BEYOND RIVALRY

Expanding the Incentive Framework for Innovation

Selcukhan Unekbas[♦]

Abstract

EU merger law recognizes rivalry as the sole source of innovation incentives. Such a narrow focus is misguided. Innovation is driven by competitive pressure, and rivalry is not its only source. Building on Schumpeter's notion of innovation as an "ever-present threat", the paper shows how economic, technological, and legal contexts can generate powerful innovation incentives. Expanding demand, user–producer interactions, technological opportunities, and regulatory frameworks often compel firms to innovate even in the absence of rivalrous pressure. The analysis demonstrates that while the European Commission has occasionally acknowledged these contextual drivers, it lacks a systematic framework for assessing them. Drawing on the Court of Justice's case law, the paper suggests that contextual drivers should be evaluated with greater completeness, coherence, and concreteness. Doing so would enhance predictability and better align merger control with the realities of innovation.

Keywords: context, incentive, innovation, merger, rivalry

JEL Codes: K21, K33, L40, L41, O31

♦ PhD Researcher, Department of Law, European University Institute, Florence, Italy; Research Fellow, Haas School of Business, University of California, Berkeley, California, USA. The author declares no conflicts of interest. Contact: selcukhan.unekbas@eui.eu

I. Introduction

In his seminal work, *Capitalism, Socialism and Democracy,* Schumpeter talked about innovation competition as an "ever-present threat".[1] Accordingly, innovation makes an incumbent "feel" like it is in a competitive situation, "even if it is alone in its field". Often, "investigating government experts fail to see any effective competition" and "conclude that [the firm's] talk, under examination, about its competitive sorrows is all make-believe".

Schumpeter was saying that the absence of rivalry is not necessarily the absence of competitive pressure. But how? What makes firms "feel" pressured to innovate? Under what conditions is innovation an "ever-present threat"? How could "investigating government experts" recognize that, in some cases, competition is broader than rivalry? This paper seeks to answer these questions.

The starting point can be, again, Schumpeter. A few paragraphs later, Schumpeter gives a hint of an answer to the foregoing questions. His remarks come from an inverse angle: when is innovation *not* an ever-present threat? Apparently, innovation matters less "in the sectors furthest removed from all that is most characteristic of capitalist activity".[2]

Schumpeter understood capitalism's core characteristic as innovation. At first glance, this may lead to a tautological conclusion: innovation matters less in non-innovating industries. But Schumpeter's point is deeper. Innovation is an ever-present threat in industries where *opportunities to innovate are high.* Put differently, a context conducive to innovation generates pressure on firms that competition is forthcoming, even in the absence of visible rivalry.

This paper argues that the context of a merger may reveal more than commonly appreciated. EU merger law adopts a case-specific approach to assessing transactions, where the legal, economic, and technical context of deals help understand risks of competitive harm.[3] That said, the *implications* of context are not fully considered.

The economic, technological, and legal circumstances of a proposed merger often have powerful effects on firms' innovation incentives.[4] Economic properties of markets, such

[1] Joseph A. Schumpeter, *Capitalism, Socialism and Democracy* (Harper & Brothers 1942).

[2] *Ibid* 85.

[3] Christopher Cook, Vladimir Novak, & Sven Frisch, 'Recent Developments in EU Merger Remedies' (2016) 7 (5) Journal of European Competition Law & Practice 349. Such a contextual (or "all-things-considered") approach is not limited to merger analysis but is a general feature of EU competition law. See, Case C-240/22 P *Intel Corporation* [2024] ECLI:EU:C:2024:915, para 179; and Case C-56/65 *Societe Technique Miniere* [1966] ECLI:EU:C:1966:38. See also, Fernando Castillo de la Torre, 'On Boxes and Paradoxes: Form and Substance in Judicial Review of Competition Decisions' (*EU Law Live,* 29 September 2022) https://eulawlive.com/competition-corner/on-boxes-and-paradoxes-form-and-substance-in-judicial-review-of-competition-decisions-by-fernando-castillo-de-la-torre/ accessed 21 July 2025.

[4] The impact of institutional factors like legal and policy measures, economic factors like the changing structure of customer demand, and technical factors like the evolution of relevant scientific fields on innovation and technological change is a widely

as a growing demand pool, changing factor costs, and user interactions, incentivise firms to innovate (**I**). Some products present broad technological opportunities that require constant innovation from firms (**II**). And legal measures like regulations and procurement can drive innovation (**III**). In such cases, firms' incentives to innovate may be strong even in the absence of pressure from rivals.[5] Accordingly, contextual elements can reinforce or replace pressure from rivals as a source of innovation incentives (**IV**).

I. Economics

The economic context of a transaction can influence innovation incentives. Changing conditions of production, demand characteristics, and user-producer interactions are mechanisms that provoke firms to innovate.

1. Conditions of production

Changes in factor costs and availability can stimulate innovation in certain directions. If the costs of an input rise, this will push firms to innovate to economise on the expensive production factor. As noted by Sir John Hicks, "[a] change in the relative prices of factors of production is itself a spur to innovation and to inventions of a particular kind – directed at economising the use of a factor which has become relatively expensive".[6] For instance, growing scarcity of natural resources is likely to induce a "powerful mechanism of response" from firms that employ them.[7]

Innovation in aircraft engines is illustrative. The efficiency and viability of a jet engine depend on its ability to resist high temperatures. An important material for heat resistance is nickel, which was a scarce resource when jet-propulsion aircraft first emerged. The scarce, and therefore expensive, material induced firms to come up with a radical innovation called "hollow turbine blades", which leveraged aerodynamics and air flow to cool off the engine.[8] In other words, shortages in natural resources rendered costs excessively high, leading to economizing innovations.

2. Demand characteristics

The presence of constant demand for technological development may induce firms to innovate. In some markets, the demand for new products and for improvements on existing products remains high. This calls forth innovation, as the certainty of demand

accepted premise in innovation studies. See, *e.g.,* Frank W. Geels, 'Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study' (2002) 31 (8) Research Policy 1257.

[5] Conversely, even in the presence of many rivals, a firm may perceive itself as "winning" and refrain from innovating. See, Richard Cyert & James March, *A Behavioral Theory of the Firm* Pearson 1963).

[6] John R. Hicks, *The Theory of Wages* (MacMillan 1932).

[7] Nathan Rosenberg, 'Innovative Responses to Materials Shortages' (1973) 63 (2) The American Economic Review 111.

[8] Michael Gibbert & Philip Scranton, 'Constraints as sources of radical innovation? Insights from jet propulsion development' (2009) 4 Management & Organizational History 385.

makes it more attractive for firms to introduce new and better products to capture profit opportunities. For example, the actual and potential market size for therapeutic drugs have been found to induce higher innovation from pharmaceutical firms.[9]

Constant or expanding demand is a mirror image of innovation incentives driven by rivalry. Although both mechanisms are market-related, demand-induced innovations address an enlarging pool of demand, while rivalry-induced innovations respond to *a threat of shrinking* demand.[10] Put differently, innovations triggered by pressure from rivals are "reactions" to market forces, whereas those responding to increasing demand are "proactive" searches for new products and techniques without necessarily being pushed by rivalrous pressures.[11]

3. User-producer interactions

A third way in which economic forces influence innovation incentives is demand articulation.[12] For some products, "the degree of specificity of the market signals received by the innovating firm and consequently the extent to which it anticipates demand" is relatively high.[13] Such products exhibit a clearer presentation of customer needs thanks to the extensive and detailed user feedback.[14] Firms that pay sufficient attention to these signals will be spurred to innovate in response.[15]

Demand articulation is more likely to induce innovation in factor markets. As opposed to final consumers, intermediate customers are well-informed and can form specific demand patterns that can be communicated with suppliers.[16] Put differently, demand in factor markets is of "higher quality" compared to the scattered demand that often appears in consumer markets – it comes from buyers that know what they want and whether they

[9] Daron Acemoglu & Joshua Linn, 'Market Size in Innovation: Theory and Evidence from the Pharmaceutical Industry' (2004) 119 (3) The Quarterly Journal of Economics 1049.

[10] The demand is "shrinking" relative to an individual firm because rivals are trying to appropriate it with their own innovations. See, David Mowery & Nathan Rosenberg, 'The influence of market demand upon innovation: a critical review of some recent empirical studies' (1979) 8 (2) Research Policy 102.

[11] Charles Carter & Bruce Williams, *Investment in Innovation* (OUP 1958).

[12] Simon Kuznets, *Secular Movements in Production and Prices* (Houghton Mifflin 1930) 8.

[13] Morris Teubal, Naftali Arnon, & Manuel Trajtenberg, 'Performance in the Israeli Electronics Industry: A Case Study of Biomedical Instrumentation (1976) *5* Research Policy 354.

[14] Keith Pavitt & Warren Walker, 'Government policies toward industrial innovation: a review' (1976) *5* Research Policy 11.

[15] This is known as "learning-by-using". See, Nathan Rosenberg, *Inside the Black Box: Technology and Economics* (CUP 1983).

