Reorienting Competition Law

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I. Introduction

Moving from academia to practice and, in particular, becoming head of a competition authority, constitutes an exercise that is highly enriching, in terms of the experience gained and the holistic understanding one may develop of the competition law "enterprise", to employ the expression of my colleague and friend Herb Hovenkamp[1]. It also quite challenging: the academic has to exercise some self-restraint in order to balance the aspirations of her/his vision of the area with, first, the requirements and realities of the day-to-day job, that is the complexities of dealing with the political process and the necessary policy dialectic that occurs with various stakeholders, and second, the institutional capabilities (and eventual limits) of the competition authority in question. In my case, this tension was stronger, as I was offered the opportunity to participate to the legislative process, being appointed as head of the Law Commission that was tasked by the Greek government to prepare a draft bill for the amendment of Greek Competition Law. The idiosyncratic position of the academic turned enforcer highlights what Weber insightfully explained a century ago: it is a man (or woman) with double vocation as he/she needs to ensure the symbiosis (in him/her) of two kinds of authority/roles, scientific and political/bureaucratic[2]. One may hope that the creative tension between these two vocations could indeed become source of experimentation and institutional innovation, in particular if this position of authority is exercised in a moving socio-economic and political context, as it is presently the case.

It becomes indeed clearer by the day that the "liminal moment" of competition law is not a prediction from the ivory tower of academia[3], but constitutes a reality faced by competition authorities around the world. Following the great soul-searching exercise imposed by the economic "irritant[4]" of the digital platform phenomenon, during the period 2016-2019[5], competition

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[1] H. Hovenkamp, The Antitrust Enterprise (Harvard U. Press, 2008).

[2] I refer here to M. Weber's two lectures known as the vocation lectures in 1917 and 1919 concern, the first one the topic of "Science as vocation" and the second one the topic of "Politics as vocation".

[3] I have noted the liminality of the moment in I. Lianos, 'Polycentric Competition Law', (2018) 71 Current Legal Probs. 161, 162 ("Liminality refers to periods of transition during which the normal limits to thought, self-understanding and behaviour are relaxed, opening the way to novelty and imagination, construction and destruction. Established hierarchies and standing norms disappear and sacred symbols are mocked at and ridiculed, their authority questioned, taken apart and subverted.").

[4] I use this term by analogy to the well-known "legal irritants" expression, which is an important vector for change in autopoietic systems. See, G. Teubner, 'How the Law Thinks: Towards a Constructivist Epistemology of Law', (1989) 23 Law and Society Review 727, 747.

[5] This period has seen a boost of intellectual productivity, largely commissioned by competition authorities eager to understand the "new economy" and participate to an unprecedented effort of global production of "regulatory" science

authorities had to weather the storm of the Covid-19 pandemic[6], while they have been recently confronted to the tidal wave of price hikes and inflationary trends[7]. Furthermore, competition authorities around the world are beginning to deal with the sustainable development goals, not exclusively the environmental and climate change protection agenda[8], but also the social sustainability one, in particular with regard to the transformation and precarity of work in the digital 'gig' economy[9]. Finally, there are calls to enhance the role of industrial policy considerations in competition law enforcement, which if taken forward may jeopardize the policy autonomy of a field of law that has been at the center of the effort of EU integration in recent decades[10]. This simultaneous eruption of these different policy agendas the last two years, in

(S. Jasanoff, *The Fifth Brand – Science Advisers as Policy Makers* (Harvard University Press, 1990), p. 17) in this specific field that occurred almost simultaneously. For a "mapping" exercise of the various reports produced, see F. Lancieri & P. Sakowski, Competition in Digital Markets: A Review of Expert Reports (January 30, 2021). 26 Stan. J.L. Bus. & Fin. 65 (2021).

[6] I. Lianos, T. Minssen, & C. Kollmar, Tackling Grand Challenges with Competition Law: Lessons from the Pandemic (November 29, 2021). in W. Sauter, M. Canoy and J. Mulder (eds), *EU Competition Law and Pharmaceuticals* (Edward Elgar Publishing 2022) Forthcoming., Available at SSRN: https://ssrn.com/abstract=3985344 .

[7] In less than six months, inflation and price rises have occurred in rates "unseen in recent decades": FAO, Food Outlook (November 2021), available at Food Outlook – Biannual Report on Global Food Markets (fao.org) . This provoked a debate over the link between the lack of product market competition/concentration and inflation. The discussion started following the recent efforts of President Biden to increase competition in certain highly concentrated industries in the US, such as meatpacking: Opinion | Fighting Inflation Means Taking On Corporations - The New York Times (nytimes.com)) . The effectiveness of the antitrust tool to deal with inflation was challenged by senior economists, such as former Presidents Clinton and Obama economic advisors Larry Summers and Jason Furman (Inflation strategy at White House fuels debate - The Washington Post) while others economists have claimed that higher corporate profits reflect roughly 60 percent of the rise in inflation now borne by consumers (see, Corporate Profits Drive 60% of Inflation Increases (substack.com)). Although there is some correlation between product market competition and inflation (see, the ECB commissioned report M. Przybyla and M. Roma, Does Product Market Competition Reduce Inflation? Evidence from EU Countries and Sectors, ECB Working paper Series NO. 453 / March 2005, available at Does product market competition reduce inflation? Evidence from EU countries and sectors tries and sectors (europa.eu)], there is consensus that fighting inflation is not a goal of competition law, although it may be claimed that aggressive competition law enforcement, under certain conditions, contributes to restraining inflationary tendencies (if these are built-in) and broadly may affect macro-economic conditions.

[8] See, for instance, the positions expressed in the OECD, Sustainability and Competition debate, Sustainability and competition - OECD (December 2020) ; HCC, Draft Staff Discussion Paper on Sustainability Issues and Competition Law (July 2020), available at Staff Discussion paper.pdf (epant.gr) ; ACM, Guidelines on Sustainability Agreements (January 2021) Guidelines on sustainability agreements are ready for further European coordination | ACM.nl ; HCC & ACM, Technical Report on Sustainability and Competition (January 2021), available at Technical Report on Sustainability and Competition (epant.gr) ; M. Vestager (European Commission), Competition Policy in Support of the Green Deal, available at Competition policy in support of the Green Deal | European Commission (europa.eu) .

[9] See, European Commission, Collective Bargaining for Self-Employed (October 2020), available at Competition: Collective bargaining for the self-employed (europa.eu). For a discussion, see N. Countouris, V. De Stefano, and I. Lianos, The EU, Competition Law and Workers' Rights (March 25, 2021). Available at SSRN: https://ssrn.com/abstract=3812153 or http://dx.doi.org/10.2139/ssrn.3812153 .

[10] See, the German, French and Polish governments proposals, Modernising EU Competition Policy (2019), available at modernising-eu-competition-policy.pdf (bmwi.de) , which led to an important discussion on this issue: see, M. Heim (Bruegel), Modernising European Competition Policy: A Brief Review of member States' Proposals (July 24, 2019), available at Modernising European Competition Policy: A Brief Review of Member States' Proposals | Bruegel ; B. Deffains, O. d'Ormesson, T. Perroud, Competition Policy and Industrial Policy: for a Reform of European Law (January 2020), available at FRS For a reform of the European Competition law-RB.pdf (robert-schuman.eu) ; See also the critical comments to this proposal by I. Lianos, The Future of Competition Policy in Europe – Some

combination with socio-economic developments that have challenged systemic resilience (a pandemic and accompanying economic crisis) may become vectors for significant changes, not only of the methodological and conceptual toolkit of competition law, but also more broadly of its goals and overall role in the legal and regulatory system of the EU.

Some have focused on the role of "ideology" as a major driver for the changes in the field, as is generally the case for social sciences[11]. The last fifty years, starting with the Chicago Revolution in the 1970s[12], erupted a distinct neo-liberal agenda postulating the goal of economic efficiency instead of fair competition, continued with the domination of the consumer welfare consensus, following the post-Chicago reform of the 1990s[13], and most recently was challenged by the emergence of the anti-bigness agenda of the New-Brandeisians[14]. In my view, these continuous ideological debates over the role and capacity of competition law enforcement institutions to structure a more efficient, resilient and fairer economy, highlight the fact that competition law can be conceived as a tool of economic and social regulation[15]. The way it restricts, enables and structures economic power has profound implications, not only on the economic field, but also on all other interconnected spheres of social action (political, social, cultural)[16]. However, I think that, although ideology (and the related debate about the goals of competition law) plays an important role in the current discussions about competition law and policy and sheds light on the origin of disagreements, it only partly explains the significant changes occurring in the way competition law is enforced, but also more broadly is perceived as an institution within society.

The current eclectic agnosticism as to the "goals" question in EU competition law, despite the efforts to the contrary[17], is a perfectly legitimate strategy in view of the complexity of the issues

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Reflections on the Interaction Between Industrial Policy and Competition Law (March 2019). CLES Policy Paper Series 1/2019, Available at SSRN: https://ssrn.com/abstract=3383954

[11] On the role of ideology in economic discourse, see, inter alia, the recent argument of T. Piketty, *Capital et Idéologie* (Seuil, 2019), 20-26.

[12] R.A. Posner, The Chicago School of Antitrust Analysis, (1979) 127 University of Pennsylvania Law Review 925; W. H. Page, The Chicago School and the Evolution of Antitrust: Characterization, Antitrust Injury, and Evidentiary Sufficiency, (1989(75(7) Virginia Law Review. 1221

[13] H. Hovenkamp, Post-Chicago Antitrust: A Review and Critique, (2001) Colum. Bus. L. Rev. 257; C. S. Yoo, The Post-Chicago Antitrust Revolution: A Retrospective, (2020) Faculty Scholarship at Penn Law. 2237.

