Free and Open Source Software Programs in European Union Merger Control

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This article proposes an analytical framework for assessing free and open source software programs in merger control procedures. When one of the merging parties owns the intellectual property rights associated with a Free and Open Source Software (FOSS) program, the competition authorities should first assess the ability and likelihood of the merged undertaking to remove this program from the market. To this end, the authority must evaluate whether the incentive of the merged undertaking to make the program involved in the transaction available post-merger under a FOSS licence will be reduced in comparison with the pre-merger situation. If, post-merger, it is still more profitable for the merged undertaking to provide the program under a FOSS licence than under a proprietary one, this program will then continue to exercise a significant competitive constraint in the market and no competitive concern will arise. By contrast, if the competition authority concludes that the FOSS program may disappear from the market, the authority must assess whether the competitive pressure this program wielded pre-merger will be taken up post-merger. In addition, this article discusses the possible role of FOSS licences in the design of merger remedies.

1 INTRODUCTION

This article examines strategies for assessing free and open source software (FOSS)[1] programs in merger control procedures in the European Union (EU).

A key proposal to be presented here is that when one of the merging parties owns the intellectual property rights associated with a FOSS program (such as the trademark)[2] and this undertaking plays a decisive role in the development of this

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[1] The terms FOSS and FLOSS (free/libre open source software) are used interchangeably, *see* Rishab A. Ghosh et al., *Free/Libre and Open Source Software: Survey and Study*, http://flossproject.merit.unu. edu/report/Final0.htm (accessed 20 Dec. 2016).
[2] On the role played by trademark law in FOSS programs, *see* Pamela S. Chestek, *The Uneasy Role of Trade Marks in Free and Open Source Software: You Can Share My Code, But You Can't Share My Brand*, 8 J. Intell. Prop. L. & Prac. 421 (2013). On the role played by trademarks in merger control procedures, *see* Damiano Canapa, *Trademarks and Brands in Merger Control: An Analysis of the European and Swiss Legal Orders* (Kluwer Law 2016).

program pre-merger, the competition authorities should first assess the ability and likelihood of the merged undertaking to remove this program from the market. If such a removal seems likely, they should then determine whether the competitive pressure this program wielded pre-merger will be taken up post-merger by (1) another FOSS program already present in the market or (2) a fork developed by a competitor on the basis of the FOSS program involved in the merger (a program produces a fork when developers create a distinct and separate piece of software based on a copy of the source code of a first software program).[3]

After a presentation of some of the underlying economics of FOSS programs (section 2), the possible classification of FOSS licences and the possibility of revoking a FOSS licence are examined seriatim (section 3). Several EU mergers in which FOSS programs were involved are then reviewed (section 4). This review forms the basis for appraising FOSS programs in the substantive assessment of mergers; with this in place, we propose an analytical framework and discuss the possible role of FOSS licences in the design of merger remedies (section 5).

2   FOSS PROGRAMS AND INTELLECTUAL PRODUCTION: SOME ECONOMICS OF FOSS PROGRAMS

2.1   INTRODUCTION

A FOSS program is made available through a licence that complies with 'The Open Source Definition' provided by the *Open Source Initiative*, an organization dedicated to promoting open source software programs.[4] According to this Definition, the source code of a program distributed under a FOSS licence is 'open', which means that it is freely available to any person willing to use, modify or distribute it.[5] The open nature of FOSS programs means that anyone is free to develop a fork derived from a copy of this program. A FOSS licence thus differs from a proprietary (or closed source) licence, which is used by a copyright or patent owner to grant permission to others to use his intellectual property in a restricted way.[6]

From an organizational point of view, three principles govern FOSS programs. (1) Because it results from the contributions of many programmers, a FOSS program is a collective invention.[7] (2) The programmers of FOSS programs,

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[3]   Wikipedia, *Fork (Software Development)*, http://en.wikipedia.org/wiki/Fork_%28software_develop ment%29 (accessed 20 Dec. 2016).
[4]   Open Source Initiative, *The Open Source Definition*, https://opensource.org/osd (accessed 20 Dec. 2016).
[5]   *See* Open Source Initiative, *The Open Source Definition*, https://opensource.org/osd (accessed 20 Dec. 2016).
[6]   Lawrence Rosen, *Open Source Licensing; Software Freedom and Intellectual Property Law*, 52 (Prentice Hall 2004).
[7]   *See* Robert C. Allen, *Collective Invention*, 4 J. Econ. Behav. & Org. 1, 1–11 (1983).

by agreeing to license their copyright over the program according to the terms of the FOSS licence, forgo intellectual property rights for their work. (3) Decisions regarding the evolution over time of the official version of the program are taken by an entity with a special involvement in the program. This allows software producers to retain some control over the elements of their FOSS networks.[8]

The limits of peer production are determined by the modularity, granularity, and the integration cost of a project, not by its total cost or complexity. The *modularity* refers to the degree to which the project can be segmented into smaller modules that can be independently produced. *Granularity* relates to the size of the modules, which is a function of the time needed to produce them. *Integration*, finally, deals with the ability of the modules to be combined into the finished project.[9]

2.2   PARTICIPATION OF SOFTWARE PRODUCERS IN FOSS PROGRAMS

The collaborative development of FOSS programs was initially highly informal. Over time, however, commercial companies began to interact more extensively with the FOSS community.[10] Today, half of the workers active in the most successful FOSS programs – such as *Android*, *Linux* or *MySQL*[11] – are supported by corporations, directly or indirectly.[12]

As a rule, a commercial software producer prefers to provide a software program under a FOSS licence rather than under a proprietary one when the former is more profitable than the latter. The classical model of maximization of profits therefore provides the main incentive to commercial companies to distribute their programs under a FOSS licence.[13]

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[8]   Josh Lerner & Jean Tirole, *The Economics of Technology Sharing: Open Source and Beyond*, 19 J. Econ. Persps. 99, 105–106 (2005). On the different types of entities, *see* Stanley M. Besen & Joseph Farrell, *Choosing How to Compete: Strategies and Tactics in Standardization*, 8 J. Econ. Persps. 117, 126 (1994).