[16] Keith Pavitt, 'Sectoral patterns of technical change: Towards a taxonomy and a theory' (1984) 13 (6) Research Policy 343.

are getting it.[17] This can incentivise suppliers to innovate in order to keep up with the sophisticated demands of their customers.[18]

4. Case law

Economic context as an incentive for innovation appears sporadically in EC decisions. To begin with, demand characteristics appear as a driver of innovation in a few cases. A prominent example is *Caterpillar/MWM*.[19] The deal presented horizontal overlaps in the market for gas gensets, which are gas-powered generators that convert chemical energy into mechanical energy to produce electricity. The parties were not regarded as close competitors, leading to little concern for reduced innovation incentives post-merger. That said, the EC partly based its decision on the market's demand characteristics.[20] In particular, it recognized that "the market demands engines/gensets to be increasingly more efficient, generate more power, and at the same time have a lower environmental impact, which requires that all competitors constantly develop new products or optimise the products they offer".[21] In other words, the constant demand for innovation meant that "competitors need to regularly launch new or improved products (…), making manufacturers that do not invest in R&D obsolete".[22] Hence, innovation pressure came not (only) from rivalry, but also constant demand.

A more radical conclusion was reached in *IBM/Telelogic.*[23] In this merger, which sought to combine two firms making software development tools, the parties' products were regarded as close substitutes for users in various industries. Thus, unlike *Caterpillar/MWM,* there were substantial innovation concerns post-merger. Nonetheless, the EC accepted that "customer needs, *rather than the competition between IBM and Telelogic*, has been, and continue to be, the most important driver for innovation in the software development tools area".[24] It noted the growing demand from small and medium-sized businesses and "the ever increasing needs of customers" as indicators that innovation is necessary to

[17] Bengt-Ake Lundvall, 'Innovation as an Interactive Process: From User-Producer Interaction to the National Systems of Innovation' in Lundvall (ed), *The Learning Economy and the Economics of Hope* (Anthem 2016). In consumer markets where demand is scattered, information may have to be manually aggregated to stimulate innovation. On that point, see Nikita Divissenko, *Regulating Innovation in the Digital Age: A Demand-Centred Toolbox for the Data-Driven Economy* (Bloomsbury Hart 2025).

[18] Sarah Slaughter, 'Innovation and learning during implementation: a comparison of user and manufacturer innovations' (1993) 22 Research Policy 81. Suppliers' innovation incentives may also stem from reputational concerns. See, Bentley MacLeod, 'Reputations, Relationships, and Contract Enforcement' (2007) 45 Journal of Economic Literature 595.

[19] Case No COMP/M.6106 *Caterpillar/MWM* [2011].

[20] The EC made similar arguments in *Boehringer/Sanofi,* where the increasing prevalence of certain animal diseases and the resulting demand for treatments pushed firms to innovate. See, Case No COMP/M.7917 *Boehringer Ingelheim/Sanofi Animal Health* [2016], para 37.

[21] *Ibid,* para 115.

[22] *Ibid,* para 150.

[23] Case No COMP/M.4747 *IBM/Telelogic* [2008].

[24] *Ibid,* para 232 (emphasis added).

survive in the market.[25] Consequently, the reduction of rival pressure post-acquisition did not jeopardise innovation incentives.

Demand articulation features in some cases as well. As anticipated, these cases took place in factor markets with advanced customers. *J&J/Synthes* was a merger concerning spine devices, which help correct various conditions affecting the spine (like deformities).[26] Purchasing patterns in spine devices were sophisticated. Hospitals and surgeons were relatively insensitive to price reductions and instead prioritized innovativeness and quality. The EC noted that these patterns would not change post-merger, implying that firms would continue to receive the specialized demand for innovative products.[27] *GE/Alstom* was another case where demand articulation was discussed.[28] The EC recognized that customers in the relevant market (heavy duty gas turbines) "represent the high end of the market and their sophisticated demand has been driving the need for innovation in the industry".[29] The fact that gas turbines used expensive natural gas for energy production led customers to continuously demand more innovative operations with shorter start-up times, higher load capacity, and lower heat rates.[30] In other words, innovation was an inherent feature of the relevant market due to specialized demand. Nonetheless, unlike demand characteristics, the impact of articulated demand on innovation incentives was not readily acknowledged by the EC in any of these cases.[31]

Unlike demand expansion or articulation, changing conditions of production did not appear as a source of innovation incentives in merger decisions. One reason could be that evolving input costs are an ever-present feature of economic activity.[32] At any point, some production factors are bound to be more expensive than others. Although this likely pushes firms to innovate in their direction to save costs, it is probable that such incentives are too speculative and general to be considered for merger assessments. However, as explored below, the situation changes when rising input prices can be directly attributed to regulatory measures.[33]

[25] *Ibid,* para 237.

[26] Case No COMP/M.6266 *Johnson & Johnson/Synthes* [2012].

[27] *Ibid,* para 594.

[28] Case No COMP/M.7278 *General Electric/Alstom (Thermal Power – Renewable Power & Grid Business)* [2015].

[29] *Ibid,* para 521.

[30] *Ibid,* para 993.

[31] The links between sophisticated customer demand and innovation incentives appear more relevant to merger law when considered in light of the definition of market power, which, according to the CJ, enables a firm to act "independently" of its customers.

[32] Nathan Rosenberg, 'The Direction of Technological Change: Inducement Mechanisms and Focusing Devices' (1969) 18 Economic Development and Cultural Change 1.

[33] See, Section IV.1.B below.

II. Technology

Technological context can act as an alternative source of innovation incentives. The likelihood of innovation for a given unit of innovative effort, or "technological opportunity", determines the extent of pressure on firms to innovate.[34] Operating in a high technological opportunity market may push firms to innovate despite relatively low levels of pressure from rivals.

1. Technological opportunities

When a product market is first established, it is surrounded by considerable uncertainty. The existence, extent, and nature of customer demand, the practical means of satisfying that demand, and the response from regulatory authorities create a very uncertain environment.[35] At this stage, the market in question has relatively high technological opportunity, which spurs entry, market share fluctuation, and experimentation.[36] As the market evolves and matures, the uncertainty starts to wither. Patterns of customer demand become clearer, returns to R&D diminish, and a dominant design emerges.[37] Competition becomes concentrated around a few winning firms. Eventually, the technological opportunities may become so scarce that innovation grounds to a halt.[38]

Things rarely happen in such a linear fashion, however. Products experience technological lifecycles differently, for there is considerable heterogeneity between them in terms of technological opportunity.[39] The basic reason for this divergence is that some products *replenish depleted technological opportunities faster* than others.[40] For products constrained by a scarcity of opportunities for technological development, the incentive to innovate cannot be supplied by technological factors, but must turn to alternative sources (*e.g.,* competitive pressure from rivals). By contrast, some products are underpinned by technology with plenty of development opportunities.[41] In such cases, the technology itself supplies the incentives for firms to innovate.

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[34] Stefano Breschi, Franco Malerba, & Luigi Orsenigo, 'Technological regimes and Schumpeterian patterns of innovation' (2000) 110 The Economic Journal 388.

[35] James M. Utterback & William Abernathy, 'A dynamic model of process and product innovation' (1975) 3 (6) Omega 639.

[36] Steven Klepper, 'Entry, Exit, Growth, and Innovation over the Product Life Cycle' (1996) 86 (3) The American Economic Review 562. See also, Case No COMP/M.3687 *Johnson & Johnson/Guidant* [2005], para 75 ("[r]apid, ongoing technological innovation and product development are key drivers of competition. […] Recent history in coronary stents shows that each breakthrough has changed the competitive landscape").

[37] Johann Peter Murmann & Koen Frenken, 'Toward a systematic framework for research on dominant designs, technological innovations, and industrial change' (2006) 35 (7) Research Policy 925.

[38] See, *e.g.,* Case No COMP/M.7155 *SSAB/Rautaruukki* [2014] para 172.

[39] Franco Malerba & Luigi Orsenigo, 'Schumpeterian patterns of innovation are technology-specific' (1996) 25 Research Policy 451.

[40] Alvin Klevorick, Richard Levin, Richard Nelson, & Sidney Winter, 'On the sources and significance of interindustry differences in technological opportunities' (1995) 24 (2) Research Policy 185.

[41] Richard Levin, Wesley Cohen, & David Mowery, 'R & D Appropriability, Opportunity, and Market Structure: New Evidence on Some Schumpeterian Hypotheses' (1985) 75 (2) The American Economic Review 20.

Three mechanisms contribute to a relative abundance of technological opportunity. First, the underlying technology of a product may facilitate "natural trajectories" of innovation.[42] Natural trajectories are forces that push firms to continuously improve the various parameters of products employing the technology.[43] To illustrate, innovation in pesticides commonly proceeds along changing resistance levels. Agrochemical firms must continuously innovate to keep up with increasingly powerful pests to provide stable protection to crops.[44] In other words, pesticide technology creates "expectations" that further innovation will be forthcoming which, in turn, incentivizes firms to realize those expectations.[45] Products like these deplete technological opportunities slower.

Second, some products may present high technological opportunities due to complementarities. Technological developments in related or adjacent products may unlock new opportunities and drive firms to innovate further. This is especially the case when changes in one component of a system of products pushes changes elsewhere in the system.[46] Since a system is only as powerful as its weakest link, the weak parts are natural targets of innovation. When implemented, these innovations rarely address the weakness perfectly – they often overshoot the mark, which then renders another component relatively weak.[47] This self-feeding process can continue in "compulsive sequences" and provide a powerful incentive for firms to carry on innovating.[48] For instance, aircraft design progresses by improving certain product features one after the other. Improvements in one feature like speed requires innovation in engines, which propels designers to increase wing strength, which then incentivizes developments in carry weight.[49]

Finally, technological opportunities may diminish slower because of increases in knowledge.[50] The role science, and links with science, plays in incentivizing innovation is highly product-specific.[51] When links with academic research are intertwined with

[42] Giovanni Dosi, 'Technological paradigms and technological trajectories: A suggested interpretation of the determinants and directions of technical change' (1982) 11 Research Policy 147.