[14] See, L. Khan, The New Brandeis Movement: America's Antimonopoly Debate, (2018) 9(3) Journal of European Competition Law & Practice 131; T. Wu, *The Curse of Bigness: Anti-Trust in the New Guilded Age* (Columbia Global Reports, 2018).

[15] I. Lianos, Competition Law as a Form of Social Regulation, (2020) 65(1) The Antitrust Bulletin 3.

[16] In my previous publications I drew on the work of M. Walzer, *Spheres of Justice: A Defense of Pluralism and Equality* (Basic Books, 1983) to advance a "complex equality" perspective for competition law and policy, that is block pervasive inequality and make sure it will not be multiplied through the conversion process and expanded across different social goods: I. Lianos, Competition Law as a Form of Social Regulation, (2020) 65(1) The Antitrust Bulletin 3, 79 seq..

[17] Compare for instance, Case T- 321/ 05, *AstraZeneca AB and AstraZeneca plc v European Commission* [2010] ECR II– 2805, para 804. ; Joined Cases T- 213/ 01 and T- 214/ 01, *Österreichische Postsparkasse and Bank für Arbeit und Wirtschaft* v *Commission* [2006] ECR II– 1601, para 115; Joined Cases 56 & 58/ 64, *Consten & Grundig v Commission* [1966] ECR 299; and Case 28/ 77, *Tepea v Commission* [1978] ECR 1391, para 56. In this direction, see also the

requiring decision-making. It is important to acknowledge the fact that decision-making cannot be a simple application of an hypothetico-deductive process, in which one departs from a "major" proposition, a specific goal of competition law, and then deduces some "minors" disguised in fact-based conclusions. There is always need for legal pragmatism, while simultaneously it is important to avoid the criticism of abusive decision-making[18]. Consequently, competition authorities need to develop pragmatic solutions to the challenges they face, with respect to their institutional capabilities and the prevailing socio-economic context (and consensus) in their jurisdiction. They need to continuously evaluate their performance, while adjusting their action accordingly, and seriously engage with possible doubts and objections expressed by stakeholders and the broader competition community[19]. I want to emphasize this *praxis* of competition authorities by reference to practical decision-making, as the way forward in order to engage with the increasing complexity of enforcing competition law.

I explore in this short paper three dimensions of complexity, drawing on the initiatives and the experience gained by the Hellenic Competition Commission (HCC) during the first two years of my mandate. I believe that the issues discussed in this paper could be of relevance for other competition authorities as well. By narrating my personal experience, I want to emphasise the various vectors of complexity that make the current period a hallmark moment in the history of competition law/antitrust and highlight its progressive reorientation.Part II explores the complexity introduced by the moving political economy of competition law and in particular calls for its contribution to the new impetus of systemic resilience through the promotion of sustainable development. Part III explores the challenges it faces in regulating the increasingly more complex knowledge economy, that relies on sophisticated relations of production and consumption that cannot be classified in the binary opposition competition v. non-competition, and which involve different forms of cooperation and competition (co-opetition). I briefly discuss in this Section one of the major substantive law innovations of the recent Amendment to the Greek Competition Act, the initiative to introduce a provision (article 2A) concerning abusive conduct in ecosystems, which has failed to proceed at the last mile of the legislative process. Part IV explores the

recent Opinion of AG Rantos in C-377/20, *Servizio Elettrico Nazionale*, ECLI:EU:C:2021:998, paras 99 & 106, with Case C- 52/ 09, *Konkurrenverket v TeliaSonera Sverige AB* [2011] ECR 527, paras 21– 4 ("The function of [competition] rules is precisely to prevent competition from being distorted to the *detriment of the public interest, individual undertakings and consumers, thereby ensuring the well- being of the European Union*. [. . .]"; Opinion AG J Kokott, in Case C- 95/ 04, *British Airways plc v Commission* [2007] ECR I– 2331, para 68 (emphasis added). See also, in the context of Article 101 TFEU for a similar formulation, Opinion AG J Kokott in Case C- 8/ 08, *T- Mobile Netherlands BV and Others* [2009] ECR I– 4529, para 71.

[18] In my past work I have argued that the question of the goals of competition law cannot be examined without a proper institutional understanding and comparative institutional analysis: I. Lianos, Some reflections on the question of the goals of EU competition law, in I. Lianos & D. Geradin (eds.), *Handbook on European Competition Law – Substantive Issues* (Edward Elgar, 2013), 1.

[19] This approach is inspired by the anti-essentialism of certain schools of pragmatism (e.g. the work of R. Rorty) that put forward a distinct theory of praxis. In this view, competition authorities may be perceived as participants and experimenters in a community of inquiry, and therefore not as "spectators" discovering pre-established economic and legal foundations and then deriving more complex knowledge from these foundations.

implications of this increasing complexity for the enforcement tools and strategies at the disposal of competition authorities. The final part concludes.

II. Complex institutional goals and the moving political economy of competition law: sustainable development and competition law

It has been suggested elsewhere that the systemic resilience of the social contract may offer a high-end goal that would accommodate both efficiency and fairness concerns in competition law[20]. The current calls for competition law to integrate sustainable development concerns introduce an important level of institutional complexity, that also intersects with the discussion over the ongoing and never-ending debate on the goals of competition law, although the two issues are not strictly related. These initiatives form part of the current efforts to implement the Sustainable Development Goals (SDGs)[21] agenda adopted by the General Assembly of the United Nations (UN) in all fields of EU action[22]. As outlined in the 2019 reflection paper 'Towards a Sustainable Europe by 2030',[23] the EU has fully committed to the implementation of the 2030 Agenda through its internal and external policies[24]. The essence of the concept of sustainable development is that it entails a balance of the needs of current generations with those of future generations, taking into account environmental, societal and economic limitations[25]. Sustainable development objectives are also firmly enshrined in the EU Treaties[26].

One may distinguish between situations of lateral conflict, which may occur because competition law enforcement can jeopardize the aims followed by these various regulatory tools, from what we can call situations of regulatory osmosis, that is, the absorption of regulatory aims in the enforcement of competition law. This process may occur as a result of the pressure to interpret and enforce competition law principles in congruence with the aims and the structure of the entire legal system to which competition law is integrated. A competition authority or a judge enforcing competition law should, therefore, strive to interpret the law in accordance with the broader moral and legal principles undergirding the legal system.

The integration of sustainable development goals in competition law enforcement may generate tensions with the dominant rhetoric of "consumer welfare" or "consumer well-being" in

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[20] I. Lianos, Competition Law as a Form of Social Regulation, (2020) 65(1) The Antitrust Bulletin 3, 85.
[21] United Nations, 'Sustainable Development Goals' (2015) <https://sdgs.un.org/goals>.
[22] The General Assembly of the United Nations (UN) adopted, in September 20151, broader development targets for both developed and developing countries, encompassing all sustainability dimensions (economic, financial, institutional, social and environmental).
[23] European Commission, 'Proposal towards a sustainable Europe by 2030' (February 2019) <https://ec.europa.eu/info/publications/towards-sustainable-europe-2030_en>.
[24] Ibid.
[25] The report entitled 'Our common future' and came to be known as the 'Brundtland Report' after the Commission's chairwoman, Gro Harlem Brundtland, 20 March 1987.
[26] The economic, social and environmental aspects of sustainable development are highlighted in Article 3(3) of the Treaty on European Union. Article 7 also sets a framework for 'consistency' between EU policies and activities and all its objectives, which is profoundly linked to the principle of policy coherence that is essential for the attainment of SDGs.

competition law, principally for the following two reasons: it will require the consideration of sustainability benefits as efficiencies, and competition decision-makers (competition authorities and courts) would need to adequately tackle the possibility of a sustainability-based trade-off between harm to competition and benefits to sustainable development. This is source of controversy for the following reasons.

First, EU competition law has so far taken a narrow perspective on the concept of consumer (user)[27]. This concept is understood as referring to the 'representative consumer' assumption' used in neoclassical economics, whose models have more than one class of agents (e.g. producers and consumers), each being 'representative' of its class and perceived, at least in-class, as identical. Consumers cannot be considered as identical, as there may have a different willingness to pay for environmental/sustainability benefits. One way to deal with this problem is to define relevant markets more narrowly so as to include in each class/category consumers that have identical willingness to pay for environmental benefits. A similar problem exists with the consideration of inframarginal consumers as forming part of the same relevant market than marginal consumers, although these differ in their willingness to pay for, for example, the quality of distribution or other quality parameters differentiating the product through advertising. In most cases we include these consumers to the same relevant market and it is widely accepted that vertical restraints imposed by manufacturers with the aim to attract marginal consumers (for instance selective distribution agreements) may be justified on the basis that they increase overall the "value" of the product bundle, despite their price effects, and therefore the fact that may produce some negative distributional effects to inframarginal consumers having a low or no willingness to pay for these additional "benefits"[28]. The gains for some individuals can be balanced against the losses for other individuals in the specific sociological category of "consumers", in order to determine the relative goodness (efficiency) of a state of affairs. Hence, the argument goes that if the Commission has accepted in other instances (vertical agreements) that some consumers (the inframarginal) may suffer economic loss, in order to enhance firms' competition for marginal consumers, it is coherent from a policy perspective to do so also in the context of sustainability agreements.