[9]   Yochai Benkler, *Coase's Penguin, or, Linux and the Nature of the Firm*, 112 Yale L.J. 369, 434–443 (2002).

[10]   Martin Campbell-Kelly & Daniel Garcia-Swartz, *The Move to the Middle: Convergence of the Open-Source and Proprietary Software Industries*, 17 Intl. J. Econ. Bus. 223 (2012).

[11]   Mark A. Lemley et al., *Software and Internet Law* 299 (Wolters Kluwer 2011); Stephen M. Maurer, *The Penguin and the Cartel: Rethinking Antitrust and Innovation Policy for the Age of commercial Open Source* Utah L. Rev. 269, 270–279 (2012).

[12]   Stephen M. Maurer & Suzanne Scotchmer, *Open Source Software: The New Intellectual Property Paradigm*, NBER Working Paper 12148, 9–10, 15–17, http://ist-socrates.berkeley.edu/~scotch/maurer_scotch mer_oss.pdf (accessed 20 Dec. 2016). *See also* Georg von Krogh et al., *Carrots and Rainbows: Motivation and Social Practice in Open Source Software Development*, 36 MIS Q. 649 (2012).

[13]   Lerner & Tirole, *supra* n. 8, at 105–106; Wouter Stam & Ruben van Wendel de Joode, *Analysing Firm Participation in Open Source Communities* 496 (Kirk St. Amant & Brian Still eds, Information Science Reference 2007).

The distribution of a software program under a FOSS licence offers numerous advantages to software producers. A commercial company can earn revenue by provid-ing products and services in a complementary segment for which the open source community does not provide an efficient supply[14]: a company that distributes a software program under a FOSS licence can provide products that are compatible with this program, offer services to buyers or adopt a 'dual licensing' model.[15] Such a licensing model exists where the same piece of software is available under two different licences; one of the licences is usually a FOSS licence and the other, a proprietary licence.[16]

3   CLASSIFICATION AND REVOCATION OF FOSS LICENCES

3.1   CLASSIFICATION OF FOSS LICENCES

One of the main complexities of the FOSS environment relates to the number of open source projects and of unique FOSS licences that exist.[17] Because FOSS licences necessarily contain a copyleft provision (also called 'viral' or 'reciprocal' provision), a good way to classify these licences is by distinguishing between the obligations that are related to their copyleft provision. Such a classification makes sense, because the ability to commercialize a derivative work depends on the strength of the terms of the copyleft provision contained in the FOSS licence.[18] The principle of a copyleft provision is that it prescribes that any distribution of a software program that is freely available to any person willing to use, modify or distribute it, must be done under the same licence terms.[19] More specifically, a copyleft provision may contain various obligations. (1) A copyleft provision may leave developers the freedom to choose whichever type of licence they prefer for a derivative work. (2) Such a provision may also enable the developers to choose the type of licence for the parts of the program that do not include any code from the original FOSS program. (3) Finally, a copyleft provision may require that developers license all combined files under the same licence as the FOSS project.[20]

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[14]   Linus Dahlander & Mats Magnusson, *How Do Firms Make Use of Open Source Communities*, 41 Long Range Plan. 629, 631 (2008); Josh Lerner & Jean Tirole, *Some Simple Economics of Open Source*, 50 J. Indus. Econ. 197, 212–215, 224–225 (2002).

[15]   Joel West & Scott Gallagher, *Challenges of Open Innovation; the Paradox of Firm Investment in Open-Source Software*, 36 R&D Mgt. 319, 325–327 (2006).

[16]   Elena Blanco, *Dual-licensing as a Business Model*, http://oss-watch.ac.uk/resources/duallicence2 (accessed 20 Dec. 2016).

[17]   There are currently over 460,000 open source projects available under several thousands of unique licences, *see* https://sourceforge.net/directory/ (accessed 20 Dec. 2016).

[18]   Andrew T. Pham, Matthew B. Weinstein & Jamie L. Ryerson, *Easy as ABC: Categorizing Open Source Licences*, www.ipo.org/wp-content/uploads/2013/03/EasyasABC.pdf (accessed 20 Dec. 2016). On the effects of copyleft provisions on welfare and innovation, *see* generally Michal S. Gal, *Viral Open Source: Competition vs. Synergy*, 8 J. Competition L. & Econ. 469 (2012).

[19]   GNU, *What Is Copyleft?*, www.gnu.org/licenses/copyleft.en.html (accessed 20 Dec. 2016).

[20]   On the reasons why firms choose a particular copyleft provision, *see* generally Josh Lerner & Jean Tirole, *The Scope of Open Source Licensing*, 21 J. L. Econ. & Org. 20 (2005).