[43] Richard Nelson & Sidney Winter, 'In search of useful theory of innovation' (1977) 6 Research Policy 36.

[44] Case No COMP/M.5675 *Syngenta/Monsanto* [2010] paras 61 & 249. See also, Nicolas Petit, 'Significant Impediment to Industry Innovation: A Novel Theory of Harm in EU Merger Control?' (2017) ICLE Antitrust & Consumer Protection Research Program White Paper No 1.

[45] Nathan Rosenberg, 'On Technological Expectations' (1976) 86 The Economic Journal 523. To be clear, the "expectations" in question do not eliminate the uncertain nature of innovation but merely channel it. Indeed, innovation forecasting errors remain common among firms operating in industries with clear technological trajectories. On these points, see Chris Freeman & Luc Soete, *The Economics of Industrial Innovation* (Pinter 1997).

[46] Economic literature shows that firms upgrade complementary components "asynchronously" (on different dates). See, Boyan Jovanovic & Dmitriy Stolyarov, 'Optimal adoption of complementary technologies' (2000) 91 The American Economic Review 15.

[47] Clayton Christensen & Michael Raynor, *The Innovator's Solution: Creating and Sustaining Successful Growth* (HBS Press 2003).

[48] Rosenberg (n 32) 5.

[49] Devendra Sahal, 'Technological guideposts and innovation avenues' (1985) 14 (2) Research Policy 61.

[50] Edwin Mansfield, 'Academic research and industrial innovation' (1991) 20 Research Policy 1.

[51] Richard Levin, Alvin Klevorick, Richard Nelson, & Sidney Winter, 'Appropriating the Returns from Industrial Research and Development' (1987) 3 Brookings Papers on Economic Activity 783.

innovation, breakthroughs in related scientific fields may encourage firms to take advantage of new knowledge and incorporate it in new products.[52] In other words, by extending the pool of useful knowledge, advances in science can spark new technological combinations and incentivize firms to experiment with innovations.[53] For example, German firms were incentivized to experiment with new developments in chemistry and materials science, eventually establishing a powerful synthetic rubber market.[54]

2. *Case law*

The EC's record acknowledges that some products present little opportunity for firms to innovate. Transactions that took place in commoditized product markets are illustrative.[55] In *Nestle/Perrier,* the EC noted that "the scope for product innovation in the market of [bottled] water is reduced. The water industry cannot be considered as an industry based on research, where new technological developments might quickly erode acquired positions".[56] Similarly, *Kali+Salz/MdK* concerned chemical potash, which was "a mature commodity market characterized by a largely homogeneous product and the lack of technological innovation".[57] And in *Mannesmann/Vallourec,* the relevant market was stainless steel tubes – "commodity products subject to widely accepted international specifications" where "innovation has only a relatively minor role to play".[58] Another market in which technological opportunities are few is petroleum products. In *Exxon/Mobil,* it was noted that "[t]echnological development in [motor fuels] is achieved through gradual and relatively slow incremental changes to processes and products rather than revolutionary fast-moving changes".[59] More than 25 years later, the EC still considers motor fuel products as "characterised by a relatively low level of innovation".[60]

The picture is different for products with high technological opportunities. It is uncommon for the EC to recognize that high technological opportunity may sustain firms' innovation incentives. A rare example is *Siemens/Italtel,* a merger in the public telecommunications equipment industry.[61] In that case, the EC discussed that "companies typically spend around 15%-20% of their turnover in R&D", and noted that "these costs

[52] See, Case No COMP/M.495 *Behringwerke AG/Armour Pharmaceutical* [1995], para 37; Case No COMP/M.737 *Ciba-Geigy/Sandoz* [1996], para 302; Case No COMP/M.8401 *J&J/Actelion* [2017], para 24.

[53] Nathan Rosenberg & Claudio Frischtak, 'Technological innovation and long waves' (1984) 8 Cambridge Journal of Economics 7.

[54] Diarmuid Jeffreys, *Hell's Cartel: IG Farben and the Making of Hitler's War Machine* (MacMillan 2008).

[55] Some cases contend that in some markets, such as life insurance, it is "impossible to create innovative products". See, on that point, Case T-87/96 *Unicredito* [1999] ECLI:EU:T:1999:37, para 52.

[56] Case No COMP/M.190 *Nestle/Perrier* [1992], para. 126.

[57] Case No COMP/M.308 *Kali-Salz/MdK/Treuhand* [1993], para 57.

[58] Case No COMP/M.315 *Mannesmann/Vallourec/Ilva* [1994], para 78.

[59] Case No COMP/M.1383 *Exxon/Mobil* [1999], para 473. The EC's conclusions on innovation were confirmed by the General Court in Case T-342/00 *Petrolessence* [2003] ECLI:EU:T:2003:97, para 112.

[60] Case No COMP/M.10438 *MOL/OMV Slovenija* [2023], para 323.

[61] Case No COMP/M.468 *Siemens/Italtel* [1995].

must be regarded as *necessary to be able to maintain a competitive position from a technological point of view*".[62] In other words, equipment firms' "long term viability" depended on constant R&D investments and innovation.[63] This may be an implicit recognition that large technological opportunities incentivize firms to innovate vigorously, as every round of innovation induces customers to consider new suppliers and suppliers to enter new markets.[64] Another example concerns the market for smart cards, such as SIM cards for mobile phones. In *Axalto/Gemplus,* the EC acknowledged that technological forces inherent to smart cards incentivize firms to innovate.[65] As product prices decline sharply one year after introduction, firms have periodic windows of opportunity to keep high-margin products in their sales portfolio. Thus, even though the merger reduced competitive pressure, "the new entity and its main competitors [kept] a strong incentive to innovate".[66]

There are also some cases that discuss innovation from a systems perspective. For example, the *Metso/Aker* merger discussed the interlinked nature of product development in the paper industry, where linkages between the different components of the paper production process "resulted in the design of better and more reliable products".[67] In a similar vein, in *Allied Signal/Honeywell,* the EC noted that "products that perform the functions necessary to operate an aircraft are *constantly evolving as a result of product innovation and integration*".[68] In *Exxon/Mobil,* the EC described the nature of innovation as follows: "aviation lubricants industry has suffered from poor profitability and a high-cost base as a result of the continuous need for research and development triggered by technological advances in aircraft manufacturing".[69] And in a telecoms merger, the EC stated that "demand for 4G [innovation] is driven by innovations in the handset and in the content offerings".[70] These statements come close to admitting that components of a technological system may exert pressure on firms to innovate so as to maintain overall performance. However, the EC did not consider the effects of these factors on firms' innovation incentives.

The CJ's case law appears supportive of considering the technological context as a driver of innovation. In *Cisco Systems,* the GC noted that markets must be defined in light of

[62] *Ibid,* para 50. Not following the "competitive dynamics of the market in terms of innovation" may diminish firms' market share or cause them to exit the market altogether. See, Case No COMP/M.7048 *Cargill/ADM Chocolate* [2015], para 229.

[63] *Ibid.*

[64] *Ibid,* para 51.

[65] Case No COMP/M.3998 *Axalto/Gemplus* [2006].

[66] *Ibid,* para 52.

[67] Case No COMP/M.4187 *Metso/Aker Kvaerner* [2006], para 107.

[68] Case No COMP/M.1601 *Allied Signal/Honeywell* [1999], para 30 (emphasis added).

[69] Case No COMP/M.1383 *Exxon/Mobil* [1999], para 799.

[70] Case No COMP/M.7018 *Telefonica Deutschland/E-Plus* [2014].

products' technological characteristics, such as the speed of innovation cycles.[71] As the HMGs note, "considerations leading to the delineation of the relevant markets may also be of importance for the competitive assessment of the merger".[72] Despite this connection, the EC appears reluctant to fully consider the implications of technological context on innovation incentives. While it is willing to concede that some products offer little opportunity for firms to innovate, the EC does not typically recognize that high technological opportunities may autonomously spur innovation. Consequently, the potential impact of technological context on firms' innovation incentives seems neglected in EU merger law.

III. Law

The legal context's role in spurring innovation has been evolving. While traditional views defend that laws should incentivize innovation only indirectly, emerging trends suggest a much broader role for regulatory spurring of innovative activity.[73] These developments may require merger law to incorporate the legal context as a driver of innovation incentives.

1. From rate to direction

The legal context generally plays a limited role in incentivizing innovation. From a traditional perspective, laws and regulations fix market failures involved with the innovation process.[74] These failures stem from the public goods character of innovation. Firms appropriate only a fraction of the value they create by innovating.[75] In addition, firms may be deterred from innovating because their efforts may spillover and benefit other entities, including competitors. Furthermore, innovation projects may fail to attract funding due to the uncertainty involved.[76] Consequently, markets may undersupply innovation.[77] This justifies laws, such as intellectual property rules, subsidy regulations, or favourable tax codes, that boost the level of innovative activity. In other words, traditional economic policy recognizes that markets underdeliver innovation and empowers laws to

[71] Case T-79/12 *Cisco Systems* [2013], paras 69-71.