Second, the concept of consumer/user used should not be static, to the extent that it focuses on the immediate effect of an agreement on the current consumers of the relevant market, without considering the long-term effects of such agreements, also to the well-being of this category of users. Even if one takes such narrow perspective, there is a serious risk that the threat of climate change and other environmental damage will affect the current generation of consumers who may suffer loss of life or a disruption of family life or both. Hence, the current (mainstream) approach may not fully integrate the broader impact that such an agreement has on the structural positioning of these individuals in the future regarding possible harm to their interests resulting from lowers level of sustainability. Furthermore, such a static analysis does not integrate the damage to future generations of consumers, those not yet been born. In my view, the concept of consumer welfare,

[27] See also the interesting insights on this issue by C. Beaton-Wells, Antitrust's Neglected Question: Who Is "The Consumer"?, (2020) 65(1) The Antitrust Bulletin 173.
[28] See, for instance, Case 26/ 76, *Metro SB- Großmärkte GmbH & Co KG v Commission* [1977] ECR 1875.

assessed in the context of a relevant market, is not always a good proxy to assess the anticompetitive effects of certain types of agreement. There is a risk that the current approach underestimates the long-term beneficial collective benefits of sustainability agreements, part of which may be apportioned to the users of the relevant product in question, while also enhancing variety, innovation, consumer choice, but also competition in other related (or not) markets.

Third, the jurisprudence of the EU Courts does not oppose the possibility of a sustainability trade-off[29]. The "challenges" and inherent complexity of the exercise of identifying, measuring and quantifying the sustainability benefits and then apportioning them to the consumers in the relevant market is obviously there and relates to the incommensurability problem, the fact that the benefits and costs may be of different kind, or in other words, qualitatively different. However, the trade-offs involved between static and dynamic efficiency (actual and future consumers), or those between price and quality, or even between the different individual consumers of the group of consumers affected by the specific restrictive conduct in the 'relevant market' (marginal v inframarginal) may equally be described as conducive to the incommensurability problem. Balancing various social values is also an exercise routinely undertaken by constitutional and administrative courts, sometimes involving issues of greater complexity than the more confined type of economic balancing needed in the context of a competition law dispute.

The "challenges" relate therefore to the methodological tool employed by the Commission and National Competition Authorities (NCAs), rather than to the legal framework or to public policy analysis. Changing or supplementing the methodological toolkit we dispose with other tools may solve this "challenge"[30]. One may also think of decision procedures other than balancing, which may be more appropriate in the circumstances, and could easily be imported in the context of Article 101 TFEU, such as lexicographic (or lexical) ordering (so that certain values may take priority with respect to other values without this leading, however, to the suppression of the second ordered value), trumping (some values trumping others), combinations of trumping with balancing, etc.

Finally, the third condition of Article 101(3), allowing users a fair share of the resulting benefit and the subsequent requirement of full compensation, may also be interpreted in different ways. The French version of the Treaty indicates that an *equitable* share of the profits generated by the efficiency gains should be passed on to users ('*tout en réservant aux utilisateurs une partie équitable du profit qui en résulte*'). The concept of "fair share" may be understood as requiring that the surplus brought by the "resulting benefit" is to be allocated equally between the various actors whose interests are affected by the agreement. In its 101(3) TFEU Guidance, the Commission seems to have made the choice of requiring an *actual* and *total/full* compensation for the consumers of the relevant market affected by the restriction of competition. The negative

[29] Case T- 86/ 95*Compagnie Générale Maritime v Commission of the European Communities* [2002] ECR II– 1011; [2002] 4 CMLR 29, para 343. See also Case T- 213/ 00*CMA CGM SA v Commission of the European Communities* [2003] ECR II– 913; [2003] 5 CMLR 4, para 227. Similarly, see Case C- 382/ 12 P, *MasterCard Inc and Others v Commission*, ECLI:EU:C:2014:2201, paras 237-248.

[30] See, for instance, the detailed proposals of the HCC & ACM, Technical Report on Sustainability and Competition (January 2021), available at https://www.epant.gr/en/enimerosi/competition-law-sustainability.html

effects on consumers resulting from the restriction of competition need to be fully cancelled out by the alleged benefits. In other words, a *hypothetical* compensation would be insufficient to the extent that it compensates only *a part* of the loss to consumers resulting from the specific restriction of competition.

This has the merit of making clear that immediate harm to consumer will not be tolerated and avoids the possible risk of a slippery slope towards the integration of other policy agendas than consumer welfare in competition law. However, it is not the only possible and plausible interpretation of the condition of "fair share" in Article 101(3) TFEU. One should also keep in mind that not all consumers/users are responsible to a similar extent for the social costs generated by the externalities of their consumption behavior. The "polluter pays" principle may justify that producers polluting more be treated differently. Similar principles should also apply, from the demand side, to consumers polluting more than others through their consumption behavior, if they have the choice for a green product without that disproportionally affecting the other parameters of competition (in particular price). In this context, it could be considered as "fair" to apportion a higher weight for the benefits taken into account in order to compensate the costs to the consumers of the relevant market that contribute to the negative externalities (pollution), so that these are only *partly* compensated. One possible way is to interpret the Treaty literally and take a fair share to be an equal share, that is a 50%-50% divide, if there is certainty that the 50% of these benefits that will not be allocated to the consumers of the relevant market will benefit future generations through sustainability investments. One may also advance a manifest disproportionality standard that would accept small net consumer harm in a relevant market in the presence of large sustainability benefits in the EU (or more broadly if we follow a cosmopolitan standard) that may counterbalance the risk, in particular for climate change mitigation strategies. However, one may also argue that the concept of "fair" does not require a simple mathematical formula that would divide the benefit in a predetermined way between the various actors whose interests are affected by the agreement in question, but a policy assessment depending on the circumstances of the case (the type of pollution, the externalities it imposes etc., these being evaluated[31]), and with reference to the general principles and values of EU law, as this result from a structural interpretation of the various relevant Articles in the EU Treaties. Hence, this should be left open to interpretation by the Commission and NCAs according to the circumstances of the case.

In any case, the focus on sustainability concerns breaks with the monocentric view of the consumer, as a purely economic agent expressing her/his preferences by making choices in the marketplace. Consumers are also citizens who express their collective preferences through democratic choice, participating through various ways in the polity. The overall normative framework cannot thus only be subsumed to economic rationales and be ascribed an economic dimension but needs to account for the constitutional values of the polity (and of the prevailing social contract), as these are expressed in the foundational texts that form the core principles of

[31] See, the discussion in Dutch ACM & HCC, Technical Report on Sustainability and Competition (January 2021) <https://www.epant.gr/en/enimerosi/publications/research-publications/item/1284-technical-report-on-sustainability-and-competition.html> .

the community. This "polycentric" vision finds its foundation in the recognition that people regularly participate in many distinct overlapping types of games or social interactions, at the marketplace, and in the political and cultural fields[32]. This complexity is assumed away by the population-level approach of the general competitive market equilibrium theory, one of the foundations of neoclassical economics, when it aims to translate individual preferences into aggregated social outcomes.

The simplicity of the micro-foundations of the consumer welfare analysis may thus enter in conflict with approaches that center on sustainable development, if there is no effort made to integrate that complexity. Beyond the practical issue of the extent and the way sustainability concerns may be integrated in competition law analysis, there is an important theoretical groundwork to be performed, and new institutional frameworks that are more open to such concerns have to be imagined and designed[33].

The current discussions in the EU regarding the sustainability chapter in the Commission's new Horizontal Guidelines will provide the opportunity to tackle the way sustainable development considerations may be integrated in the interpretation and enforcement of Article 101 TFEU, in view of the broader policy agenda and the strong leadership of commissioner Vestager in favour of the Green Deal[34]. The HCC made an important contribution to this EU-wide debate, first by publishing a staff discussion paper in July 2020 exploring the legal principles, organizing an international conference in September 2020, and a Technical report on evaluating sustainability arguments, jointly commissioned with the Dutch Authority for Markets and Competition (ACM)[35].

This uniform application of the competition rules in the EU should not also ignore the different situation with regard to the implementation of the "green agenda" in each member State. Taking the example of Greece, the financial uncertainty inherent to long-term investments for the green transition is reinforced by two additional difficulties. First, most of Greek businesses are small and would need to scale up, eventually cooperating with each other, in order to achieve the efficiencies needed in order to make sustainable green investments. Second, differences in financing capacity are enormous among EU Member States, despite public EU funding. The funding gap may be more severe in Greece, in view of the important economic and financial crisis during the last decade. Hence, an important effort needs to be made in order to limit regulatory uncertainty and provide incentives to banks and institutional investors to make the necessary investments for "green" growth. Additional tools of flexibility, such as no-enforcement letters,

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[32] I. Lianos, Polycentric Competition Law, (2018) 71 Current Legal Probs. 161.

[33] For the beginnings of a discussion, see Dutch ACM, Guidelines on sustainability agreements are ready for further European coordination (2021), available at https://www.acm.nl/en/publications/guidelines-sustainability-agreements-are-ready-further-european-coordination ; HCC, Draft Staff Discussion Paper on Sustainability Issues and Competition Law (July 2020), available at Staff_Discussion_paper.pdf (epant.gr) ; OECD, Sustainability and Competition, available at https://www.oecd.org/daf/competition/sustainability-and-competition.htm .

[34] Executive Vice-President Vestager's keynote speech, Competition Policy in Support of the Green Deal (September 10th, 2021), available at https://ec.europa.eu/commission/commissioners/2019-2024/vestager/announcements/competition-policy-support-green-deal_en .

[35] https://www.epant.gr/en/enimerosi/competition-law-sustainability.html .

such as those introduced by new Article 37A of Greek Law 3959/2011, as amended in January 2022, may provide, at least from the perspective of enforcement priorities, some legal certainty to undertakings, taking into account the policy discretion regarding case selection recognized to NCAs by the EU framework.