3.2   REVOCATION OF FOSS LICENCES

A FOSS licence is a bilateral contract, which can be revoked according to its terms.[21] In cases where the FOSS licence does not foresee any possibility of revocation, the copyright laws of many jurisdictions prescribe revocation rights that may nonetheless make it possible to end such a licence. For this reason, FOSS licences must generally be assessed at the national level.[22]

It is possible to imagine a situation in which a single entity, such as a foundation, would acquire control over all the legal and community aspects of a FOSS project and, following this acquisition, privatize it. In this case, this entity may then distribute all its future improvements under a proprietary licence, while the original reciprocal open source licence would still bind third-party contributors.[23]

4   MERGER CONTROL ASSESSMENT OF FOSS PROGRAMS IN THE EUROPEAN UNION

4.1   SUBSTANTIVE ASSESSMENT OF MERGERS IN THE EUROPEAN UNION

In the EU, the assessment of mergers is based on the SIEC test.[24] The European Commission ('Commission') must assess whether a proposed merger significantly impedes effective competition in the common market or in a substantial part of it, in particular as a result of the creation or strengthening of a dominant position.[25] When an operation is likely to significantly impede effective competition, the parties can propose remedies, also called commitments, which aim to remove the competition concerns in order to maintain the efficiencies created by the concentration.[26] The remedies must entirely eliminate the competition issue within a short period and be proportionate to that issue.[27]

The following section presents the main merger decisions in which the Commission assessed FOSS programs. To the best of our knowledge, the Court

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[21]   Vikrant Narayan Vasudeva, *Open Source Software and Intellectual Property Rights*, 82 (Kluwer 2014).

[22]   Axel Metzger & Stefan Hennigs, *General Report*, 30–31 (Metzger Axel ed., Springer 2016).

[23]   Gardler Ross, *Open Source and Governance*, 58 (Noam Shemtov & Ian Walden eds, Oxford University Press 2013). On the difficulties related to such a privatization, *see* Jonathan M. Barnett, *The Host's Dilemma: Strategic Forfeiture in Platform Markets for Informational Goods*, 124 Harv. L. Rev. 1861, 1897 (2011).

[24]   *Significant Impediment to Effective Competition, see* Council Regulation (EC) No 139/2004 of 20 Jan. 2004 on the control of concentrations between undertakings (the EC Merger Regulation), OJ L 24/1 (2004), Recital 5 ('EUMR').

[25]   Art. 2(3) EUMR.

[26]   Wang Wei, *Structural Remedies in EU Antitrust and Merger Control*, 34 World Competition 571, 574–575 (2011).

[27]   Recital 30 EUMR; Commission notice on remedies acceptable under Council Regulation (EC) No 139/2004 and under Commission Regulation (EC) No 802/2004, OJ C 267/1 (2008), para. 9 ('Notice on Remedies').

of Justice of the European Union never reviewed a case in which such programs were part of a concentration.

4.2 CASE COMP/M.4747: IBM/TELELOGIC

In *IBM/Telelogic*,[28] the Commission assessed for the first time certain aspects of FOSS programs in a merger control procedure. It is particularly relevant for the purposes of this article that the authority conducted an in-depth analysis to determine whether or not the *relevant product markets* for software development tools comprised open source products.[29] Software development tools are software programs used by organizations to create new and develop existing software applications.[30]

The Commission found that customers considered open source software development tools to be credible alternatives to commercial software programs for small software development projects, but not for larger (and more complex) ones.[31] The insufficient functionalities and the lack of maintenance and support of FOSS programs were underscored.[32] For these reasons, the authority stated that while commercial and open-source software development tools were in direct competition with rivals at the low-end of the market, it was very unlikely that commercial tools would suffer from the competitive pressure from open-source products at the high-end of the market.[33]

4.3 CASE COMP/M.5529: ORACLE/SUN MICROSYSTEMS

4.3[a] *Introduction*

In *Oracle/Sun Microsystems*,[34] the Commission examined in detail the extent to which the open source nature of a database software program plays a role in the *substantive assessment* of a merger. Database software programs are used to store, organize, analyse and retrieve information held in an electronic format.[35]

Oracle, the acquiring company, is the owner of *Oracle Database*, a database software program that is licensed for a fee to its customers. *Sun Microsystems* was the owner of the database program *MySQL*, a FOSS database program available for

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[28] European Commission, Commission Decision C(2008) 823 final (Case COMP/M.4747, *IBM/Telelogic*), OJ C 195/6 (2008).
[29] *Ibid.*, paras 60, 62.
[30] *Ibid.*, para. 11.
[31] *Ibid.*, para. 64.
[32] *Ibid.*, paras 67–76.
[33] *Ibid.*, para. 76.
[34] European Commission, Commission Decision C(2010) 142 final (Case COMP/M.5529, *Oracle/Sun Microsystems*), OJ C91/7 (2010).
[35] *Ibid.*, at 27.

free under a FOSS licence and operated by this company under a dual licensing model.[36]

The legal test applied to the proposed concentration was whether the market power of the notifying parties would be increased post-merger by eliminating an important competitive constraint from the market. The Commission examined the nature and degree of the competitive constraint exerted pre-merger by MySQL and the competitive situation post-merger.

4.3[b]   *Nature and Degree of the Competitive Constraint Exerted Pre-merger by MySQL*

With respect to the nature and degree of the competitive constraint exerted pre-merger by *MySQL* in the relevant product markets, the Commission found that the open source nature of the program was of particular relevance.[37] This characteristic was seen, among other things, as leading to a reduction of vendor lock-in[38] and as increasing the product innovation and the flexibility of deployment.[39] In addition, the open source nature was taken into account during the assessment of the business model and pricing.[40]

The Commission concluded that the open source nature of *MySQL*, together with its pricing, made it a 'particular competitor' in some segments of the database market. The reduction of vendor lock-in due to the open source nature of *MySQL* increased the attractiveness of the database program for customers and, from a dynamic point of view, further development of *MySQL* was expected partly because of its open source nature.[41]

4.3[c]   *Competitive Situation Post-merger*

The Commission separated the assessment of the competitive situation post-merger in two parts.

