cases in which innovation plays a role in each step of assessment in the standard analysis

Figure 1 - Merger cases decided by CADE's Administrative Tribunal (2015-2021) with innovation concerns in each step of assessment assessed exclusively under the standard analysis



Source: own elaboration

First, in 2 cases innovation played a role in the *assessment of market shares and concentration indexes*. While in John Deere/Monsanto (2017) innovation is only mentioned as the reason for John Deere's leadership, in Itaú/XP (2018), XP's role as maverick makes the use of the HHI less important.

Second, in 5 cases there was a discussion on whether innovation-related aspects would affect *entry conditions*: patents (5), R&D expenditures (2), necessary time to enter the market through innovation (1) were mentioned.

Third, in 9 cases innovation played a role in *rivalry assessment*. In 3 of them there was a discussion on whether one of the firms was a maverick (along with aggressive behavior in other variables such as prices) - a concern present in the Brazilian HMG, as discussed in section 2 - and in the other 6 there was only a discussion on whether rivalry was innovation-based or if rivalry would stimulate innovation in the market.

Fourth, when it comes to coordinated effects in price, the Brazilian Guide for Horizontal Merger Review (2016) lists factors which make coordinated effects more likely and 2 of them are related to innovation: (i) technological homogeneity amongst firms; (ii) technological stability of products and processes (CADE, 2016a, p. 43-44). In 5 cases the effect of the firms' innovation efforts on coordinated effects likelihood was discussed, specifically debating whether there the market would be characterized by innovation, which could offset coordinated behavior, as mentioned in the Brazilian HMG.

When it comes to *unilateral innovation effects*, as presented above, CADE discussed it in 5 cases. Finally, as presented, in five cases countervailing efficiencies were discussed. It is important to recall that efficiencies related to innovation are mentioned in the Brazilian HMG, as discussed in section 2.<sup>159</sup>

Table 5 presents in which steps of the assessment each case had innovation concerns, including both Bayer/Monsanto (2018) – assessed under an innovation-specific assessment – and the cases assessed exclusively under the standard analysis.

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<sup>159</sup> Another comment is that in four cases (including Bayer/Monsanto) there is innovation-related non-horizontal effects discussion regarding market foreclosure, which is not the object of this paper.

Table 5 – All Innovation concerns identified in mergers decided by CADE's Administrative Tribunal (2015-2021)

	Innovation market delimitation	Assessment of market shares and concentration indexes	Entry	Rivalry	Coordinated Horizontal Effects (price)	Innovation Unilateral Effects	Countervailing Efficiencies
GSK/Novartis (2015)							
Dabi Atlante/Gnatus (2015)							
Tigre/Condor (2015)							
Continental/Veyance (2015)							
SBT/ Record/RedeTV! (2016)							
Halliburton/Baker Hughes (2016)							
Bradesco/Banco do Brasil/Santander/Caixa Econômica/Itaú Unibanco (2016)							
Reckitt Benckiser/Hypermarcas (2016)							
Saint-Gobain/SicBRAS (2016)							
Ipiranga/Alesat (2017)							
John Deere/Monsanto (2017)							
Itaú/Citibank (2017)							
Brink's/Rodoban (2018)							
Bayer/Monsanto (2018)							
Itaú/XP (2018)							
Disney/Fox (2019)							
IBM/Red Hat (2019)							
Stone/Linx (2021)							
Danfoss/Eaton (2021)							
Hypera/Takeda (2021)							

Source: own elaboration

## 5. Concluding Remarks

The assessment of innovation concerns in horizontal mergers cases is a challenge for antitrust authorities. The standard analysis procedure may be applied to address innovation competition and merger innovation effects when there is product market competition. The US, EU and Brazilian Horizontal Merger Guidelines are focused on the standard analysis and, at different levels, present such innovation concerns in a few steps of the assessment. The US HMG goes further than the other two and define unilateral innovation effects and the two channels in which they might occur.

However, there are cases in which innovation effects cannot be properly addressed by the standard analysis when it is necessary to delimitate an innovation market and competition is strictly undertaken in this dimension and not in the product market. In this case, we need an innovation-specific assessment. The Innovation Market Analysis influenced the US Merger Control while the EU applied a new assessment in three cases since 2017: the four-layer competitive assessment. Although such procedures are not in the Horizontal Merger Guidelines in these jurisdictions, empirical works, especially for the US, show that innovation-specific assessments were undertaken. The application of such assessments is important, and they need to consider the principles of innovation competition – business-stealing, capabilities, and dynamic effects principle - and the specificities of the different ways in which innovation competition might occur.