III. The challenges of a complex economy: beyond the simplistic "consumer-centred" logic?

The need to escape the isolationist trap in competition law and to integrate the broader institutional framework that is formed in order to promote the new model of sustainable development, breaks with its "consumer-centred" logic (or at least the simplistic interpretation of it that has prevailed with the "consumer welfare" concept in recent years). It introduces a more dynamic perspective not only for the economy (macro perspective), but also for the social economy of production and consumption (micro perspective). In the increasingly complex knowledge economy, the categories of producer and consumer are blurred, and various feedback loops connect markets that would not have never been related to each other in the linear model of neoclassical price theory. It is well known that complex adaptive economies are characterized by dispersed interaction between agents, no global controller, cross-cutting hierarchical organizations, continual adaptation, and out-of-equilibrium dynamics[36]. Competition law needs therefore to adapt its vision and tools to the realities of this complex economy. This has led to a number of initiatives in Greece, in particular the proposal for a new substantive law provision for the abuse by an undertaking of its central position in an ecosystem of paramount importance for competition in Greece, but also a broader re-orientation of the NCA's priorities and case selection.

A. Knowledge economy and the formation of industrial or innovation ecosystems

Taking a perspective beyond the simple consumerist vision, one may explore how competition law may contribute to the transition towards the so called "knowledge economy"[37]. In this conception, in order to progress to the growth of the "knowledge economy", it is not sufficient to compensate the "losers" according to the percepts of the social contract, so as to guarantee systemic resilience or some other "neutral" effect to the protected social category (in this case consumers), but it is also important to provide the vast majority of people and firms access to the most advanced practices of production, thus increasing their productivity and elevating them from economic periphery to high added-value generating activities, thus providing them equality of opportunity and promoting their capabilities (which are related both to consumption and production). In this view, "dissemination of the knowledge economy beyond the insular vanguards

[36] W.B. Arthur, S.N. Durlauf, D.A. Lane (eds.), *The Economy as an Evolving Complex System II, Proceedings Volume XXVII, Santa Fe Studies in the Sciences of Complexity* (Addison-Wesley, 1997).
[37] R. Mangabeira Unger, *The Knowledge Economy* (Verso, 2019).

in which it remains arrested"[38] will enable more opportunities of participation in the production process and by the same greater investment and influx of capital to the economic and social periphery, as advantage and opportunity become more largely distributed in the economy. Hence, competition law may aim to promote a more equal access (with tools such as interoperability) to productive assets that are key for development[39].

This is crucial in view of the transformation of relations of production the last thirty years. The presence of important economies of scale enables the recoupment of the fixed costs of investments, in conjunction with modularization as a new form of organizing production[40], through the constitution of value chains, has led to an expanding role for business collaboration, including collaboration among firms that remain competitors[41]. Ecosystems, which often draw on platforms, arise not from centralized control but from the interactions between the components of such correlated productive, innovation or transactions-based system[42]. The modularization of the production process, which is divided between number of independent firms, the boundaries of organizational units and corporations being likely to match the boundaries of underlying technological modules (mirroring)[43], enables the creation of business ecosystems. These comprise mutually enhancing products or services, that are "glued" together through technology or a web of contractual or relations of "uncontract"[44].

Ecosystems are regarded as communities of collaborating firms that collectively produce a good, service, or solution with an aligned vision. Ecosystems thus do not merely denote 'theory of the firm' alternatives to vertical integration or supply-chain arrangements, rather the concept reflects the emergence of business environments marked by modularity in production, co-evolution, and decisional complexity[45]. Ecosystem orchestrators set the activity and value architectures of ecosystems with the purpose to maximize its resilience and capacity to generate

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[38] R. Mangabeira Unger, The Knowledge Economy: A Critique of the Dominant View, (Fall 2020) American Affairs 51, 63.

[39] S. Bowles & H. Gintis, Efficient Redistribution: New Rules for Markets, States, and Communities, 24 Policy & Society 307-342 (1996) (noting the importance of equality in the distribution of productive assets. This does not only relate to property rights but also to use).

[40] C.Y. Baldwin, Modularity and Organizations (November 20, 2012). Harvard Business School Finance Working Paper No. 13-046.

[41] The concept of 'co- opetition' may characterize the future of competitive interactions in the economy, where businesses become more competitive by cooperating with each other and developing unique capabilities that add value and complement those of their competitors: A Brandenburger and BJ Nalebuff, *Co- opetition* (Doubleday, 1997).

[42] A.F. Siegenfeld & Y. Bar-Yam, An introduction to complex systems science and its applications, (2020) Complexity, arXiv:1912.05088 .

[43] C.Y. Baldwin & K.B. Clark, Managing in an Age of Modularity, in R. Garud, A. Kumaraschwami, R.N. Langlois (eds.), *Managing in the Modular Age* (Blackwell Publishing, 2003),149.

[44] S. Zuboff, *The Age of Surveillance Capitalism: The Fight for a Human Future at the Frontier of New Power* (Profile Books, 2019), 208.

[45] Ron Adner, Ecosystem as Structure, (2017) 43 Journal of Management 39; Rahul Kapoor, Ecosystems broadening the locus of value creation, (2018) 7 Journal of Organization Design, Article No 12; Erkko Autio, and T. Llewellyn, Tilting the Playing Field: Towards an Endogenous Strategic Action Theory of Ecosystem Creation, in S. Nambisan (ed.), Open Innovation, Innovation Ecosystems, and Enterpreneurship: Multidisiplinary Perspectives (Word Scientific Pub., 2018), Chap. 5. See also Michael G. Jacobides, Carmelo Cennamo, Anabelle Gawer Towards a theory of ecosystems, (2018) 39 Strategic Management Journal 2255; James F Moore, Predators and prey: a new ecology of competition, (1993) 71(3) Harvard Business Review 75.

value. For instance, ecosystem orchestrators controlling an operating system make a strategic use of their application programming interfaces (APIs), which enable external apps to connect with the operating system, hardware or web-based system, algorithms based on Big data analytics, or contractual restrictions, among other forms of ecosystem 'glue', in order to ensure interconnectivity and interoperability for final consumers, but by the same also offer profitable points of control for the dominant firm in the ecosystem and the resources to build a strategic competitive advantage. This leads to a new set of dynamics, whereby those who control ecosystems can generate profit through a fresh set of dynamics[46].

In addition to the macro-myopia of an approach that ignores the "connective complexity of the economy"—the net of links that shape the economy but also underpin societal relations[47]—one may also hint to the micro-myopia of ignoring the internal structure of complex productive or innovation systems, business ecosystems, that are composed of many parts that interconnect in intricate ways.[48] This is key as in complex systems there is a disconnect between an individual's localised behaviour and the way in which this aggregates into global behaviour.[49] As a result of this disconnect, the overall emergent behaviour of a complex system is difficult to predict, even when the behaviour of the subsystem is readily predictable. Small changes in inputs and/or parameters may, thus, produce large non-linear changes in behaviour. Complex systems are also dynamic: as they learn, evolve and adapt, they generate emergent non-deterministic behaviour that breaks with the assumptions expected under the equilibrium behaviour, enabling multiple equilibria to be formed. Complex systems are not populated by homogeneous predictable agents but by a collection of heterogeneous agents (individuals, organisations etc.) the state of whom influences and is influenced by the state of others (for instance, situations of social contagion). Their interactions give rise to global systemic properties that equate to more than the sum of individual behaviour (emergence). Finally, as the interactions within complex systems are not independent, various feedback loops can enter into the system and affect the individual decisions of the actors involved in it. Complex systems require complex economics and new operational concepts that may better account for their inherent characteristics.

B. The complex economics of ecosystems as new spaces of competition

In these more complex production and innovation structures, competition interactions depend on, and determine the boundaries of, the "space" within which these agents are contained. However, determining the relevant "space" or "field" of interaction cannot be done before fully engaging computationally with the interactions of the agents themselves. This additional level of complexity highlights the need for the competition law framework to adapt its toolkit and

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[46] See, E. Autio, Orchestrating ecosystems: a multi-layered framework, Organization and Management, 2021.
[47] M. Fontana, "Can Neoclassical Economics Handle Complexity? The Fallacy of the Oil Spot Dynamic", (2010) 76(3) Journal of Economic Behaviour and Organisation, 584.
[48] J. Sussman, "Collected Views on Complexity in Systems", (2003), MIT Engineering Systems Division Working Paper Series, ESD-WP-2003-01.06, 6, cites the definition of J. Moses, Complexity and Flexibility (Mimeo).
[49] J. Miller and S. Page, *Complex Adaptive Systems* (Princeton University Press, 2007), 50.

operational concepts to the reality of a complex economy[50], in particular employing operational concepts that would account for inter and intra ecosystem competition[51]. This involves completing the "relevant market" framework employed in competition law, which explicitly focuses on the average behavior in one of the system's components (i.e., firms producing neatly separable, substitutable products) and the deviations of individual components from this average (e.g., higher prices, lower quality, and reduced innovation). The relevant market framework fails to appreciate the dynamics of multiproduct and multi-actor ecosystems. We need to adjust our regulatory framework lest it becomes perilously distant from the reality of real-world power[52].

In the presence of a "regulatory gap" that puts uneasy pressure to existing operational concepts (the relevant market), which are stretched beyond their logical limits, it becomes important to reflect on conceptual innovations[53]. Hence, the Law Commission for the revision of Greek competition law made proposals for the inclusion of a new Article 2A in Law 3959/2011 with the aim to regulate power in ecosystems. This was put forward for public consultation in August 2021[54].