[72] European Commission, 'Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings' (2004) OJ C 31/5, para 10.

[73] For clarity, "laws" refer to legislative measures as well as decisions taken by administrative bodies authorized by legislation.

[74] Jakob Edler & Jan Fagerberg, 'Innovation policy: what, why, and how' (2017) 33 Oxford Review of Economic Policy 2.

[75] Edwin Mansfield, John Rapoport, Anthony Romeo, Samuel Wagner, & George Beardsley, 'Social and Private Rates of Return from Industrial Innovations' (1977) 91 (2) The Quarterly Journal of Economics 221.

[76] Bronwyn Hall & Josh Lerner, 'The Financing of R&D and Innovation' in Hall & Rosenberg (eds), *Handbook of the Economics of Innovation* (Elsevier 2010).

[77] Richard Nelson & Paul Romer, 'Science, Economic Growth, and Public Policy' (1996) 39 (2) Challenge 9.

improve the *rate* of innovative activity. In such a setting, legal context plays a moderate and indirect role in pushing innovation.[78]

Laws increasingly operate with a different philosophy, however. As opposed to traditional policies, which argue that markets undersupply the rate of innovation, modern policy contends that markets may underdeliver innovation in *specific areas*.[79] This may stem from the extremely uncertain nature of innovation in some fields. Innovation becomes possible when technological opportunities can be met by existing (or achievable) technological knowledge, and it becomes feasible when this can be done cost-effectively to address sufficient demand. The fulfilment of either condition is uncertain. In some cases, the degree of uncertainty can be so high that it becomes prohibitive for private firms to undertake the innovation.[80] Alternatively, some innovations may not appear because of "inefficient lock-in".[81] Historical accidents and path-dependency may render some technologies sticky and confine innovative efforts into a narrow paradigm.[82]

The resulting undersupply of specific innovations may be problematic. Contemporary laws increasingly defend that some innovations are desirable to address "missions" or "grand challenges".[83] This requires laws to address, in addition to the rate of innovation, the *direction* of innovation as well.[84] In such a setting, the emphasis shifts from increasing the rate of innovation "randomly" to *specifying* the technologies into which investments should be made.[85] Put differently, the justification for legal intervention is no longer market failure stemming from a general undersupply of innovative activity, but *directional failure* that emanates from a dearth of *desirable* innovative activity.[86]

Consequently, a prime objective for law becomes the *shaping and steering* of innovation at the firm level. This is mostly done through regulations, which transform the broad-brush

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[78] Dominique Foray, 'On sector-non-neutral innovation policy: towards new design principles' (2019) 29 Journal of Evolutionary Economics 1379.

[79] Dominique Foray, David Mowery, & Richard Nelson, 'Public R&D and social challenges: What lessons from mission R&D programs?' (2012) 41 (10) Research Policy 1697.

[80] Stephen J. Kline & Nathan Rosenberg, 'An Overview of Innovation' in Landau & Rosenberg (eds), *The Positive Sum Strategy: Harnessing Technology for Economic Growth* (National Academic Press 1986).

[81] Giovanni Dosi & Richard Nelson, 'An introduction to evolutionary theories in economics' (1994) 4 (3) Journal of Evolutionary Economics 153.

[82] For instance, the dominance of the internal combustion engine, as opposed to electric-powered engines, is increasingly viewed as inefficient lock-in due to the former's negative environmental impact. See, Robin Cowan & Staffan Hulten, 'Escaping lock-in: The case of the electric vehicle' (1996) 53 Technological Forecasting and Social Change 61.

[83] Marko Hekkert, Matthijs Janssen, Joeri Wesseling, & Simona Negro, 'Mission-oriented innovation systems' (2020) 34 Environmental Innovation and Societal Transitions 76.

[84] Mariana Mazzucato, 'Innovation Policy as Creating Markets, Not Only Fixing Them: Implications for Complexity Theory' in Wilson & Kirman (eds), *Complexity and Evolution: Toward a New Synthesis for Economics* (OUP 2016).

[85] Dominique Foray, 'Why Is It So Difficult to Translate Innovation Economics into Useful and Applicable Policy Prescriptions?' in Lerner & Stern (eds), *The Rate and Direction of Inventive Activity Revisited* (University of Chicago Press 2012).

[86] K. Matthias Weber & Harald Rohracher, 'Legitimizing research, technology and innovation policies for transformative change: Combining insights from innovation systems and multi-level perspective in a comprehensive 'failures' framework' (2012) 41 (6) Research Policy 1037. See also, Kevin A. Bryan, Jorge Lemus, & Guillermo Marshall, 'R&D competition and the direction of innovation' (2022) 82 International Journal of Industrial Organization 102841.

aspirations of "missions" into targeted and granular objectives in specific markets.[87] In other words, regulations extract "doable" innovation goals from vaguely formulated missions.[88] This invites a deeper consideration of legal innovation drivers. In particular, the potential of the legal context to incentivize specific innovations by facilitating their creation or propelling their destruction must be assessed.[89]

In European law, two measures prominently incentivize innovation: public procurement (**A**) and product regulation (**B**). Public procurement leverages the spending power of State authorities to create or increase demand for innovative products. It acts as a "carrot" by increasing returns to innovation in markets prioritized by public policy. Product regulation, on the other hand, incentivizes innovation by penalizing inaction. It works as a "stick" by punishing lazy firms that remain within established, and undesirable, product technologies.

2. Public procurement

A prominent tool to stimulate innovation is procurement laws that regulate the purchase of goods and services by public authorities.[90] Procurement laws contain various procedures that incentivize firms to "introduce something qualitatively new" and create "expectations that a sequence of further development moves will be set in motion".[91] They intend to stimulate innovation by mitigating demand uncertainty.[92] In particular, the "absorptive power" of a large buyer, such as the public sector, can incentivize firms to innovate by reducing demand uncertainty significantly.[93]

EU law contains three mechanisms to trigger innovation: ordinary procurement, pre-commercial procurement, and innovation partnership.

A. Ordinary procurement

Public authorities can incentivize innovation by carefully designing ordinary procurement contracts. They can construct innovation-inducing technical specifications, variant requirements, and award criteria.

[87] Mariana Mazzucato, 'Mission-oriented innovation policies: challenges and opportunities' (2018) 27 (5) Industrial and Corporate Change 803.

[88] Joan Fujimura, 'Constructing `Do-able' Problems in Cancer Research: Articulating Alignment' (1987) 17 (2) Social Studies of Science 257.

[89] Paula Kivimaa & Florian Kern, 'Creative destruction or mere niche support? Innovation policy mixes for sustainability transitions' (2016) 45 Research Policy 205.

[90] Roberto Caranta & Pedro C. Gomes, 'Public procurement and innovation' (2021) 22 ERA Forum 371.

[91] Albert O. Hirschman, *Development Projects Observed* (Brookings 1967).

[92] Julien Chicot & Mireille Matt, 'Public procurement of innovation: a review of rationales, designs, and contributions to grand challenges' (2018) 45 (4) Science and Public Policy 480.

[93] European Commission, *Align, Act, Accelerate: Research, Technology, and Innovation to Boost European Competitiveness* (Publications Office of the European Union 2024).

Technical specifications are the characteristics of goods and services a public authority wants to buy. These characteristics can be set descriptively or functionally.[94] Descriptive specifications often refer to rigid requirements and product characteristics. Thus, they are not typically used to procure innovative solutions. By contrast, functional specifications can foster innovation by providing bidding firms with technological direction and flexibility.[95]

Contracting authorities can also require bidders to propose innovative variants of existing products. According to the EC, this is "one of the simplest and safest ways to stimulate innovation in public procurement", as the public authority can always revert to buying existing products should the variants fail.[96]

Finally, innovation incentives can stem from award criteria. EU law requires public authorities to award contracts to the "most economically advantageous tender" ("MEAT").[97] In practice, MEAT refers to the best price/quality ratio, which encompasses the product's technical merits, functional attributes, design features, innovative characteristics, delivery conditions, and after-sales options. This provides wide discretion to contracting authorities to incentivize innovation.[98]

Green public procurement illustrates the impact of ordinary tendering on innovation incentives. Many public authorities purchase some products only if they comply with strict environmental criteria. So far, green public procurement has covered only certain product groups on a voluntary basis.[99] However, the newly approved Eco-design Regulation empowers the EC to adopt environmental purchasing criteria for virtually all goods and services.[100] The legal evolution is also moving toward mandatory green

[94] European Commission, 'Guidance on Innovation Procurement' (2021) C 267/1.

[95] Elvina Uyarra & Kieron Flanagan, 'Understanding the Innovation Impacts of Public Procurement' (2010) 18 European Planning Studies 123.

[96] European Commission (n 94) 40.

[97] Roberto Caranta, 'Public procurement and award criteria' in Bovis (ed), *Research Handbook on EU Public Procurement Law* (Elgar 2016).

[98] Marta Andhov, 'Contracting Authorities and Strategic Goals of Public Procurement – A Relationship Defined by Discretion?' in Bogojevic, Groussot, & Hettne (eds), *Discretion in EU Public Procurement Law* (Hart 2019).

[99] For example, the Clean Vehicles Directive obliges public buyers to consider fuel consumption and emission characteristics of road transport vehicles. See, Abby Semple, 'Charge of the Light Brigade? The Clean Vehicles Directive and the Batteries Regulation' in Janssen & Caranta (eds), *Mandatory Sustainability Requirements in EU Public Procurement Law: Reflections on a Paradigm Shift* (Hart 2023).