The Brazilian Merger Control framework is focused on the standard analysis - as shown in its HMG and, following the European HMG, only briefly mentions the possibility of effects on innovation, considering innovation in a few steps of the analysis of potential merger effects on other variables (mostly price), such as the assessment of entry conditions, coordinated effects, the elimination of mavericks and efficiencies. With that in mind we undertook an exercise to assess the Brazilian case law to check to what extent CADE assessed innovation concerns. We found that innovation concerns were at stake in 20 cases from 2015 to 2021, 22.2% of the cases decided by the Tribunal, and appear in different steps of the assessment, and with only one being addressed on an innovation-specific assessment, a limited experience when compared to the US and EU.

As discussed, surprisingly, *Bayer/Monsanto* (2018) was the only case in which an innovation-specific assessment was applied. Furthermore, it is the only case in which the delay/interruption of innovation efforts channel of innovation effects was discussed, which is expected given the relation of this channel with innovation markets: the focus is on the effects on specific innovation efforts. The other cases in which negative innovation effects were discussed are related to the less incentive to begin innovation efforts channel, which is also expected given that competition occurs within the product market and effects would be related to a reduction in innovation incentives in the product market.

In *Bayer/Monsanto*, many topics for debate in innovation comes either from looking at past European case law in market definition and as a response to a report brought by the parties. It is also worth emphasizing that this case was also assessed on an innovation-specific assessment in the EU (the four-layer competitive assessment). In other cases, we also identified that the debate of innovation concerns was undertaken following the assessment of the same cases in other jurisdictions. In *John Deere/Monsanto* (2016), most of the debate on innovation comes from looking at the US DoJ's complaint on the case. In *Itaú/XP* (2018), a local case not assessed in other jurisdictions, it was recognized the need to address innovation concerns, but confessed that it still lacked the appropriate tools to undertake it.

Part of the timid assessment on innovation competition may be related to the fact that Brazil is a developing economy and many innovation efforts from firms which engage in mergers in Brazil are undertaken outside of Brazilian territory. However, *Itaú/XP* represents a case of an innovation-intensive merger between two Brazilian companies, showing that considering innovation competition is a necessary effort for CADE. Furthermore, although an isolated case, the assessment of *Bayer/Monsanto* (2018) was a first experience in the assessment of innovation concerns and a good opportunity for CADE to discuss internally innovation-specific assessments, as other innovation competition cases might not have been properly assessed.

It is important to leave a final note that CADE is far from being still when it comes to changing its procedures to adapt to ever-changing markets. Recently, the authority undertook efforts to catch up with international jurisdictions in the assessment of mergers

in digital markets.<sup>160</sup> Furthermore, it also important to emphasize that we only searched for cases assessed by the Administrative Tribunal. To have a complete analysis of the authority's position in innovation-related concerns, we need to also consider cases which were only assessed by the General Superintendence. Undertaking such task is a first recommendation for a research agenda.

A second and final recommendation for further research is building a framework for the assessment of innovation competition that not only adapts the standard analysis procedure and develops an innovation-specific assessment in similar grounds to international jurisdictions, but also that considers the specificities of innovation in Brazil. A proper framework would avoid reductions on innovation incentives in an economy which needs to protect its innovation efforts to catch up with developed economies. A first and easier step would be changing the Horizontal Merger Guidelines to include innovation concerns such as unilateral innovation effects and to include the two channels of innovation effects, following the US HMG. As discussed, although still timidly, these two channels are already being assessed by CADE.

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<sup>160</sup> The latest working paper on digital markets was published by CADE in August 2021 and can be found in <https://cdn.cade.gov.br/Portal/centrais-de-conteudo/publicacoes/estudos-economicos/cadernos-do-cade/plataformas-digitais.pdf>.

## CONCLUDING REMARKS

Assessing innovation competition cases in merger control is a hard task. Academics undertook extensive efforts to propose different types of assessments to properly address innovation effects and jurisdictions applied changes to their own procedures to reach these goals. Throughout the three essays presented in this dissertation we discussed this topic on different perspectives and reached some conclusions, which we will briefly discuss in this final section.

In the first essay, based on the conclusion that innovation is diverse and a single step-by-step procedure would be insufficient, we proposed a typology – the faces of innovation competition – and built a scheme for the proper assessment of horizontal mergers in which there is innovation competition. The three identified categories are: (i) innovation competition through continuous innovation efforts in the product market; (ii) innovation competition through ongoing innovation efforts for developing new products; and (iii) innovation competition through future innovation efforts. Each category demands a specific assessment to properly address innovation effects. To undertake the assessment, we used a mechanism to identify the faces of innovation competition – the business-stealing effects – and, given that in some situations the traditional merger procedure is inadequate, we took elements from the capabilities approach to discuss alternative or complementary assessment of innovation competition cases, depending on the case, to properly address potential negative innovation effects. To undertake the analysis of mergers in each face of innovation competition, we discussed the steps of assessment, theories of harm to innovation and evidence. For the gaps identified in the proposed framework we investigated insights taken from the resource-based view and evolutionary approach.