Suggested Article 2A: Abuse of position of power in an ecosystem of structural importance to competition

1. Any abuse by an undertaking of its position of power in an ecosystem of structural importance to competition in the Greek territory is prohibited.
If the requirements for the application of the present article and of articles 2 of the present Law and 102 TFEU are met, only the latter articles shall apply, excluding application of the present.
2. For the purposes of the application of para. 1, the Hellenic Competition Commission shall take into account the business model of the ecosystem and the rules governing the relations of the parties involved. The Hellenic Competition Commission shall also consider any adequately justified objective reasons put forward and which concern the practices at issue.
3. a) An "ecosystem" is defined as: (a) a nexus of interconnected and, to a great extent, interdependent economic activities of different undertakings aiming at the provision of products or services which impact on the same group of users; or (b) a platform connecting economic activities of different undertakings with the purpose of providing one or more products or services, affecting either the same users or different groups of business users or end users.
b) A "platform" is defined as an entity operating either as an intermediary for transactions between interdependent groups of end users and business users or between interdependent groups of

[50] I. Lianos, Competition law for a complex economy, (2019) 50 International Review of Intellectual Property and Competition Law (IIC), 643.
[51] For a discussion, see M. G Jacobides & I. Lianos, Ecosystems and competition law in theory and practice, (2021) 30(5) Industrial and Corporate Change 1199.
[52] I. Lianos & B. Carballa Smichowski, Bruno, Economic Power and New Business Models in Competition Law and Economics: Ontology and New Metrics (March 15, 2021). Available at SSRN: https://ssrn.com/abstract=3818943 .
[53] For a discussion, see M. Jacobides & I. Lianos, Ecosystems and Competition Law in Theory and Practice, (2021) 30(5) Industrial and Corporate Change 1199.
[54] See, http://www.opengov.gr/ypoian/?p=12356 .

business users, or as an infrastructure for the development and provision of different, yet interconnected, products and services.

4. An ecosystem shall be presumed to be of structural importance to competition where non participation in it substantially affects the effective exercise of business activities by third parties. When determining an ecosystem's structural importance to competition, account shall be taken particularly of the following elements: (a) the economic power or the significant share of the ecosystem concerned in the total turnover, or in the revenue of one or more sectors of the Greek economy, (b) its access to substantial resources, in particular to a significant number of business users depending on the ecosystem in order to connect with end users or to sensitive data and information relevant to competition, (c) the significance of its activities with regard to the access of third parties to procurement and sales markets in the Greek territory.

Notwithstanding the fulfilment of the requirements stipulated in the previous sentence, an ecosystem shall be presumed to lack structural importance to competition where, at least four (4) other independent ecosystems operate in parallel to it and such ecosystems constitute a viable alternative for users.

5. A "position of power" in an ecosystem is defined as the position of economic strength enjoyed by an undertaking, which affords it the power to behave to an appreciable extent independently of its competitors, its customers and, in general, the users of the ecosystem. When determining the possession by an undertaking of a position of power in an ecosystem, account shall be taken, *inter alia*, of the following elements: (a) the control by such undertaking of necessary resources and infrastructure for the economic activity of other undertakings, (b) the undertaking's capacity to lay down rules regulating the operation of the ecosystem and the access of third parties to it, (c) the undertaking's increased bargaining power *via-a-vis* business users and end users of the ecosystem, (d) the dependency of ecosystem users on the undertaking for the provision of intermediation services, essential for their access to markets for products and services, and the absence of a respective alternative solution.

6. The Hellenic Competition Commission may initiate ex officio investigation in order to establish whether there has been an infringement of para. 1. Where an infringement is found, the Hellenic Competition Commission issues a decision, which is notified to the undertaking concerned, by virtue of which the undertaking is obliged to cease the infringement and refrain from it in the future. By the same decision, the Hellenic Competition Commission may invite the undertaking, within 60 days from the notification of the decision, to propose remedies which it intends to impose for the undertaking to comply effectively with the decision of the Hellenic Competition Commission.

7. The Hellenic Competition Commission issues a decision within one hundred twenty (120) days following notification of the preceding decision of the Hellenic Competition Commission finding an infringement, by virtue of which, remedies proposed by the undertaking pursuant to para. 6 shall be made binding to it.

In case the proposed remedies are not considered appropriate, the Hellenic Competition Commission, following a hearing of the undertaking, may impose behavioral remedies as

appropriate and necessary for the infringement to be ended, depending on the nature and the gravity of the infringement and on the business model of the ecosystem concerned.
8. The General Directorate for Competition of the Hellenic Competition Commission may initiate proceedings to monitor compliance with a decision adopted pursuant to para. 7 and the Hellenic Competition Commission may issue a decision with respect to the compliance of the undertaking. By virtue of a decision of the Hellenic Competition Commission and where non-compliance of the undertaking has been established, the undertaking concerned is obliged to cease non-compliance and refrain from it in the future, and the Hellenic Competition Commission may also impose a fine to the undertaking pursuant to para. 2 of Article 25B.

The introduction of Article 2A – and, more specifically, the reference to a position of power in an ecosystem of paramount importance – aimed at covering lock-in situations that may produce negative effects to competition and innovation, and which could not fall under the provision on abuse of dominance. But the essence of the provision and the added value it aimed to bring to competition law enforcement relates to its focus on ecosystems. At the background stands the realisation that competition law should take into account the strategies used by economic actors to create and capture value by competing for strategic or architectural advantage[55] in the context of an ecosystem,[56] when these strategies may negatively and significantly impact competition. The starting point for the analysis should not only therefore be the relevant market, but the ecosystem itself. Undertakings compete against each other to a) expand their customer base, and/or b) exploit network effects and their positioning as bottlenecks – even if this positioning might not make sense from a conventional price-cost perspective. This preoccupation with expanding the customer base partially explains why companies continue to offer "free" products/services, even if the benefits they receive with regards to market share or user data (personal data can be seen as the price users pay for free products/services) are not directly redeemable. Even so, acquiring a large customer base at the cost of reduced profits may not be the ultimate prize. Instead, such strategic practices are more profitable once the companies are in position to develop their dynamic prognostic capabilities (improving their algorithms through customer data) and/or take on the role of gatekeeper to the ecosystem. The anticipation of such profitability improves the market capitalisation of the company right away[57].

In addition, treating certain economic activities as parts of an ecosystem, and investigating them as such, helps to develop a more holistic appraisal of competitive sources and pressures. Due

[55]M.G. Jacobides, T. Knudsen, M. Augier "Benefiting from innovation: Value creation, value appropriation and the role of industry architectures". (2006) Research Policy 35(8): 1200–1221; G. Pisano, D. Teece, "How to Capture Value from Innovation: Shaping Intellectual Property and Industry Architecture", (2007), California Management Review, 50(1).
[56] D. Teece, "Business Models, Value Capture and the Digital Enterprise", (2017) 6(8) Journal of Organizational Design; M.G. Jacobides, C. Cennamo, A. Gawer, "Towards a Theory of Ecosystems" (2018) Strategic Management Journal 39.
[57] On the role of financialization in digital economy, but also more generally see, I. Lianos & A. McLean, Competition Law, Big Tech and Financialisation: The Dark Side of the Moon (September 15, 2021). Available at SSRN: https://ssrn.com/abstract=3930565 .

to the nature of the products and services offered by digital ecosystems, the boundaries between stages of the value chain dissolve, making some companies more powerful[58]. To get an accurate picture of the origins of competition and points of control, we must take a more holistic view of the entire system and look for "positional power"[59].

It is important to highlight that ecosystems, as defined in Article 2A, include various companies and nexuses of dependency, and should be distinguished from conventional vertical relationships between actors and supply chains. The actors that form an ecosystem are usually independently owned, but financially and technologically interconnected due to:

i. the highly complementary relationships between the resources (technological, financial and human) needed to participate
ii. the fact that the user or group of users are provided with a coherent and often financially integrated offering, even though multiple actors are involved (with the distribution of revenues often not being made explicit); relatedly, there are positive or negative feedback loops between different categories of users, and
iii. often the sunk costs that complementors must invest for a "seat at the table", which may result in them being locked in. This may raise an issue in as much as the scope and extent of the ecosystem is such that potential ecosystem participants would be materially worse off if they chose *not* to participate in the ecosystem.

The issues tackled by Article 2A were also identified in other jurisdictions. Germany has already moved to implementing a proposal addressing the above issues in the tenth review of its competition law (new Article 19a), which introduces a new provision regarding undertakings with paramount significance for competition across markets[60]. Austria has also introduced legislation regarding undertakings operating in "multisided" digital markets[61]. Elsewhere, the "gap" in the current provisions concerning unilateral practices was covered by the enforcement of specific provisions on abuse of economic dependence[62]. There are a number of jurisdictions in Europe with provisions on non-structural economic power, such as abuse of economic dependence, relative

[58] C. Baldwin and J. Woodard, The Architecture of Platforms: A Unified View, *in Platforms, Markets and Innovation* (A. Gawer ed., 2009), 24-26, T. Eisenmann et al., "Platform Envelopment", (2011) 32 Strategic Management Journal 1270.

[59] Lianos & B. Carballa Smichowski, Bruno, Economic Power and New Business Models in Competition Law and Economics: Ontology and New Metrics (March 15, 2021). Available at SSRN: https://ssrn.com/abstract=3818943 .

[60] New Article 19a GWB-E (Referen-tenentwurf eines Zehnten Gesetzes zur Änderung des Gesetzes gegen Wettbewerbsbeschränkungen).

[61] Art. 28a και 36 para 2a Cartel Act (KaWeRÄG) on lodging an application with the Cartel Court requesting it to declare that an undertaking operating in a multi-sided digital market holds a dominant position.