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[36]   According to this licensing model, paying customers benefited from the database licence (either proprietary or open source), certain tools, and support. On the other hand, the open source licence distributed under the terms of the FOSS licence was available free of charge and did not include any support, *Ibid.*, para. 235. On the dual licensing model in general, *see also* above s. 2.2.

[37]   European Commission, Case COMP/M.5529, *supra* n. 34, at 168.

[38]   *Ibid.*, at 252–255.

[39]   *Ibid.*, at 256–262. The same function was already recognized to FOSS programs in *IBM/Telelogic*, *supra* n. 28, at 240–241. *See also* Maurer & Scotchmer, *supra* n. 12, at 20–25, where the different efficiency implications of FOSS programs are assessed.

[40]   European Commission, Case COMP/M.5529, *supra* n. 34, at 234–251.

[41]   *Ibid.*, at 263. The Commission came to a similar conclusion in European Commission, Commission Decision SG-Greffe(2008) D/202023 (Case COMP/M.5080, *Oracle/BEA*), OJ C 159/2 (2008), paras 29, 31; European Commission, Commission Decision C(2008) 2591 (Case COMP/M.5094, *Nokia/Trolltech*) OJ C 161/1 (2008), para. 23; European Commisison, Commission Decision C(2010) 5157 (Case COMP/M.5904, *SAP/Sybase*), OJ C 214/1 (2010), para. 85.

Firstly, the authority examined the expected evolution of *MySQL* after its acquisition by *Oracle*,[42] with a focus on whether *Oracle* would have the *ability* and *incentive* to eliminate or degrade this program.[43] This assessment was linked to the fact that, contrary to the situation typically prevailing in horizontal mergers – where two previously competing products cease to compete once they have the same owner – a FOSS program may, because of its nature, remain a competitor to a proprietary software program owned by the same company.

The Commission found that *Oracle* would have the *ability* to stop offering *MySQL* under the FOSS licence. If this were the case, MySQL would not exist anymore as a maintained open source program; what would remain are only the existing open source licences.[44] Moreover, *Oracle* would have the ability to degrade *MySQL*'s features and functionality available under the FOSS licence over time, which may lead many current users of the open source version of MySQL to adopt another open source database program, or a proprietary database program from a competitor.[45]

Despite this ability, the Commission stated that *Oracle* would not have the *incentive* to eliminate or degrade *MySQL*, immediately or over time.[46] *Oracle*'s public announcement that it would continue the development of *MySQL* for at least five years was of particular importance: these pledges insured that *MySQL* would still be offered post-merger under a FOSS licence.[47] In addition, further developments of the FOSS version of *MySQL*, together with its proprietary version, could be anticipated.[48] The period of five years was particularly helpful in giving sufficient time to competing open source database vendors to extend their market position, possibly through a fork of MySQL, while ensuring that an enhanced version of MySQL would remain available in the market until then.[49]

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[42]   European Commission, Case COMP/M.5529, *supra* n. 34, at 616–658.

[43]   *Ibid.*, at 616.

[44]   *Ibid.*, at 617–618. As explained in the decision: '[t]hrough the proposed transaction the notifying party would acquire the copyright to all of the source code of the MySQL database products. Apart from those portions of the code that have been made available under the GPL license in the past, this would leave the notifying party in control of the decision to add to, remove from or make changes within code that is being made available under each license regime. Furthermore, the notifying party would acquire other rights such as the trademark and would at least initially become the employer of the MySQL staff currently employed by Sun' (para. 617); '[a]fter the transaction Oracle could theoretically decide to simply stop offering MySQL code under the GPL. Given that *Oracle* would own the MySQL trademark, with such a step MySQL would cease to exist as a maintained open source product and only the existing open source licenses would remain' (para. 618).

[45]   *Ibid.*, at 620.

[46]   *Ibid.*, at 624–626.

[47]   *Ibid.*, at 627–632.

[48]   *Ibid.*, at 632.

[49]   *Ibid.*, at 633. For a critical assessment of that finding, *see* Daniel Zimmer, *The Merger Between Oracle and Sun: European Commission in Line with DoJ*, 4 J. Eur. Competition L. & Prac. 315, 316–317 (2010). Contradicting itself somewhat, the Commission therefore concluded that *Oracle* would have *neither the ability* nor the incentive eliminate *MySQL* post-merger, European Commission, Case COMP/

Secondly, the Commission examined whether sufficient *actual or potential competition* would exist to exert a competitive constraint on *Oracle*.

Regarding *actual competition*, the assessment was focused on the extent to which an existing FOSS database program, other than *MySQL*, would be able to develop sufficiently to exert a competitive constraint on *Oracle*. The authority found that at least one actual competitor distributing a database software program under FOSS terms, *PostgreSQL,* was likely to develop its activities in a way sufficient to replace, over time, the competitive constraint exerted in the database market by *MySQL*.[50] The Commission emphasized the importance of having another database software program available under a *FOSS licence*, because of the nature of such programs and the specific constraint that the open source nature of *MySQL* exerted pre-merger on *Oracle*.[51]