[100] Regulation (EU) 2024/1781 of the European Parliament and of the Council of 13 June 2024 establishing a framework for the setting of ecodesign requirements for sustainable products (2024) OJ L 2024/1781.

procurement as opposed to voluntary mechanisms.[101] As such, green public procurement can be a source of innovation incentives.[102]

B. Pre-commercial procurement

Pre-commercial procurement happens when public bodies contract with firms to drive "solution exploration and design, prototyping, [and] the original development of a limited volume of first products".[103] From the perspective of public authorities, the aim is to "buy the process of innovation" to stimulate new solutions that can outperform those available on the market.[104]

The purpose of pre-commercial procurement is *not* to buy commercial volumes of the developed product. Instead, this procedure is mostly used for proof-of-concept and initial breakthroughs. However, pre-commercial procurement can be combined with a follow-on procedure to purchase the innovation in larger volumes. Furthermore, the results obtained by the innovating firms can be exploited in commercial markets later.[105]

C. Innovation partnership

Finally, procurement can incentivize innovation through *innovation partnerships.* These procedures "establish a long-term [collaboration] for the development and subsequent purchase of a new, innovative product, service or works".[106] They consist of three phases: *selection*, whereby the public authority identifies firms with the necessary capabilities to deliver the innovation; *execution,* whereby the product is developed in collaboration with the contracting authority; and *commercialization*.

The commercialization phase is what distinguishes innovation partnerships from pre-commercial procurement.[107] In effect, the procedure allows public bodies to "place an order for a product or system that does not yet exist, requiring technological innovation for the order to be met".[108] Hence, the contracting authority in an innovation partnership commits to buy the outcome of the innovation in advance.[109]

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[101] Enrique Carreras & Davide Vannoni, 'Mandatory Requirements in Sustainable Public Procurement: The Economic Perspective' in Janssen & Caranta (eds), *Mandatory Sustainability Requirements in EU Public Procurement Law: Reflections on a Paradigm Shift* (Hart 2023).

[102] An empirical paper found that winning public contracts with environmental criteria increases firms' probability to introduce innovative products by 20 percentage points. See, Bastian Krieger & Vera Zipperer, 'Does green public procurement trigger environmental innovations?' (2022) 51 Research Policy 104516.

[103] European Commission, 'Pre-commercial procurement: Driving innovation to ensure sustainable high quality public services in Europe' COM(2007) 799 final.

[104] European Commission (n 94) 6.

[105] For example, under certain conditions, the firms can apply for intellectual property protection for their innovations.

[106] Directive 2014/24/EU of 26 February 2014 on public procurement (2014) OJ L 94/65, Recital 49.

[107] Marta Andhov, 'Innovation Partnership in the New Public Procurement Regime – A Shift of Focus from Procedural to Contractual Issues?' (2015) 24 Public Procurement Law Review 18.

[108] Charles Edquist, Leif Hommen, & Lena Tsipouri, *Public Technology Procurement and Innovation* (Springer 2000).

[109] Michael Kremer, Jonathan Levin, & Christopher M. Snyder, 'Advance Market Commitments: Insights from Theory and Experience' (2020) 110 AEA Papers and Proceedings 269.

Several legislative measures empower public authorities to make binding commitments to buy not-yet developed products and services. A case in point is space markets. To illustrate, the regulation establishing the EU Space Programme enables contractors to conduct "public procurement of innovative solutions".[110] These purchases are expected to "stimulate innovation by offering to the space services providers access to current and potential new markets" and by "driving innovation toward new products".[111]

3. Product regulation

The relationship between regulation and innovation incentives can often be negative. Regulation requires compliance programs to be set up, which diverts resources from innovative activity. Compliance costs may be easily absorbed by incumbents but not entrants. This may reduce entry, hurt dynamism, and lower innovation.[112] Regulations that are too prescriptive may also encourage firms to evade, rather than comply with, them.[113] However, the antagonistic view of regulation and innovation is incomplete. In some cases, rather than being a burden, product regulations can also incentivize firms to innovate. Particularly, regulations can "set up a specific competitive framework that [makes] it more difficult for firms to use competitive strategies alternative to product innovation".[114]

The complex relationship between regulation and innovation invites a case-specific consideration.[115] In some cases, the compliance burden effect may dominate and lessen innovation, as the EC's recent competitiveness report explains.[116] In other cases, the incentive effect may dominate. In those cases, regulation can spur firms to innovate like other drivers of innovation incentives. As noted by two scholars in 1995: "[e]conomists are used to the argument that pressure for innovation can come from strong competitors, demanding customers, or rising prices of raw materials; [but] properly crafted regulation can also provide such pressure".[117]

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[110] Regulation (EU) 2021/696 of the European Parliament and of the Council of 28 April 2021 establishing the Union Space Programme and the European Union Agency for the Space Programme [2021] OJ L 170/69, para 20.

[111] European Commission, 'Proposal for a Regulation on the safety, resilience and sustainability of space activities in the Union' COM(2025) 335 final.

[112] Knut Blind, 'The influence of regulations on innovation: A quantitative assessment for OECD' (2012) 41 (2) Research Policy 391.

[113] Niklas Elert & Magnus Henrekson, 'Evasive entrepreneurship' (2016) 47 Small Business Economics 95.

[114] Bruno Amable, Lilas Demmou, & Ivan Ledezma, 'Product market regulation, innovation, and distance to frontier' (2010) 19 Industrial and Corporate Change 117.

[115] Andrea Renda & Jacques Pelkmans, 'EU regulation: hindering or stimulating innovation?' in Braunerhjelm, Andersson, Blind, & Eklund (eds), *Handbook of Innovation and Regulation* (Elgar 2023).

[116] European Commission, 'A Competitiveness Compass for the EU' COM(2025) 30 final.

[117] Michael E. Porter & Claas van der Linde, 'Toward a New Conception of the Environment-Competitiveness Relationship' (1995) 9 (4) The Journal of Economic Perspectives 97.

Regulations work to incentivize innovation by translating high-level policy missions into enforceable rules.[118] But unlike procurement laws, which produce a "carrot" effect by creating new markets for firms, EU product regulations act as a "stick". That is, product regulations incentivize firms to innovate away from undesirable technologies by "mobilizing penalties rather than rewards".[119] To illustrate, by setting energy consumption targets, labelling, and technical specifications, energy efficiency regulations help phase out wasteful products by inducing firms to innovate energy-saving technologies.[120] In this way, product regulations exert pressure on firms that perpetuate the use of certain technologies so that "novelties [can] break through".[121]

4. Case law

The EC is keen on considering the legal context while assessing mergers. Both procurement processes and product regulations are considered to frame the merger analysis. An illustrative example is *Smiths/Morpho,* a merger that combined two firms supplying explosive detection systems equipment. In this case, the EC defined the relevant market by referring to EU-wide product standards, and noted that the recent wave of procurement activity had designated innovative criteria as an important factor for purchase decisions.[122] That said, the decision did not consider these factors as a source of innovation incentives.[123]

Very few cases portray the legal context *as a driver of innovation*, though. A rare instance was the old telecoms merger between Siemens and Italtel.[124] In this case, the EC noted that telecom operators ("TO") normally buy public switching equipment under a specific procurement procedure and, after the acquisition, become locked-in to the supplier for maintenance, repairs, and upgrading. However, it also stated that "public procurement is likely to play a more important role at those times when TOs are considering the introduction of new major technological developments", because procurement "opens up the possibility for TOs to consider new suppliers and for suppliers to enter a *de novo*

[118] Andreas Pyka, Ezgi Ari, & Stephanie Lang, 'Dedicated regulation: translating missions into regulation' in Braunerhjelm, Andersson, Blind, & Eklund (eds), *Handbook of Innovation and Regulation* (Elgar 2023).

[119] Ian Ayres & Amy Kapczynski, 'Innovation Sticks: The Limited Case for Penalizing Failures to Innovate' (2015) 82 (4) The University of Chicago Law Review 1781.

[120] For example, a study of Spanish firms found that "legislation adjustment" was a key driver of environmental innovation. See, Maria Santolaria et al., 'Eco-design in innovation driven companies: perception, predictions and the main drivers of integration' (2011) 19 (12) Journal of Cleaner Production 1315.

[121] Carolina Haddad, Valentina Nakic, Anna Bergek, & Hans Hellmark, 'Transformative innovation policy: A systematic review' (2022) 43 Environmental Innovation and Societal Transformations 14.

[122] Case No COMP/M.8087 *Smiths Group/Morpho Detection* [2017], para 177.

[123] This was probably because the EC mainly raised price-based concerns.

[124] John Temple Lang, 'European Community Antitrust Law: Innovation Markets and High Technology Industries' (1996) 20 (3) Fordham International Law Journal 717.

network".[125] This is notable. Even if implicitly, the EC seemed to admit that procurement of technologically advanced products may prompt firms to innovate.