[62] Some jurisdictions have re-introduced provisions on abuse of economic dependence, making specific reference to the legislative gap concerning digital platforms in their abuse of dominance provisions: Loi modifiant le Code de droit économique en ce qui concerne les abus de dépendance économique, les clauses abusives et les pratiques du marché déloyales entre entreprises, Art. 4, http://www.ejustice.just.fgov.be/cgi_loi/change_lg.pl?language=fr&la=F&cn=2019040453&table_name=loi . For instance, French competition authorities have applied provisions for the abuse of economic dependence (Article L. 420 2, alinéa 2 du code de commerce) – which form part of their rulebook on free (and not unfair) competition – to non-dominant firms in a market: Case 20-D-04 16 March 2020 «relative à des pratiques mises en œuvre dans le secteur de la distribution de produits de marque Apple», https://www.autoritedelaconcurrence.fr/sites/default/files/integral_texts/2020-06/20d04.pdf .

market power or bargaining power[63] and this number may soon increase, as more and more member states realize that the "gap" in the enforcement of the traditional abuse of dominance provisions may not be entirely filled by the recent Digital Markets Act. The latter only applies to the largest platforms and covers the digital economy, thus leaving outside platforms that may emerge in more traditional sectors, such as banking, automobile industry, retail, but also platforms of regional or national significance which do not dispose of a dominant position on a market[64]. These developments highlight the need to develop new concepts of (economic power) and new metrics, beyond the traditional concepts and tools provided by neoclassical economics, that would take into account "ecosystems" as a new field of competitive interaction[65].

Article 2A was finally ill-fated. Facing opposition by certain business interests (mainly in the telecommunications sector, which claimed that with this provision the HCC would have been able to implement competition law in the telecom markets, from which it is presently excluded, as *ex post* competition law enforcement in this area belongs to the full-jurisdiction the sector-specific regulator) —and despite the support received from the major consumer associations in Greece and BEUC, the European Consumer Organisation[66], as well as from the major associations of small and medium undertakings and the association of businesses in the tourism industry—the government withdrew the proposed reform, although the possibility for revisiting the issue remains, once the EU Digital Markets Act is implemented.

This unsuccessful effort, as well as the successful introduction of a new Article 1A in the Greek Competition Law regarding price signalling and invitations to collude (which I will develop in a separate study) show that any effort of reorienting competition law towards a complex economy framework may meet intense opposition and will therefore need strong support, not just from stakeholders within the specific jurisdiction, but also among some of the "guardians" of European competition law, including the European Commission, academia, law firms and economic consultancies. Recent difficulties and opposition by vested interests and others to similar efforts to expand the role of competition authorities and make them fit for purpose for the emerging

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[63] See, for instance, provisions in Germany, Italy, Switzerland, Belgium, France, Hungary, Cyprus, Bulgaria, Portugal. Latvia, UK (concept of strategic market status), Czech Republic, Romania.

[64] This trend towards expansion of abuse of economic dependence concepts is also visible in other regions of the world: see, the presentation by S. Lee, Abuse of Economic Dependence in Competition Law From a Comparative Perspective (ASCOLA Asia Regional Workshop 2022, Jan 5, 2022), available at https://www.slideshare.net/SangYunLee23/sangyun-lee-abuse-of-economic-dependence-in-competition-law-from-a-comparative-perspective-ascola-asia-regional-workshop-2022-jan-5-2022 .

[65] See, for instance, I. Lianos & B. Carballa Smichowski, Economic Power and New Business Models in Competition Law and Economics: Ontology and New Metrics (March 15, 2021). Available at SSRN: https://ssrn.com/abstract=3818943 ; European Commission, Support study accompanying the Commission Notice on the evaluation of the definition of relevant market for the purposes of Community competition law – Final Report (2021), available at https://ec.europa.eu/competition-policy/system/files/2021-06/kd0221712enn_market_definition_notice_2021_1.pdf (pp. 80-88).

[66] https://www.beuc.eu/publications/greek-draft-law-%E2%80%9Cmodernization-competition-law-digital-age%E2%80%9D/html .

social contract in the digital age[67], also showcase that the road of reform may be long and particularly perilous for those undertaking it.

It is interesting that this reform effort in Greece, but also other equivalent elsewhere, were supported by a wide alliance of stakeholders, involving not just consumers but also small and medium firms and larger firms that operate as complementors in digital, or other, ecosystems. Hence, initiatives to take into account the concept of "ecosystems" in competition analysis illustrate the recent emphasis put on the interests of other stakeholders rather than just consumers in competition law enforcement. One may refer to recent research on the formation of industrial ecosystems and policies for "innovative industrial renewal" in Europe, which aim to catch up the digital production gap that is expanding between the EU and its main commercial competitors, in particular the US and China, and call for more efforts to understand the architecture and dynamics of modern industrial ecosystems[68]. One may also add the need to protect labour from monopsonistic behaviour undertaken by digital platforms[69], or farmers from the asymmetrical bargaining power that is exercised against them by large "AgTech" platforms[70]. Similar efforts have taken place regarding the use of competition law against privacy restrictions of competition, that received support from data protection as well as competition law experts[71]. This broader "social alliance" for competition law reform needs to develop, not just, in each jurisdiction, but also have a transnational dimension, which requires the coordination of various interests for a more "progressive" interpretation and implementation of the law.

We need however also to be vigilant and careful that such initiatives do not depart from the constitutional value of competition law in the EU social and political "contract", and that their integration in competition law assessment is subject to the presence of a clear constitutional

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[67] See, D. Bush, Populism at the FTC Upsets the Antitrust Religion of Consumer Welfare: A Reply to Sokol and Wickelgren (December 15th, 2021), available at https://promarket.org/2021/12/15/populism-ftc-antitrust-consumer-welfare-bush .

[68] H.-J. Chang & A. Andreoni, Industrial Policy in the 21st Century, (2020) FORUM 51(2) Development & Change 324; A. Andreoni, Industrial ecosystems and policy for innovative industrial renewal: A new framework and emerging trends in Europe, available at https://tem.fi/documents/1410877/4430406/Antonio_Andreoni.pdf/8a499465-50e2-4bcb-959b-59c5202663f7/Antonio_Andreoni.pdf.pdf .

[69] J. Azar, I. Marinescu & M. Steinbaum, Labour Market Concentration, IZA Institute of Labour Economics (December 2017), available at https://www.econstor.eu/bitstream/10419/177058/1/dp11254.pdf ; I. Lianos, N. Countouris and V De Stefano, Re-thinking the competition law/labour law interaction: Promoting a fairer labour market, (2019) 10(3) European Labour Law Journal 291; Naidu, Suresh and Posner, Eric A., Labor Monopsony and the Limits of the Law (January 13, 2019), available at SSRN: https://ssrn.com/abstract=3365374 .

[70] I. Lianos, C. Lombardi, Superior Bargaining Power and the Global Food Value Chain. The Wuthering Heights of Holistic Competition Law?, (CLES Research Paper series 1/2016). Centre for Law, Economics and Society, UCL Faculty of Laws: London, available at https://discovery.ucl.ac.uk/id/eprint/10045043/1/Lianos_cles-1-2016.pdf; I. Lianos, A. Ivanov & D. Davis (eds.), *Global Food Value Chains and Competition Law* (Cambridge University Press, 2022).

[71] See, for instance, E.M. Douglas, The New Antitrust/Data Privacy Law Interface, The Yale Law Journal Forum (Jan. 18th, 2021), available at https://www.yalelawjournal.org/pdf/DouglasEssay_pv1pt6ak.pdf; ; N. Economides & I. Lianos, Restrictions On Privacy and Exploitation In The Digital Economy: A Market Failure Perspective, (2021) 17(4) Journal of Competition Law and Economics 765.

mandate, such as the one found in the horizontal clauses of the Treaty (e.g. Article 11 TFEU[72]) and other texts of constitutional dimension (EU Charter of Fundamental Rights).

IV. Complexity and the Reformation of the Competition Law Enforcement Toolkit

Another level of complexity consists in engaging with the transformational technology of the fourth industrial revolution, and more particularly the use of Big Data, AI and its various dimensions, such as machine learning technologies in competition law enforcement. This was a major challenge for the HCC, as we had to cover, rather quickly, a significant lag in terms of investments in the use of technology for forensic purposes.

The implementation of artificial intelligence (AI) not only changes the dynamics of the competitive game, and raises new questions as to algorithmic collusion[73], or the use of behavioural targeting/discrimination for new extraction of value strategies in both the digital and non-digital space of the economy[74]. The emergence of large digital conglomerates and ecosystems that produce important extra-organizational externalities[75], but may also provide the opportunity and the need for updating the traditional tools of competition law enforcement with new tools that "augment" the capabilities of competition authorities (augmented competition law")[76]. Furthermore, the development of new technologies that make possible a data-rich competition law enforcement may enable competition authorities to broaden up their perspective and tackle issues that were left until now outside the traditional conceptual framework of competition law, essentially because of the lack of appropriate tools, methods and metrics to engage with them.

Competition authorities participate to this re-orientation effort, not through their traditional enforcement activity, but taking a more "responsive" approach[77], by the multiplication of other methods of engagement with the market participants in their effort to promote a more competition-

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[72] According to this provision, "(e)nvironmental protection requirements must be integrated into the definition and implementation of the Union's policies and activities, in particular with a view to promoting sustainable development".

[73] SK Mehra, Antitrust and the Robo- Seller: Competition in the Time of Algorithms (2016) 100 Minnesota L Rev 1323; A Ezrachi and ME Stucke, Artificial Intelligence & Collusion: When Computers Inhibit Innovation, (2017) University of Illinois L Rev 1775; U Schwalbe, Algorithms, Machine Learning, and Collusion (June 1, 2018), available at SSRN: https://ssrn.com/abstract=3232631; OECD, *Algorithms and Collusion: Competition Policy in the Digital Age* (14 September 2017)..

[74] CMA, Algorithms: How can they reduce competition and harm consumers (January 19th, 2021), available at https://www.gov.uk/government/publications/algorithms-how-they-can-reduce-competition-and-harm-consumers/algorithms-how-they-can-reduce-competition-and-harm-consumers .