Regarding *potential competition*, the Commission analysed whether a fork (or the threat of a fork) of *MySQL* might develop into a competitor that would replace the competitive constraint exerted pre-merger by *MySQL*.[52] After having explained that a fork of *MySQL* could not be prevented from a legal point of view[53] (because of the copyleft provision contained in the FOSS licence), the authority explained that the development of a fork was faced with commercial barriers to entry, technological barriers to entry, and barriers to entry related to intellectual property rights.[54] *Commercial* barriers to entry faced by a competitor were a consequence of the fact that an undertaking would need time and means, financial and technological, to expand the recognition of a fork of *MySQL* and to insure its continuing development. In particular, the developer of a fork could not use the trademark 'MySQL', which was property of *Oracle*.[55] As a consequence, he would need to build product and brand recognition, loyalty and reputation in the database market.[56] Moreover, despite the fact that a fork of this program would benefit from the source code of an existing product, the developer of such a fork would face *technological* barriers to entry in the database market comparable to the barriers faced by any other company entering that market, in particular, the long-

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M.5529, *supra* n. 34, at 658. It must be underscored that, five years after the merger, *Oracle* appears to have respected his non-binding commitments and has even reiterated them, *see* Matt Aslett, *Oracle Reiterates Its Commitment to MySQL with Oracle Enterprise Manager Integration*, www.oracle.com/us/corporate/analystreports/mysql–oem–integration-2348064.pdf (accessed 20 Dec. 2016).

[50] European Commission, Case COMP/M.5529, *supra* n. 34, at 659–677. For additional examples in which FOSS programs were considered as competitors to proprietary programs in a given market, *see* Case T-167/08 *Microsoft Corp. v. Commission*, EU:T:2012:323, para. 228; European Commission, Case COMP/M.5080, *supra* n. 41, at 29–33, 44.

[51] European Commission, Case COMP/M.5529, *supra* n. 34, at 661.

[52] *Ibid.*, at 678–749. On the notion of fork, *see* above s. 1.

[53] *Ibid.*, at 679.

[54] *Ibid.*, at 681.

[55] *See* above n. 44.

[56] European Commission, Case COMP/M.5529, *supra* n. 34, at 682–690.

term need to employ people with high technical skills regarding the commercial software business in order to be able to maintain and continuously improve the source code of the database software.[57] Finally, the developer of a fork would face barriers to entry relating to *intellectual property rights*, which would derive from the fact that the terms of *MySQL*'s FOSS licence only allowed the original copyright holder, and not the developer of a fork, to engage in dual licensing. As such, it would not be possible to licence a fork of MySQL under a commercial licence. This last restriction, which would limit the possible revenues of the developer of a fork, would reduce the incentive to develop a competitive fork.[58]

However, in view of *Oracle*'s public pledges and despite the existence of several barriers to entry, the Commission found it could not rule out that a fork of *MySQL* would exert a sufficient post-merger competitive constraint on *Oracle*.[59] The Commission therefore concluded that *Oracle* would have neither the ability nor the incentive to degrade or eliminate *MySQL*, underscoring the importance of the open source nature of this database program in the finding of that conclusion. In addition, the authority stressed that (1) a FOSS database program, which was likely to expand and replace the competitive constraint exerted pre-merger by *MySQL*, already existed in the market and that (2) the development of a fork of *MySQL* could not be ruled out.[60]

4.4   CASE COMP/M.5669:CISCO/TANDBERG

In *Cisco/Tandberg*,[61] the Commission expressed concerns about the consequences of the merger in the market for dedicated-room solutions (ready-built and custom-built).[62] These concerns led the parties to propose *remedies,* including a FOSS component.

The operation would in particular increase the difficulties for competitors to enter into the market and to expand their position, because of the insufficient interoperability between the different solutions provided by vendors. The merged undertaking would indeed have an increased incentive to use its proprietary protocol to strategically restrict the interoperability of its dedicated-room solution with competing ones, thereby raising the barriers to entry.[63]

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[57]   *Ibid.*, at 702–714.
[58]   *Ibid.*, at 715–749.
[59]   *Ibid.*, at 750.
[60]   *Ibid.*, at 756–759.
[61]   European Commission, Commission Decision C(2010) 2217 (Case COMP/M.5669, *Cisco/Tandberg*), OJ C 36/9 (2010).
[62]   *Ibid.*, at 87. Dedicated-room solutions are a type of video conferencing, which combine multiple large high-definition (HD) screens, fixed-focus HD cameras, microphones and loudspeakers, that provide for life-size images of participants and directional audio, *Ibid.*, at 12.
[63]   *Ibid.*, at 85–86.

In order to remove this concern, the Commission accepted commitments, including the creation of a source code library for the new version of its proprietary protocol, access to which would be made available under a FOSS licence.[64] These *remedies* would remove the competitive concerns by insuring the interoperability between competing systems of dedicated-room solutions. The Commission emphasized that the remedies, taken together, would be equivalent to the divestment of a business.[65]

5   OPEN SOURCE NATURE OF SOFTWARE PROGRAMS AND ASSESSMENTS OF MERGERS

5.1   FOSS PROGRAMS IN THE ASSESSMENT OF MERGERS

5.1[a]   *Generalities*

During the substantive assessment of a merger, the open source nature of a software program does not in itself eliminate the possibility of anticompetitive effect.[66]

Because of their increased complexity, FOSS programs increasingly tend to belong to the same *relevant product markets* as proprietary software programs, at least in the lower segment thereof.[67] *Pre-merger,* FOSS programs providing an important competitive force in a market may thus constitute an important competitive constraint.[68]

The open source nature of a software program, moreover, plays a significant role in the assessment of the *post-merger* competitive situation, in two respects: (1) during the assessment of the likelihood of the elimination or degradation of a FOSS program and (2) during the assessment of the post-merger actual and potential competitors.[69] Still, the acquisition of a FOSS program, because of its open source nature, does not enable the direct acquisition of a blocking position. In fact, a FOSS program may remain, following a merger, a competitor to a proprietary software owned by the same company. This is because the free availability of the source code of a program distributed under a FOSS licence remains unchanged post-merger, which means that the freedom to use, modify and distribute such a program remains post-merger. As a result, contrary to the situation normally arising in horizontal mergers, pre-merger competing FOSS programs do not necessarily cease to compete once they are under control of the same undertaking.[70]