Another example took place in the space industry. In *ASL/Arianespace,* the EC considered a merger between two firms manufacturing and operating satellites.[126] While the parties' operations were commercial in nature, the EC recognized that "major innovations […] are generally prompted by military and institutional contracts"; that "[w]ith such financing, satellite manufacturers will continue to innovate"; and that "even in the event of losing some projects to a [competitor], all the main satellite manufacturers would likely find alternative sources of revenues that would ensure their viability and keep introducing innovations in the commercial segment".[127] Thus, the EC recognized that procurement can keep firms' innovation incentives high, even in industries like space where demand is mostly government-led.[128]

Finally, a clear example of regulation driving innovation is illustrated by the *Aurubis/Metallo* merger.[129] The deal, which sought to combine two suppliers of copper scrap for smelting and refining ("CSSR"), threatened to eliminate direct innovation competition. However, the EC was convinced that innovation in the relevant market "was driven by exogenous factors such as regulatory requirements", and

> *"the evolving nature of the CSSR supply and the likely increasing complexity of CSSR materials will both necessitate the adaption of current flowsheets by copper refiners and require further innovation in order to maintain a competitive and profitable input mix. Further, a certain level of innovation and investment will in any case not be affected by the Transaction, as it is already pre-Transaction not driven by competition between copper refiners, but rather by changing regulatory requirements, such as [the REACH Regulation]. These exogenous drivers for innovation will remain post-Transaction, as competitors will still compete as to who is best able to adapt to the changing supply mix of CSSR and to new regulatory requirements."*[130]

The case is thus an example of regulation incentivizing innovation by firms that operate in an otherwise mature industry.

IV. Synthesis

The foregoing discussion implies that the role of context in incentivizing innovation may be underappreciated. Considering contextual evidence more systematically may enable

[125] Case No COMP/M.1717 *Siemens/Italtel* [1999], para 48.

[126] Case No COMP/M.7724 *ASL/Arianespace* [2016].

[127] *Ibid,* paras 306-310.

[128] For an older case with similar conclusions, see Case No COMP/M.4403 *Thales/Finmeccanica/Alcatel Alenia* [2007], para 133.

[129] Case No COMP/M.9409 *Aurubis/Metallo Group Holding* [2020].

[130] *Ibid,* para 780-786.

merger law to protect innovation more effectively. This section synthesises the discussion by proposing three principles, derived from the CJ's case law, to orient the analysis of contextual factors as innovation drivers. First, the EC must take a more *complete* account of contextual innovation drivers (**1**). Second, the presentation of contextual factors must be *coherent*, considering their dynamic nature and interaction with other evidence (**2**). Third, the legal, economic, or technological elements that drive innovation must be sufficiently *concrete* to be considered in merger assessments (**3**).

1. Completeness

EU merger law considers all the relevant circumstances while evaluating a proposed transaction.[131] It is rare for a single factor to be dispositive for resolving a case. Rather, the EC brings a body of evidence to support its assessment.

The CJ's judgment in *Tetra Laval* illustrates this approach. In that case, the CJ noted that the evidence presented by the EC must "contain all the information which must be taken into account in order to assess a complex situation".[132] In other words, there exists a *completeness rule* in EU merger law.

This applies equally to contextual drivers of innovation incentives. A single contextual element seldom dominates firms' incentives to innovate.[133] Rather, contextual drivers of innovation are interdependent and combine elements of the legal, economic, and technological circumstances surrounding a merger.[134]

A. Economic and technological factors

An example where economic and technological factors jointly incentivized firms to innovate was a proposed joint venture between two steel suppliers, *Tata Steel* and *Thyssenkrupp*.[135] The economic incentive to make innovative products stemmed from demand articulation. As the EC noted, "automotive customers require[d] steel suppliers to provide significant R&D efforts to continuously develop novel products for increasingly safe and efficiently performing vehicles".[136] In turn, this precipitated technological opportunities due to complementarities. As noted by customers, innovation in automobiles proceed in a systemic fashion by exploiting "certain

[131] Ioannis Kokkoris & Howard Shelanski, *EU Merger Control: A Legal and Economic Analysis* (OUP 2014). See also, Horizontal Merger Guidelines (n 72), para 5 & 13.

[132] Case C-12/03 P *Tetra Laval* [2005], para 39.

[133] In the 1960s, Jacob Schmookler championed that one mechanism (demand) dominated others in incentivizing firms' to innovate. This "linear" view of innovation is no longer accepted. See, Giada di Stefano, Alfonso Gambardella, & Gianmario Verona, 'Technology push and demand pull perspectives in innovation studies: Current findings and future research directions' (2012) 41 Research Policy 1283.

[134] Frederic M. Schrerer, 'Demand-Pull and Technological Invention: Schmookler Revisited' (1982) 30 (3) The Journal of Industrial Economics 225.

[135] Case No COMP/M.8713 *Tata Steel/Thyssenkrupp (JV)* [2019].

[136] *Ibid,* para 733.

interlinkages" between components.[137] The assessment concerned whether the proposed joint venture would limit parties' innovation incentives despite the presence of such economic and technological forces.

Disruption is another pertinent example where economic and technological factors meet to jointly drive innovation.[138] Disruptive innovations can succeed only because incumbents prioritize customers in higher segments and neglect those in lower value networks.[139] Importantly, it is the combined influence of economic and technological innovation drivers that push incumbents to focus excessively on high value customer branches. The high opportunities contained within a technological trajectory create expectations on behalf of customers that continuous innovations will be forthcoming. In a way, the incentives to innovate produced by the economic and technological context are *too powerful:* they push firms to focus excessively on premium segments to the detriment of others, paving the way for disruption.

B. Legal and economic factors

Legal measures that incentivize innovation, such as procurement, do not work autonomously. Many of them interact with economic forces to stimulate innovation by firms. Public procurement is an illustrative example. As noted, contracting authorities incentivize innovation by establishing demand for a new (or improved) product. Similarly, when a contracting authority specifies the performance requirements or functional characteristics of the goods it wants to purchase, it engages in demand articulation as a sophisticated customer.[140] In such scenarios, the legal context combines with the economic one to prompt innovation.

There are other contexts where legal and economic forces work together to incentivize innovation. Laws can induce demand for certain products which, in turn, pushes firms to innovate to capture larger profit opportunities. To illustrate, consider the acquisition of medical devices by hospitals. In many countries, the national health system includes purchasing programs whereby the administration decides whether to reimburse certain medical devices. These decisions may significantly alter the demand for covered equipment and spur innovation by firms in response. As a study notes, "[m]edical device firms operate in an industry that is characterized by high levels of competition and

[137] *Ibid,* para 734. For historical evidence on collaborations between auto and steelmakers for innovation, see Jens Laage-Hellman, Frida Lind, & Andrea Perna, 'The role of openness in collaborative innovation in industrial networks: historical and contemporary cases' (2021) 36 Journal of Business & Industrial Marketing 116.

[138] Another example where economic and technological factors influence firms' innovation incentives together is technological ecosystems. The joint creation of value in ecosystems may incentivize leaders to introduce new and improved products based on the specific demand patterns of certain users. See, on that point, Carliss Baldwin & Eric von Hippel, 'Modeling a Paradigm Shift: From Producer Innovation to User and Open Collaborative Innovation' (2011) 22 (6) Organization Science 1369.

[139] Clayton Christensen & Richard Rosenbloom, 'Explaining the attacker's advantage: Technological paradigms, organizational dynamics, and the value network' (1995) 24 (2) Research Policy 233.

[140] Philippe Larrue, 'The Design and Implementation of Mission-Oriented Innovation Policies: A New Systemic Policy Approach to Address Societal Challenges' (2021) OECD STI Policy Papers No. 100.

extensive patenting. As a result, firms need to innovate in response to the positive shock to demand if they are to keep their competitive edge. Notably, the exogenous shock to product demand [stemming from reimbursement decisions] represents a shift in the demand curve".[141] This is an example where legal and economic context comes together to influence firms' innovation incentives.

Another scenario where legal and economic factors converge to incentivize innovation is carbon pricing. Using fossil fuels generates greenhouse gases (like CO2), which impose social costs not borne by the emitting firms. Hence, the mispricing of fossil fuels leads to the consumption of greater quantities. To counter such externalities, the European regulatory framework establishes a system where net emitters of greenhouse gases can purchase allowances from more environmentally friendly firms. This scheme corrects the mispricing of fossil fuels by incorporating the costs of emissions into the price. The resulting increases in input costs "encourage the development of new technologies that make pollution control less costly in the long run".[142] Indeed, by reflecting the true costs of carbon, the EU emission regulations have induced a 10% increase in patenting activity in low-carbon technologies.[143]

C. Legal and technological factors

In some cases, laws may incentivize innovation by privileging a technological trajectory with higher opportunities for innovation. Product regulations that promote sustainable materials incentivize innovation by promoting alternative development trajectories and driving demand.[144] The EC recognized this dynamic in a merger between cement suppliers, where it noted that customers "constantly face[d] new challenges due to revised standards and new certifications of clinker-reduced cements".[145] Thus, the legal drive for more sustainable cement prompted not only the articulation of specific demand patterns by customers, but it also established an alternative technological trajectory for producers that provided higher opportunities for innovation.[146]

Another example of legal and technological factors jointly influencing innovation incentives is the promotion or development of specialized scientific knowledge.[147] Some technologies that provide greater innovation opportunities may nonetheless be distant

[141] Ivalina Kalcheva, Ping McLemore, & Shagun Pant, 'Innovation: The interplay between demand-side shock and supply-side environment' (2018) 47 (2) Research Policy 440.

[142] David Popp, 'Induced Innovation and Energy Prices' (2002) 92 The American Economic Review 160.