Moving to the second essay, we looked at the US and European experiences in the assessment of innovation competition in Merger Control. Both jurisdictions have changed the way they address innovation competition over time. The current US Horizontal Merger Guidelines dedicates a subsection to innovation in the unilateral effects section and the European Commission developed a new approach – the four-layer competitive assessment – which was first applied in Dow/Dupont (2017). The three case studies -



Takeda/Shire (EC - 2018), Sabre/Farelogix (DoJ – 2019) and AbbVie/Allergan (EC – 2020) – represent recent cases in which innovation effects were assessed in different ways. The first and last one represents pharmaceutical cases with overlaps related to similar diseases in which innovation competition through future innovation efforts was either not investigated or briefly addressed, despite the important role this discussion had in Dow/Dupont (2017). The second case represent competition within a product market regarding the removal of a frequent and disruptive innovator. The case studies confirm that both jurisdictions are considering innovation effects and have evolved their assessment, although further improvements are needed. Few conclusions are: (i) given the selected case studies, the assessment of innovation competition through future innovation efforts seems to have been applied with caution, despite being included in the four-layer competitive assessment; (ii) the EC seems to be focused on harm through the delay and/or interruption of innovation efforts; (iii) the DoJ properly addressed innovation competition through continuous innovation efforts in Sabre/Farelogix; (iv) the business-stealing principle is regularly applied; and (v) the capabilities principle still needs to be better explored.

Finally, the third and final essay is devoted to the Brazilian experience in addressing innovation concerns in Merger Control. The Brazilian Merger Guidelines does not present an innovation-specific assessment and briefly mentions the possibility of innovation effects. It discusses innovation concerns in a few steps of the assessment of other effects (mostly prices): (i) assessment of entry conditions; (ii) coordinated effects; (iii) the elimination of a maverick; and (iv) efficiencies. We investigate the case law and identify only 20 cases decided by the Tribunal between 2015 and November 2021 in which innovation concerns were considered (22.2 % of total cases addressed by the Tribunal). We also find that only in Bayer/Monsanto (2018) an innovation-specific assessment is undertaken and in 19 cases only the standard analysis was applied, a limited experience when compared to the US and EU. In Itaú/XP (2018), CADE expresses how further discussion regarding innovation concerns is needed and that the agency still lacks the tools to properly address innovation concerns. Such statement summarizes an important agenda for the agency. A few of the insights taken from the essay are: (i) in all the cases assessed by the standard analysis in which negative unilateral innovation effects were discussed, the channel of harm to innovation addressed was the reduction in incentives to begin new innovations efforts; (ii) in Bayer/Monsanto this channel was

discussed along with the delay and/or interruption of innovation efforts; (iii) much of the discussion of innovation issues in some cases are related to the assessment of the same case in other jurisdictions.

We can conclude, from the three essays, that the assessment of innovation effects needs improvements. The difficulties that jurisdictions like the US, EU and, especially, Brazil face when addressing innovation effects or concerns may be connected to the need of a proper framework to undertake such task. Without pretending to provide the final answers in such a complex subject, we believe that the framework developed in the first essay may be helpful to jurisdictions identify relevant cases, their proper assessment and, ultimately, face the challenges discussed in the second and third essays dedicated to exploring the international and Brazilian jurisprudence, respectively. Further advances in both fronts – theory and practice – are necessary and need to be undertaken together, as they are complementary.

By looking back at the first essay, we believe to have taken a step towards an assessment in which both the traditional and capabilities-based approaches coexist in the regular procedures in Merger Control and are applied depending on the case. Additionally, by understanding that a capabilities-based assessment still needs to be further developed - a conclusion which is reinforced by the other two essays when looking at the guidelines and case law in the US, EC, and Brazil - we took a first step in bringing insights to the assessment by exploring the strategic management and evolutionary approaches. However, we recognize that this literature has much more to offer and by exploring it, we may fill the greatest gap still to be solved: an assessment which considers sectoral specificities and innovation patterns, as well as its regional characteristics. Not only innovation competition occurs in different ways, but innovation itself occurs through different processes which need to be considered.

As discussed in the first essay, much of the antitrust literature on innovation competition considers R&D as synonyms to innovation efforts, an idea which can be related to the technology-push model, when the role of R&D in innovation differs between sectors and countries. Moving away from this definition is an important step towards achieving an ideal framework of assessment of innovation competition in horizontal mergers, which needs to consider the sectoral and regional specificities of both innovation competition and innovation itself.

Finally, with the three essays, without pretending to provide a final word on the topic, we hope to provide a better understanding of the assessment of innovation competition in horizontal mergers regarding the theoretical background and an adequate framework of assessment, how two important jurisdictions have addressed the mergers and how a relatively young jurisdiction has taken this challenge. Further developments are needed, but we hope that we took a first step into the right direction.

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