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[64]   *Ibid.*, at 147 *cum* 157.
[65]   *Ibid.*, at 163.
[66]   Same opinion Simonetta Vezzoso, *Open Source and Merger Policy – Insights from the European Commission's Oracle/Sun Decision*, 42 IIC: Intl. Rev. Indus. Prop. Competition L. 344, 358 (2011).
[67]   European Commission, Case COMP/M.4747, *supra* n. 28, at 76 (*see* above s. 4.2).
[68]   European Commission, Case COMP/M.5529, *supra* n. 34, at 263 (*see* above s. 4.3[b]).
[69]   Case T-167/08 *Microsoft Corp. v. Commission*, *supra* n. 50, at 228; European Commission, Case COMP/M.5529, *supra* n. 34, at 659–677 (*see* above s. 4.3[c]).
[70]   This situation is contrary to the acquisition of certain patents, which are not competing anymore following a merger and can confer a blocking position to the acquiring undertaking,

5.1[b]   *Analysis Scheme*

The disappearance from the market of a FOSS program involved in a merger may support the finding that this merger raises competitive concerns. This is the case if the incentive of the merged undertaking to provide this program under a FOSS licence decreases post-merger and if, as a consequence, the competitive pressure exerted pre-merger by this program disappears without being replaced. This may happen where the merged undertaking would own the intellectual property rights associated with a FOSS program (such as the trademark) and that this undertaking would play a decisive role post-merger in the development of this piece of soft-ware. However, the post-merger disappearance from the market of the competi-tive pressure exerted by a FOSS program does not lead, in itself, to a competitive concern, as other factors (such as the existence of countervailing buyer power) must also be assessed. At the same time, this element supports such as conclusion.

   Other things being equal, it is essential to begin the analysis by assessing the post-merger ability and incentive of the merged undertaking to revoke the FOSS licence of the open source program involved in the merger. This assessment is crucial in view of the importance that the main contributor of a FOSS program plays on its development.[71]

5.1[b][i]   A Revocation of the FOSS Licence Is Possible and Likely

The first question the competition authority must answer when examining the post-merger competitive situation is whether a revocation of the FOSS licence is *possible*, i.e. whether the merged undertaking would have the *ability* to withdraw the program involved in the merger. This is the case if the merged undertaking can terminate or constrain the FOSS licence.[72]

   If a revocation of the FOSS licence is possible and the merged undertaking would have the ability to eliminate the FOSS program from the market, the authority must examine whether such a revocation is *likely*. To this end, the

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   see e.g. DoJ, *Department of Justice Requires 3D Systems Corporation and DTM Corporation to Lift Patent Entry Barriers: Companies Agree to License Portfolio of Patents*, Press Release (16 Aug. 2001), www. justice.gov/archive/atr/public/press_releases/2001/8810.htm (accessed 20 Dec. 2016).

[71]   The Commission underscored the possible importance of the main contributor of a FOSS program in European Commission, Commission Decision C(2012)1068 (Case COMP/M.6381, *Google/Motorola Mobility*), OJ C 75/1 (2012). In that case, original equipment manufacturers (OEMs) were found to be 'highly dependent' on *Google*'s *Android* mobile operating system (OS), even though its source code was released for free under a FOSS licence (para. 67). If OEMs made transformations in the *Android*-based mobile OS software, they risked losing access to *Google* applications for reasons of incompatibility. For this reason, their freedom to make transformations in the *Android*-based mobile OS software was only theoretical (para. 25).

[72]   *See* European Commission, Case COMP/M.5529, *supra* n. 34, at 616–622. On the revocation of FOSS licences, *see* above s. 3.2.

authority must evaluate whether the incentive of the merged undertaking to make the program involved in the transaction available post-merger under a FOSS licence will be reduced in comparison with the pre-merger situation.

As explained above, a commercial producer provides a software program under a FOSS licence if such a distribution is more profitable than a distribution under a proprietary licence.[73] As a consequence, a merged undertaking does not have the incentive to provide a software program under a FOSS licence when it is less profitable for this undertaking to provide the program under a FOSS licence than under a proprietary one. If the authority concludes that the incentive to provide a program under a FOSS licence would remain the same post-merger as it was pre-merger, the competitive situation remains unchanged in the first instance.[74] Such a situation also arises if the merged undertaking concludes that too many burdens would result from the privatization of a FOSS licence and that this undertaking would thereby keep the licence unchanged. By contrast, if, post-merger, the incentive to provide a software program under a FOSS licence decreases, a revocation of this licence is likely.

If the revocation of a FOSS licence is *possible and likely*, the competition authorities must examine the likelihood that the competitive constraint exerted pre-merger by the FOSS program involved in the transaction will be replaced by another *FOSS* program. In that context, both an actual and a potential competitor may exert sufficient and timely post-merger competition.