[143] Raphael Calel & Antoine Dechezlepretre, 'Environmental Policy and Directed Technological Change: Evidence from the European Carbon Market' (2016) 98 The Review of Economics and Statistics 173.

[144] European Commission, 'Chemicals Strategy for Sustainability: Towards a Toxic-Free Environment' COM(2020) 667 final.

[145] Case No COMP/M.10560 *SIKA/MBCC Group* [2023].

[146] *Ibid,* paras 212-218.

[147] Mariana Mazzucato, 'From market fixing to market-creating: a new framework for innovation policy' (2016) 23 (2) Industry and Innovation 140.

from commercial application.[148] In these cases, legal initiatives may steer firms toward those technologies by establishing a scientific knowledge base. Programs like "Operation Warp Speed" in the United States incentivized biopharmaceutical firms to work with new areas of science, such as messenger-RNA, to develop new vaccination technologies.[149] Similarly, innovation in agrochemicals depends on public R&D expenditure and scientific effort.[150]

2. Coherence

In EU merger law, individual components of evidence must fit together in a reasonable way to support the conclusion reached by the decision-maker.[151] The coherence rule has three basic images, which may be called *legal coherence* (**A**)*, temporal coherence* (**B**)*,* and *policy coherence* (**C**)*.*

A. Legal coherence

Legal coherence refers to an equal appreciation of facts and their likely consequences. As the CJ set out in *Tetra Laval,* merger analysis "consists of an examination of how a concentration might *alter the factors determining the state of competition on a given market* in order to establish whether it would give rise to a serious impediment to effective competition".[152] Compared to the counterfactual scenario where the transaction does not occur, the merger must seriously impair firms' incentives to innovate. Such an outcome is more likely when the merging parties derive their innovation incentives from rivalry.[153] By contrast, if contextual factors like legal, economic, or technological circumstances govern innovation incentives, then the reduction of rivalry resulting from the merger may not "alter" innovation incentives.

The GC's criticism of the EC in *Tetra Laval* illustrates the point. In that case, the EC argued that the merger would reduce Tetra Pak's incentives to innovate in carton packaging. By closely analyzing the context, the GC reached a different conclusion. It is useful to quote the relevant paragraph in its entirety[154]:

> *"Turning to the allegedly diminished need for Tetra to innovate following implementation of the modified merger, both the contested decision and the explanations given in the*

[148] David Mowery, Richard Nelson, & Ben Martin, 'Technology policy and global warming: Why new policy models are needed (or why putting new wine in old bottles won't work)' (2010) 39 (8) Research Policy 1011.

[149] William B. Bonvillian, 'Operation Warp Speed: Harbinger of American industrial innovation policies' (2024) 51 (6) Science and Public Policy 1195.

[150] Philip Pardey et al., 'Long-Run and Global R&D Funding Trajectories: The U.S. Farm Bill in a Changing Context' (2015) 97 American Journal of Agricultural Economics 1312.

[151] Damien Geradin, Anne Layne-Farrar, & Nicolas Petit, *EU Competition Law and Economics* (OUP 2012).

[152] *Tetra Laval* (n 132), para 43 (emphasis added).

[153] See, *e.g.,* Case No COMP/M.4980 *ABF/GBI Business* [2008].

[154] Case T-5/02 *Tetra Laval* [2002], para 329 (emphases added).

> *Commission's written and oral pleadings show that, at present, competition on the various carton markets takes place principally through innovation. According to the Commission, Tetra's introduction in the past of 'new carton packages with more user-friendly features such as the carton top package with screw top closure' (recital 398) shows that innovation is a practical necessity. According to Tetra's pleadings at the hearing, which were not disputed on this point by the Commission, these innovations were not due to pressure from the PET equipment markets, but rather to the demands of consumers of carton-packaged products. Even if the acquisition of Sidel were to reduce the pressure on innovation emanating from the indirect, but growing, competition from the PET equipment markets, at least as regards FFDs and tea/coffee drinks packaging, for which not insignificant growth is predicted by 2005, the contested decision does not state why demand from customers wishing to remain with carton would not continue in the future to be the driving force behind innovation, especially on the aseptic carton markets. Although the Commission correctly points out, in particular, that Tetra can improve the production rate of its carton packaging equipment, the contested decision does not show that the incentive to do so would disappear simply because of the acquisition of Sidel. This is even less likely given that it is not disputed that Tetra's activities in the carton markets are very profitable. Consequently, it is unlikely that Tetra, following the modified merger, would be less inclined to continue investing in any innovation possible for the range of equipment and products it offers its customers on the carton markets."*

Hence, equally appreciating all sources of innovation incentives is necessary to coherently assess mergers. If there are contextual factors that push firms to innovate, then the impact of the reduction in rivalry must be analysed within that context.[155] Such analysis should be made transparently, and the EC must explicitly weigh how a reduction in rivalry brought about by the merger affects innovation incentives as opposed to countervailing contextual forces.[156] This is the only way to determine if the merger has a decisive impact on innovation incentives.

B. Temporal coherence

Temporal coherence refers to a reasonable understanding of events that are "more or less likely to occur in the future if a decision prohibiting the planned concentration […] is adopted".[157] Merger analyses are prospective. In assessing proposed transactions, the EC not only considers the prevailing conditions of competition, but it also predicts, with a reasonable degree of certainty, the evolution of those factors in the future.[158] This may

[155] In such cases, omitting the analysis of contextual innovation drivers may be "capable of calling into question [the EC's] finding(s)". See, Case T-312/20 *EVH v Commission* [2023], para 351.

[156] In the few instances where the EC acknowledged contextual factors as drivers of innovation incentives, it did not weigh them against the merger's effects on rivalry. See, *e.g.*, Case No COMP/M.7932 *Dow/Dupont* [2017], para 2040.

[157] *Tetra Laval* (n 132), para 42.

[158] Horizontal Merger Guidelines (n 72), para 9.

include the likelihood of dominance in light of the technological context, or the possibility of entry by potential competitors based on the economic context.[159]

The same standard must govern the assessment of contextual drivers of innovation. The impact of legal, economic, and technological factors on innovation incentives may change over time.[160] Hence, the EC's analyses must consider the likely composition of contextual innovation incentives in the future. In other words, the interpretation of facts and evidence in the present must not contravene their likely future evolution.

Electric vehicles are an illustrative example. For much of the last decade, electric vehicle innovation was driven primarily by legal factors. In the EU, these included carbon emissions targets and regulatory standards governing the environmental impact of vehicles.[161] However, with the growth of these markets, legal innovation drivers are increasingly supplemented by technological factors. Firms are incentivized to innovate not only for compliance reasons, but also to respond to technological developments in adjacent sectors. Innovation in electric vehicles is increasingly pushed by advances in artificial intelligence, autonomous driving software, energy storage, and battery chemistry.[162] This shows a refocusing of innovation incentives on technological complementarities and systemic synergies rather than on purely legal objectives. In a hypothetical merger scenario between two automobile firms, these dynamics must be considered to assess the likely evolution of innovation incentives in post-transaction.

C. Policy coherence

Finally, policy coherence requires the decision-maker to respect the normative decisions made by legislatures. It mostly relates to legal and regulatory incentives for innovation. The scholarship on mission-oriented innovation policies and legal incentives to technological change presents mixed conclusions on the desirability of such programs. A common criticism is that State-led innovation policies typically select a few designs or products to be developed. This effectively bypasses market processes, such as identifying customer needs and selecting the best means to address them. The risk is that, by relinquishing the selection properties of markets, State-led innovation policies may lock products into technological trajectories that are less desirable.[163] Another point made by

[159] For example, in *Siemens/Alstom*, the EC predicted that "the entry of CRRC or other Asian suppliers on a sufficient scale to constrain the merging parties is extremely unlikely". In hindsight, the prediction seems erroneous, as evidenced by CRRC's powerful entry into European markets. See, on that point, European Commission, 'Summary notice concerning the initiation of an in-depth investigation in case FSP.100147 pursuant to Articles 10(3)(d) of Regulation (EU) 2022/2560' C/2024/1913.

[160] Jan van den Ende & Wilfred Dolfsma, 'Technology-push, demand-pull and the shaping of technological paradigms – Patterns in the development of computing technology' (2005) 15 Journal of Evolutionary Economics 83.

[161] Jacques Pelkmans & Andrea Renda, 'Does EU regulation hinder or stimulate innovation?' (2014) CEPS Special Report No. 96.

[162] Mekyung Lee, 'An analysis of the effects of artificial intelligence on electric vehicle technology innovation using patent data' (2020) 63 World Patent Information 102002.

[163] Johan P. Larsson, 'Innovation without Entrepreneurship: The Pipe Dream of Mission-Oriented Innovation Policy' in Wennberg & Sandstrom (eds), *Questioning the Entrepreneurial State: Status-quo, Pitfalls, and the Need for Credible Innovation Policy* (Springer 2022).

sceptics of innovation policy relates to governmental capacity to initiate, execute, and sustain such programs.[164] There is also the possibility that the regulation in question *hinders* rather than propels innovation.[165]

These concerns invite serious consideration from academics, policymakers, and legislators. However, policy coherence requires the EC to refrain from questioning the desirability of legal innovation incentives set up by lawmakers.[166] In merger law, the EC's duty is to "establish convincingly the merits […] of a decision on a merger" by analyzing "the circumstances that allegedly produce effects".[167] If there are legal or regulatory factors that incentivize firms to innovate, this fact must be duly considered in the merger analysis. In other words, the EC cannot ignore the existence of such innovation drivers from a normative perspective.