[75] M. Bourreau & A. de Streel, Conglomerates and EU Competition Policy, (March 2019); A. Ross Sorkin, 'Conglomerates Didn't Die. They Look Like Amazon' The New York Times (New York City, 19 June 2019); Parmy Olson, 'How Zuckerberg Is Feeding His Facebook Conglomerate' Forbes (Jersey City, 27 March 2015); I. Lianos, K. Hendrik Eller & T. Kleinschmitt, The Limits of Private Governance of Ecosystems, (CLES Research paper series 07/2021).

[76] I. Lianos, Polycentric Competition Law, (2018) 71 Current Legal Probs. 161, 208 (venturing the slogan of 'augmented competition law' in order to signify that this type of analysis will surely rely on advanced computing, algorithms and artificial intelligence supported decision-making).

[77] M. Ioannidou, Responsive' Remodelling of Competition Law Enforcement, (2020) 40(4) Oxford Journal of Legal Studies 846; S. Makris, Openness and Integrity in Antitrust, (2021) 17(1) Journal of Competition Law & Economics 1 (arguing for a "responsive law" perspective in antitrust).

compatible design and architecture for the emerging new economy of the fourth industrial revolution.

A. The "realist" turn in competition law: emergence of computational competition law and economics

The turn towards computational competition law and economics provides a good illustration of the impact of technological transformation on the role and work of competition authorities[78]. In view of the recent emphasis put by competition authorities worldwide on climate change and environmental and social sustainability, which call for a broader methodological framework and the expansion of competition law assessment to more than just prices and output, and the difficulties emerging out of the Covid-19 pandemic, with regard to the possibility of competition authorities to investigate conduct, often now taking place in digital markets, through the traditional means of competition law enforcement, such as down raids, it becomes essential to engage with the possible use of new computational technologies in competition law enforcement.

These new computational methods do not only impact on competition law enforcement techniques, but also involve the use of new analytical methods and the development of a different conceptual framework for making causal arguments in competition law. Competition law has not yet engaged with complex systems science, in particular the fields of computational economics[79], systems dynamics[80], evolutionary dynamics, network science[81], fractals and scaling, pattern formation[82], econophysics[83], nonlinear dynamics and chaos[84], but will need to do so in the near future. This will raise similar, if not more complex, methodology questions as those raised by the "more economic approach": the integration of economic thinking and arguments in competition law during the last three decades in Europe[85].

To showcase the value of these computational tools, I take as an illustration the area of cartel enforcement, in which competition authorities may rely on 'market-based' evidence focusing on the detection of coordinated oligopolistic price elevation, including 'price patterns' in the industry, evidence of price elevation and facilitating practice. Econometric techniques using a

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[78] For a detailed discussion, see HCC, Computational Competition Law and Economics – An Inception Report (January 2021), available at https://www.epant.gr/en/enimerosi/publications/research-publications/item/1414-computational-competition-law-and-economics-inception-report.html ; See also the Computational Antitrust Project at Codex, University of Stanford, available at https://law.stanford.edu/codex-the-stanford-center-for-legal-informatics/computational-antitrust/ .

[79] L. Tesfatsion, Agent-Based Computational Economics: Growing Economies From the Bottom Up, (2002) 8(1) Artificial Life 55; L. Tesfatsion & K.L. Judd (eds.), *Handbook of Computational Economics* (North Holland, 2006).

[80] J. Sterman, *Business Dynamics* (Irwin/McGraw, 2010).

[81] A.L. Barabási, *Network Science* (CUP, 2016).

[82] T.C. Shelling, *Micromotives and Macrobehavior* (Norton & Company, 2006)

[83] R.N. Mantegna & H.E> Stanley, *Introduction to Econophysics: Correlations and Complexity in Finance* (CUP, 1999).

[84] J. Gleick, *Making a New Science* (Open Road Media, 2011).

[85] See, I. Lianos & C. Genakos, Econometric evidence in EU competition law: an empirical and theoretical analysis, in I. Lianos & D. Geradin (eds.), *Handbook on European Competition Law – Enforcement and Procedure* (Edward Elgar, 2013), 1.

structural approach (focusing on markets with traits thought to be conducive to collusion) have also been used to help provide information as to where cartels may be located, as well as logit models or OLS predicting the probability or the number of cartels likely to exist in a specific industry[86]. Some authors have also emphasised behavioural approaches to detecting cartels, which also require the use of econometric techniques.[87] Quantitative economic analysis includes, as a first step, an industry analysis with a scoring approach (looking to different variables, such as indicators of price, transparency, concentration and entry) in order to exclude from the sample cases where cartel activity is relatively improbable and, as a second step, a critical event analysis (with a focus on exogenous shocks or structural breaks) testing the collusive against the competitive scenario.

The use of computational methods (algorithms) offers additional opportunities for detecting collusion more accurately on the basis of Big Data evidence. They complement existing digital technologies used for competition law enforcement, such as online whistleblower tools. As previously discussed, screening relies on an econometric analysis of data. However, by-hand econometric analysis has limitations, as it solely depends on human resources. Digital technology developments shift manual analysis of data to automatic cartel detection.

Each jurisdiction takes a different approach in designing and implementing their software screening tools. software tools developed by competition authorities have different designs, as they differ in both set of collected bidding information and indicators they analyse. Existing software screenings rely on a linear model and use simple tests, mostly easy to deceive by astute colluders. Big data and advanced machine learning techniques might offer a possible solution to this problem, as they provide the possibility to find nontrivial collusive patterns that econometrics could not foresee and they may build non-trivial tests on these patterns. As mentioned above, the main advantage of current screening tools is the analysis of large amounts of procurement data, which is infeasible if this was done by humans. Advanced machine learning techniques should enable the employment of effective cartel detection criteria on the basis of Big Data which were previously unknown to econometrics.

Upon taking up the role of head of the HCC, we moved immediately to a pluriannual research and development project in order to enhance our computational capabilities. In March 2020, the HCC launched the HCC Economic Intelligence and Data Analytics Platform, which is an effort to integrate and keep updated multiple external data sources in common database schema and provide visualization tools for data exploration and screening. The Platform also integrates a screening method to detect anti-competitive practices – including cartels, excessive pricing and

[86] OFT773, 'Predicting cartels' (Economic discussion paper, March 2005). For an overview, see P Rey, 'On the Use of Economic Analysis in Cartel Detection', in C-D Ehlermann and I Atanasiu (eds), *Enforcement of Prohibition of Cartels, European Competition Law Annual 2006* (Hart Pub, 2007) 69–82; P A Grout and S Sonderegger, 'Structural Approaches to cartel Detection' in C-D Ehlermann and I Atanasiu (eds), *Enforcement of Prohibition of Cartels, European Competition Law Annual 2006* (Hart Pub, 2007) 83–104.

[87] J E Harrington, Jr, 'Detecting Cartels' (Department of Economics, John Hopkins University, 2005), available at econ.jhu.edu/wp-content/uploads/pdf/papers/wp526harrington.pdf ; J E Harington Jr 'Behavioral Screening and the Detection of Cartels' in C-D Ehlermann & I Atanasiu (eds), *Enforcement of Prohibition of Cartels, European Competition Law Annual 2006* (Hart Pub, 2007) 51–68.

exclusionary pricing – from the analysis of market data (in particular prices), taking advantage of new legislation enabling the authority to have mandated access to primary data regarding prices by the main supermarkets in the country, the distribution system for petrol stations, and the Athens central market for vegetables and fruits. This enables the authority to follow daily the level of prices for more than 2000 thousands product codes across the country and to be able to use a time series since January 2020 and for some products a few years earlier[88]. However, the transition from a linear model with hand-crafted weights to advanced machine learning techniques (such as neural networks or random forests) requires big training data sets containing examples of collusive and competitive behaviour. The creation of such data sets demands a huge number of man-hours to analyze procurement data and annotate whether it is competitive or not, and thus requires some collaboration between competition authorities[89].

The use of screening tools by competition authorities is not the only manifestation of the computational turn, framed by some as the "more technological approach"[90], in competition law enforcement. More and more competition authorities hire data scientists and put in place special units in order to assist then in developing advanced forensic techniques and data analytics. Some authorities have also included in their organizational structure an IT Forensic unit.

We established at the HCC in October 2020 a forensic IT unit, which is headed by an economist and cooperates with number data scientists, who are acting as external experts for the authority. Moreover, the Commission is investing in its expandable Big Data Management Infrastructure Platform/dash-board, tailor made for the authority by an external contractor where real-time public data from different sources (Price Observatory of Supermarkets, fuel prices, vegetables and fruits prices, public procurement data, etc.) is automatically uploaded and updated every day or many times per week. Furthermore, the Commission has appointed experts to design a program, drawing raw data from unstructured information available in the national public procurement database and other sources. This data will be mainly used for cartel-detection but will also offer an integrated data analytics environment with various tools/apps, on the basis of bespoke programmes and /or available off the shelf software tools to visualise and analyse data. Finally, the recruitment process of a chief technology officer and his team of data-scientists will be completed in January 2022 and to this new role will be added that of a chief economist and a team of economic experts/advisors to be completed in February 2022.

Of particular interest for the further development of such techniques and tools is the adaptation of legal standards for initiating investigations and also the standards of evidence used in assessing such material, an area we will be investing on in the following months, by launching

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[88] For a presentation of the platform, see HCC, Computational Competition Law and Economics, Issues, Prospects – an Inception Report (January 2021), available at https://www.epant.gr/en/enimerosi/publications/research-publications/item/1414-computational-competition-law-and-economics-inception-report.html .