The need to replace a FOSS program by another FOSS program, as opposed to a proprietary one, is linked to the specific competitive constraints that FOSS programs exert in the market. These programs, because of their nature, lead to a reduction of vendor lock-in, to an increase of innovation and to more flexibility in deployment.[75] Moreover, it is important to maintain a range of offers from which customers can freely choose.[76] Regarding the merger between *Oracle* and *Sun*, Neelie Kroes, then Competition Commissioner, justified the decision to keep an open source solution in the database market for economic reasons, in a difficult economic context, stating, 'all companies are looking for cost-effective IT solutions, and systems based on open-source software are increasingly emerging as viable alternatives to proprietary solutions'.[77]

Regarding the question whether an *actual competitor* may replace the competitive constraint exerted by the FOSS program involved in the merger with a

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[73]   *See* above s. 2.2.
[74]   This was the case in the merger between *Oracle* and *Sun Microsystems*, *see* above s. 4.3[c].
[75]   *See* above s. 4.3[b].
[76]   *See* Vezzoso, *supra* n. 66, at 354–356, 358–359.
[77]   European Commission, *Mergers: Commission Opens In-depth Investigation into Proposed Takeover of Sun Microsystems by Oracle* (3 Sept. 2009), http://europa.eu/rapid/press-release_IP-09-1271_en.htm (accessed 20 Dec. 2016).

FOSS program already present in the market, this analysis affirms the traditional assessment of actual competition. This assessment is concerned with market shares and with the levels of market concentration.[78]

Regarding whether a *potential competitor* may develop a fork based on the FOSS program involved in the merger (or begin the development of a new FOSS program), the authority must assess whether the foreseeable gains resulting from the development of the FOSS program will be superior to the costs of develop-ment. In view of the limits of peer production, the authority must consider the modularity of the project, the granularity of the modules, and the possibility of integrating the modules in the finished open source product[79]: forks are more likely in projects that have a high degree of modularity, where the granularity of the different modules is small[80] and where the integration of the different parts into a finished product is easy. A competitor also faces commercial barriers, technolo-gical barriers, and barriers related to intellectual property rights.[81] With respect to the latter, the authority, when it assesses the likelihood of the development of a fork, must pay attention to the terms of the FOSS licence. A FOSS licence with a copyleft provision that requires developers to license their work under the same licence than the original FOSS project may discourage potential entrants to develop a fork, even if such terms make it more likely that the code remains practically open and easier to improve. By contrast, if the copyleft provision of the licence leaves developers free to choose the type of licence of the derivative work or, alternatively, if this provision enables the developers to choose the licence type for the parts or the program that do not include any code from the original FOSS program, entrants are better able to restrict the access to their own developments and to commercialize them.[82]

To sum up, if sufficient and timely post-merger actual or potential competition by a FOSS program is foreseen, the disappearance from the market of the FOSS program involved in the merger will be compensated for and the merger will not raise any competitive concerns. By contrast, if sufficient and timely post-merger competition is

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[78]   European Commission, Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings, OJ C 31/179 (2004), paras 16, 19–21.
[79]   *See* above s. 2.1.
[80]   Maurer & Scotchmer, *supra* n. 12, at 24.
[81]   European Commission, Case COMP/M.5529, *supra* n. 34, at 681. While the availability of open source software programs suggests that barriers to entry are low and that, following a merger, a new product could quickly come to market, it must be underscored that the open-source nature of a software program is only one of many aspect of the question of the viability of an entry, *see* Scott Sher et al., *The Emerging Role of Open-Source Software in Merger Analysis*, 7 Eur. Competition L. Rev. 323, 327 (2011).
[82]   Maurer, *supra* n. 11, at 301–308.

unlikely to exist, the competitive pressure exerted pre-merger by the FOSS program will disappear from the market post-merger without being replaced.

5.1[b][ii]   A Revocation of the FOSS Licence Is Impossible or Unlikely

On the other hand, if the revocation of a FOSS licence is *impossible* or *unlikely*, i.e. if the merged undertaking cannot or will not stop offering the software program involved in the transaction under a FOSS licence, the competition authority must examine whether this program will remain a competitive force in the market after the merger. This is the case if the merged undertaking or a third party is likely to continue the development of this program in such a way as to keep it sufficiently competitive.

As with the assessment of the likelihood to revoke a FOSS licence, the merged undertaking's incentive to degrade the FOSS program involved in the merger by, for example, ceasing any investment,[83] depends on whether it would be more profitable for this undertaking to continue the development of this program or to abandon it. To make this assessment, the costs of development of the program must be compared to the revenues the merged undertaking can earn by providing products and services in a complementary segment for which the open source community does not provide sufficient supply. As explained above, the merged undertaking can provide products or services connected with the FOSS program or it can make available this program under a dual licensing model.[84]

If the conclusion of the assessment is that the merged undertaking would have no incentive to reduce its development of the FOSS program post-merger, the merger does not create any competitive issue: in such a case, the FOSS program will remain a competitive force in the market.

By contrast, if a reduction or cessation of the development of the FOSS program by the merged undertaking is expected (for example, if the merged undertaking does also own a competing proprietary program and thus has no interest in keeping the FOSS program as a competitive force in the market), the competition authority must examine whether the competitive constraint exerted pre-merger in the market by this program will persist post-merger. This assessment is the same as that conducted when a revocation of a FOSS licence is possible and likely: if sufficient and timely post-merger entry is expected to prevent anticompetitive effects, the degradation of the FOSS program involved in the merger does not raise any competitive concern. If, by contrast, the competition authority concludes that sufficient and timely post-merger competition is unlikely to exist,

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[83]   European Commission, Case COMP/M.5529, *supra* n. 34, at 616–658; Vezzoso, *supra* n. 66, at 354.
[84]   *See* above s. 2.2.

the competitive pressure exerted pre-merger by this FOSS program will disappear from the market post-merger without being replaced.