Such an approach would align with antitrust assessments as well. The CJ has repeatedly emphasized that, where the applicable regulatory framework mandates the sharing of infrastructures essential for competition, the legal assessment changes. To illustrate, telecom regulations that force integrated firms to grant access to local infrastructures will absolve the EC's duty to assess the indispensability of those infrastructures in refusal to deal cases.[168] Now, relaxing the burden of proof in this way may reduce firms' innovation incentives. Nonetheless, that is not for enforcement to question. The decision made by the legislature to liberalize the infrastructure must be respected, along with its legal consequences. The same principle should equally apply to evaluating contextual drivers of innovation incentives as well.

3. Concreteness

A legal system aspires to "determine the truth about the interests it purports to protect".[169] It does this by selecting "legal facts" deemed relevant, and "empirical facts" to establish the legal fact. "Incentive to innovate" is a relevant legal fact for assessing mergers in EU law. And "rivalry" is a relevant empirical fact for establishing innovation incentives. These

[164] State-led innovation policy may fail due to misaligned incentives of public officials - they may promote certain innovations over others for their own gain. See, on that point, Gordon Tullock, Gordon L. Brady, & Arthur Seldon, *Government Failure: A Primer in Public Choice* (Cato Press 2002). State-led innovation incentives may also be "captured" by rent-seekers. See, Anne Krueger, 'The Political Economy of the Rent-Seeking Society' (1974) 64 (3) The American Economic Review 291.

[165] Philippe Aghion, Antonin Bergeaud, & John Van Reenen, 'The Impact of Regulation on Innovation' (2023) 113 (11) The American Economic Review 2894; Knut Blind, Crispin Niebel, & Christian Rammer, 'The impact of the EU General data protection regulation on product innovation' (2024) 31 Industry and Innovation 311.

[166] Ester Herlin-Karnell & Theodore Konstadinides, 'The Rise and Expressions of Consistency in EU Law: Legal and Strategic Implications for European Integration' (2013) 15 Cambridge Yearbook of European Legal Studies 139.

[167] *Tetra Laval* (n 132), para 41.

[168] See, *e.g.,* Case C-165/19 P *Slovak Telekom* [2021], paras 54-55. See also Niamh Dunne, 'Dispensing with Indispensability' (2020) 16 Journal of Competition Law & Economics 74.

[169] Nicolas Petit, 'Thoughtful Competition Law: Power and Reflexivity' in Prete & Rezki (eds), *Judging & (Re)Thinking European Union Law – Liber Amicorum in Honour of Nils Wahl* (Springer 2025).

distinctions matter in merger control because they condition which features of reality can be evaluated in legal terms, and which are deemed external to the assessment.

Many factors shape incentives to innovate, including technological opportunity, input price shifts, demand trends, procurement practices, and regulatory imperatives.[170] However, not all such factors can be relevant to merger control.[171] Because merger assessments operate on specific markets, contextual drivers must be capable of shaping innovation incentives at the level of that market.

Sector-wide subsidies or general demand expansion may contribute to innovation systemically, but their effects are too diffuse, indirect, or temporally misaligned to assess within a merger investigation. Credits or tax breaks for R&D activity mostly operate at national and sectoral levels and are not typically linked to competitive dynamics for specific products. An industry may contain plenty of technological opportunities, but the same may not apply to individual products.[172] The semiconductor industry as a whole is known for displaying high innovation opportunity, but this is not equally distributed at the product level: integrated circuits and their sub-markets contain more innovation opportunities than memory chips.[173] Simply pointing to expanding demand may also be too speculative. In effect, EU free movement rules and harmonizing legislation expand demand by integrating markets, which likely increases firms' incentives to innovate.[174] But since the impact in question is unlikely to affect innovation concretely, it will not be cognizable for merger law.

By contrast, contextual elements that generate market-specific innovation pressures should be recognized as cognizable sources of innovation incentives. EU procurement rules encourage contracting authorities to define the expected performance or functioning of the goods they want to purchase.[175] This gives rise to specific procurement criteria that can correspond to a relevant market in merger assessments. For instance, EU space regulations target innovation procurement in "space-related encryption", "on-

[170] Schumpeter was also keen on emphasizing *sociological developments* as innovation drivers. See, Richard Arena, 'Schumpeter and Schumpeterians on competition: some policy implications' (2017) 27 Journal of Evolutionary Economics 161.

[171] Fernando Castillo de la Torre, 'Predicting the Future: Evidential Basis for Prospective Assessments in EU Merger Control' in Prete & Rezki (eds), *Judging & (Re)Thinking European Union Law – Liber Amicorum in Honour of Nils Wahl* (Springer 2025).

[172] The EC has previously recognized that demand articulation is important for innovation in the market for the design of automotive starter batteries, but not in the market for replacement parts. See, Case No COMP/M.012 *Varta/Bosch* [1991], paras 12-15.

[173] Chad Bown & Dan Wang, 'Semiconductors and Modern Industrial Policy' (2024) 38 (4) Journal of Economic Perspectives 81.

[174] Rainer Frey & Katrin Hussinger, 'European market integration through technology-driven M&As' (2011) 43 Applied Economics 2143.

[175] Carina R. Hamer, 'Technical Specifications' in Caranta & Sanchez-Graells (eds), *European Public Procurement: Commentary on Directive 2014/24/EU* (Elgar 2021).

[175] Furthermore, the product-specific procurement criteria are regularly revised and adjusted in line with market developments. See, *e.g.,* Antonio Delre et al., 'Assessment of the European Union Green Public Procurement criteria for four product groups' (2022) JRC Science for Policy Report No. 30943.

board safety systems", "launchers", and "space-related data processing tools".[176] The market-specificity of procurement is more apparent in innovation partnerships, where the contracting authority specifies the innovative nature and characteristics of the goods it wants to buy, effectively leading to new market creation.[177]

Some examples can illustrate the discussion further. *Zimmer/Biomet* was a merger in the medical devices industry.[178] In this case, the articulation of demand lacked the features necessary to generate product-specific innovation signals. Procurement was highly decentralized across public hospitals, with heterogeneous purchasing criteria and limited cross-border coordination.[179] This fragmentation meant that no single buyer (or set of buyers) could shape supplier innovation incentives in a product market, such as hip, shoulder, or spinal implants. By contrast, *Siemens/Alstom* featured concentrated, centralized, and sophisticated procurement by national rail operators, such as SNCF and Deutsche Bahn.[180] These buyers not only accounted for a large share of demand in high-speed and regional train markets, but also issued tenders with performance specifications that shaped suppliers' innovation priorities. In this context, innovation was directly driven by the need to win major procurement contracts, making demand structure a concrete contextual factor in the innovation analysis.[181]

The point is the following. Contextual factors, such as demand articulation and procurement, can be a merger-relevant source of innovation pressure, but only when they can push innovation at the market level. The EC's assessments can reveal whether a contextual factor has sufficiently concrete effects on firms' innovation incentives, which can be controlled by the CJ.

V. Conclusions

Treating rivalry as the sole source of innovation incentives is myopic. What pushes firms to innovate is pressure. Rivalry supplies that pressure, but it is not alone. Economic, technological, and legal factors may also generate the incentives that drive innovation. Elements like growing demand, powerful user-supplier interactions, product regulation, and technological trajectories deserve consideration in merger analysis as additional sources of pressure.

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[176] European Commission (n 111), Art. 109. See also, Douglas Robinson & Mariana Mazzucato, 'The evolution of mission-oriented policies: Exploring changing market creating policies in the US and European space sector' (2019) 48 (4) Research Policy 936.

[177] Pedro C. Gomes, *EU Public Procurement and Innovation: The Innovation Partnership Procedure and Harmonization Challenges* (Elgar 2021).

[178] Case No COMP/M.7265 *Zimmer/Biomet* [2015].

[179] Procurement was relatively centralized in few countries, such as under "procurement alliances" in Germany. See *Ibid,* para 325.

[180] Case No COMP/M.8677 *Siemens/Alstom* [2019], para 233.

[181] *Ibid,* para 234. See also, European Commission, *Study on the competitiveness of the rail supply industry – Final report* (EU Publications Office 2019).

Recognizing these factors need not create legal uncertainty. The EC's practice shows that they are already acknowledged in an unstructured manner. Hence, the real risk to uncertainty is *ignoring* alternative innovation drivers, for this will leave the EC wide discretion to decide whether to consider them at all. Nor does broadening the inquiry mean abandoning rigour or accountability. The CJ's case law makes clear that merger analysis must be complete, coherent, and concrete. There is no reason why the same standards cannot guide the assessment of contextual innovation drivers.

The stakes are high from another perspective as well. If merger enforcement clings to rivalry alone, it risks blocking beneficial mergers that could enhance innovation, mistaking a lack of rivalry for a lack of incentives. This is a recipe for false positives. That said, broadening the inquiry is not a license to clear all deals in markets with rich innovation opportunities. Abundant opportunities mean little if the merged firm lacks the ability to recognize and capture them. Hence, there are likely to be many complementarities between the analysis contained in this paper and the emerging literature on innovation capabilities in competition enforcement.[182]

[182] Nicolas Petit & David Teece, 'Capabilities: The Next Step for the Economic Construction of Competition Law' (2024) 15 (8) Journal of European Competition Law & Practice 513.