5.2   FOSS LICENCES AND MERGER REMEDIES

In cases where a competitive concern results from the disappearance of the competitive constraint exerted pre-merger by a FOSS program, merger remedies may enable such a program to remain into the market. To this end, the merged undertaking may commit to improving the FOSS program involved in the merger for a sufficiently long period in order to enable the development of (1) a fork based on this FOSS program or (2) an already existing competing FOSS program. The fork or the already existing FOSS program then replaces the competitive constraint exerted in the market pre-merger by the FOSS program involved in the transaction. Alternatively, the merging parties may commit to not releasing a new proprietary version of a software program that was distributed under FOSS terms pre-merger, without simultaneously releasing a free version of that program.

Where the merging parties commit to continuing the improvement of the FOSS program for a certain period, this improvement must be sufficient to keep this program as a competitive force in the market and it must be consistent with what would have been done in the absence of the merger. Regarding the duration of the committed improvement, it must be determined on a case-by-case basis and must give enough time to sufficiently develop a fork based on the FOSS program involved in the merger or an already existing FOSS program. In view of the dynamic nature of the software markets,[85] a period of five years, such as the one that prevailed in the merger between *Oracle* and *Sun Microsystems*,[86] should be sufficient to enable competing open source database vendors to extend their market position. Finally, the effective development of the FOSS program involved in the merger during a certain period, as a behavioural remedy, should be overseen by a monitoring trustee.[87]

When the post-merger availability of the technology of an open source or proprietary software program must be guaranteed, it may be worthwhile to include access remedies with a FOSS component. Such remedies, which provide access to a technology, have similar effects to divestiture remedies. The merged undertaking may, for example, commit to license a proprietary program under FOSS terms, thereby making this program available to third parties post-merger.[88] Such

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[85]   *See also* Ulrich Schwalbe & Daniel Zimmer, *Law and Economics in European Merger Control*, 136–137 (Oxford University Press 2009).

[86]   *See* above s. 4.3[c].

[87]   Notice on Remedies, *supra* n. 27, paras 117–120.

remedies may be completed by a commitment to honouring previous licensing engagements, at least for a certain period. The idea is to guarantee the free availability of the source code of a FOSS program in order to enable the development of a fork based on this program or to give sufficient time to a competing FOSS program already present in the market to increase its market presence. Finally, the merging parties can make available a protocol under a FOSS licence to ensure the interoperability between competing systems.[89]

6   CONCLUSION

FOSS programs may influence the outcome of a merger control procedure.[90] While the nature of a FOSS program does not enable the direct acquisition of a blocking position, such a program may nonetheless play an important role in the substantive assessment of a merger.

A FOSS and a proprietary software program may belong to the same relevant product market and, pre-merger, a FOSS program may exercise a significant competitive constraint on the other market actors. If, post-merger, it is still more profitable for the merged undertaking to provide the program under a FOSS licence than under a proprietary one, this undertaking is expected to continue to offer and develop this program. This program will then continue to exercise a significant competitive constraint in the market and no competitive concern will arise. By contrast, if the competition authority concludes that the FOSS program may disappear from the market, the authority must assess whether the development of a fork based on that piece of software or the development of a competing FOSS program are likely.[91]

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[88]   Such remedies were used in two mergers assessed by the *Antitrust Division* of the *United States' Department of Justice*, *see* DoJ, *CPTN Holdings LLC and Novell Inc. Change Deal in Order to Address Department of Justice's Open Source Concerns*, Press Release (20 Apr. 2011), www.justice.gov/opa/pr/2011/april/11-at-491.html (accessed 20 Dec. 2016); DoJ, *Statement of the Department of Justice's Antitrust Division on Its Decision to Close Its Investigations of Google Inc.'s Acquisition of Motorola Mobility Holdings Inc. and the Acquisitions of Certain Patents by Apple Inc., Microsoft Corp. and Research in Motion Ltd.*, Press Release (13 Feb. 2012), www.justice.gov/opa/pr/statement-department-justice-s-antitrust-division-its-decision-close-its-investigations (accessed 20 Dec. 2016).

[89]   As in European Commission, Case COMP/M.5669 (above s. 4.4), where the remedies insured the compatibility between different dedicated-room solution systems.

[90]   This is contrary to the general finding of Judge Easterbrook, who considered that FOSS programs had nothing to fear from antitrust laws, *see Wallace v. IBM et al.*, 467 F.3d 1104, 1108 (7th Cir. 2006). *See also*, in the context of Arts 101 and 102 TFEU, Neil Brown, *Business Implications of FOSS*, 313 (Noam Shemtov & Ian Walden eds, Oxford University Press 2013).

[91]   This concern is therefore different from the competitive problem that may arise when a FOSS program is dominant in a market. In that case, the concerns may relate to the conditions of use of proprietary components for this program (*see* above s. 2.2). For example, in its investigation against *Google Android*, the European Commission reproaches to *Google* (who is allegedly dominant in the market for general Internet search services, licensable smart mobile operating systems and app stores for the *Android* mobile operating system) to require from *Android* device manufacturers that wish to pre-

If the competition authority identifies a competitive concern, the merging parties may also propose remedies that insure a FOSS program will continue to compete in the market. Such remedies are necessary to address situations in which a competitive concern arises following the disappearance of the competitive con-straint exerted pre-merger in the market by a FOSS program.

install *Google*'s proprietary apps to enter into an agreement, which prohibits these manufacturers to sell devices running on *Android* forks, *see* European Commission, *Antitrust: Commission sends Statement of Objections to Google on Android Operating System and Applications*, Press release, (20 Apr. 2016), http://europa.eu/rapid/press-release_MEMO-16-1484_en.htm (accessed 20 Dec. 2016).