[89] Rosa M. Abrantes-Metz & Albert D. Metz. Can Machine Learning Aid in Cartel detection? CPI Antitrust Chronicle July 2018. P. 3.
https://www.competitionpolicyinternational.com/wp-content/uploads/2018/07/CPI-A-M-Metz.pdf

[90] R. Podszun, The More Technological Approach: Competition Law in the Digital Economy, in Surblytė G. (eds) Competition on the Internet. MPI Studies on Intellectual Property and Competition Law, vol 23. (2015, Springer), 101.

a major project regarding evidence from computational economics and data science in competition law enforcement, with a number of external partners.

With regard to the first issue, usually competition authorities act upon complaints or general market information that is provided to them either by market participants or through a systematic monitoring of different economic sectors, for instance by examining generalist or specialised press or through organised meetings with economic actors. However, the emergence of the Internet and the development of Big Data analytics provide competition authorities with multiple other sources of information that are publicly available or can be harvested through web-scraping tools. Scraping is a method for crawling *web* sites and automatically extracting structured data on it. The use of algorithms may greatly facilitate the data collection process, as well as data analysis. Such tools have already been used in competition law investigations. For instance, in the Google Search investigation, the European Commission explored in order to build the anticompetitive effect of Google's conduct data on the traffic to Google's own comparison shopping service and traffic to competing comparison shopping services and merchant platforms, its own compilation of data from the approximately 380 services identified by Google as competing with Google Shopping[91]. Furthermore, the use of data visualization, natural language processing and predictive analytics may enable the systematic monitoring of entire economic sectors in order to decipher various patterns that may raise red flags with regard to the presence of anticompetitive behaviour.

Particular applications include the use of Web-scraping enables in order to scale up evidence gathering, the use of geocoding that may enable competition authorities to analyse locations of competitors in merger analysis or develop mechanisms to facilitate e-discovery by using a machine learning models, such as TexRank, or by employing predictive coding tools, which use a subset of documents ("seed documents") in order to train computer algorithms to make predictions over the content of the other documents[92]. The software analyses documents and 'scores ' them for relevance to the issues in the case. The results of this categorisation exercise are then validated through a number of quality assurance exercises. These are based on statistical sampling—the sampling being fixed in advance depending on what confidence level and what margin of error are desired. This sampling is further reviewed (blind) by a human. The process of sampling is repeated as many times as required to bring the overturns to a level within agreed tolerances, and so as to achieve a stability pattern, each use of the predictive coding process being bespoke for that case. This technology saves time and reduces costs. Advanced network analysis may also facilitate the visualization and assessment of interactions between various economic players, as well as the analysis of large datasets of emails through specialized software, such as Tovek.

The development of such technologies may appear at first sight to blur the distinction between regulators and competition authorities, as they provide competition authorities the

[91] European Commission, Case AT.39740 *Google Search (Shopping),* paras 614-618.

[92] See, S. Hunt, Data, technology and analytics in competition enforcement: building a new professional capability and offering December 2019, available at PowerPoint Presentation (concorrencia.pt) .

possibilities to continuously map and monitor economic activity in various sectors of the economy and explore the feedback loops and other indirect effects that may be in operation between them. Hence, it becomes important to expand the mapping jurisdiction of competition authorities to also cover situations in which the authority does not act having launched a sector enquiry or a market investigation, lest a competition law enforcement case, but proceeds to establish continuous intelligence gathering about the operation of the economy. This power is now provided to the HCC by Article 14(2) of the new Greek Law on Competition, as voted by Greek Parliament on January 20th, 2022. There is now legal basis for the HCC to send RFIs to undertakings in order to gather data and complete its market mapping research programme. The tool will be used in order to prepare a bi-annual "State of Competition Report" that will be submitted to Parliament and will eventually guide not just the enforcement action of the authority but also more broadly in the regulatory and legislative process in this policy area.

With regard to the second issue, the use of such tools may require some adaptation to the legal standards put in place to limit the discretion of competition authorities to launch investigations and in particular initiate inspections. Similar constraints may be put to the use of predictive approaches on the basis of data analytics in view of the required standards of evidence. The rules of evidence have been framed with the view that most evidence will be factual. Yet, sources of evidence are diverse and might include contemporaneous documents, such as emails or statements by market participants (competitors, customers and consumers), but also more complex evidence. The probative value attached to a piece of evidence depends on the reliability of that evidence. For instance, complex evidence such as econometrics is assessed on the basis of some specific causal inferences (internal validity) made on the basis of some observations that are generalized, the last operation relating to the connection of these inferences to the real outside world (external validity), the main issue being if we can make a causal claim in competition law based on econometric evidence[93]. Similar concerns may be raised with regard to evidential inferences made on the basis of data science, although descriptive uses of data analysis may not be judged problematic from a law of evidence perspective. Indeed, in this context we may be closer to the dominant conception of causality in law, which refers to causal connections between events and involves a concrete instantiation of a causal law on the particular occasion, regarding the existence of a causal link between the specific event A and the specific event B, rather than the more "theoretical" and categorical approach of causation followed in econometrics, where the inferential direction runs from theory to data requiring the matching of the remaining conditions in the set against the applicable causal generalization. However, some predictive data analytics techniques, such as predictive coding, may face similar difficulties to those confronted by econometrics. Courts should therefore develop a more hospitable tradition to such type of evidential material. This has already been the case in some jurisdictions, which has already

[93] For a discussion see, I. Lianos & C. Genakos, Econometrics in EU Competition Law: an empirical and theoretical analysis, in I. Lianos, D. Geradin (Eds.), *Handbook in EU Competition Law – Enforcement and Procedure* (Edward Elgar, 2013), 1.

accepted the technology of predictive coding or technology assisted review of documents[94]. It is likely that the greater use of data analytics and computational techniques will lead to the development of specific case law regarding the standards of proof applied in this context and in particular the assessment of the criterion of reliability of evidence.

This computational turn also demands different strategies of engagement and new methodologies. brings it to the forefront of the economic enquiry simulation approaches that rely less on theory and more on conjectures and patterns that temporarily fit.

In simple economics, models are constructed for the purposes of prediction and are derived from a set of first principles, which often include assumptions as to the abilities and motives of the underlying agents with these being linked through mathematical reasoning and deduction with axioms, the latter being associated with the notion that "social systems tend toward equilibrium states".[95] In contrast, the computational models are used as mapping tools.[96] They provide the foundation for computational experiments and, thus, aim to generate only inductive proof. In these models, "abstractions maintain a close association with the real-world agents of interest" and "uncovering the implications of these abstractions requires a sequential set of computations involving these abstractions".[97] These computational models should enable the consideration of the complicated preference structures of both the population and its heterogeneity in order to account for their more elaborate set of choices. Of course, this raises interesting questions about causal claims with Big Data, which seem to rely on "variational induction" and eventually "the identification of phenomenological laws which may hold only locally in specific contexts", and how different this is with regard to causal claims that are built on the hypothetico-deductive model of economics, that is very much dependent on theoretical hypothesis, on the basis of deduction from certain generalised features of our experience and practices (premises) to infer that the world must be like to make the existence of these experiences and practices possible (conclusion), which will then be verified or disproved by empirical evidence[98]. In any case, the purpose of the inquiry should not only be to understand the empirical or actual phenomena, as they relate to events and state of affairs, but to grasp the functioning of the real economy, that is the structures, powers, mechanisms and tendencies that form the background conditions for such phenomena to be produced.

One of the tools that is often used to generate these computational models is 'agent-based modelling'. It attempts to depart from the abstraction of the underlying agents in a system by combining all agents into a single simplified and representative agent. It brings the role of networks as spaces of interaction to the fore and has important implications on the understanding of power relations within systems. Computational models may also allow for a greater heterogeneity of the

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[94] For instance, *in Pyrrho Investments,* which is not a competition law case, the UK High court accepted predictive coding as an acceptable technique to analyse document evidence: *Pyrrho Investments Ltd v MWB Property Ltd*, [2016] EWHC 256 (Ch).

[95] J. Miller and S. Page, *Complex Adaptive Systems* (Princeton University Press, 2007), 59.

[96] *Ibid*, 36.

[97] *Ibid*, 65.

[98] For an interesting discussion, see W. Pietsch, *Big Data* (CUP, 2021).

agents the interactions of whom will be modelled. For instance, it may allow for the developing of "an ecology of agent types, each relying on different behavioural governing mechanisms".[99] Although as mentioned above, computational models cannot completely dispense with the constitution of representative agents. This enables theorists to construct computation models from the bottom-up, with any abstraction being focussed "over the lower-level individual entities that make up the system".[100] The model also integrates learning and adaptation as a by-product of this direct interaction. As such, it incorporates frameworks for emergence with the model being flexible enough that "new unanticipated features" may naturally arise within the model.[101]

Agent-based modelling thus accounting for different attributes, such as the size, the business model, as well as the specific ownership structure and corporate governance of undertakings, and could also integrate a dynamic perspective, by designing these agents to be adaptive through learning. A similar modelling can be done for various sociological categories of individuals, such as "investors", "labour", "consumers", accounting for their income, education or wealth level, varying degrees of rationality, thus not relying on the average behaviour of individuals defined *in abstracto* but on the basis of their real attributes and those the theory/hypothesis to be tested considered important. The model may not focus on price-system intermediated interactions but also centre on or combine non-price ones. It may be possible to also develop a typology of realistic rule-sets to be applied to all or categories of agents, as well as different agent environments (taking into account the different spheres of competition – markets, ecosystems, sectors) that fully account for the complexity of these interactions and relationships (for example, competition, cooperation, co-opetition, ownership, control, influence) and open up to various behavioural frameworks that fit the research question asked (this will be different, for instance, if the research focuses on the impact on privacy, prices and output, quality, innovation, democracy, among other dimensions). The interactions to take into account may be financial flows, unique visitors metrics and time spent on a website, information exchange/data flows, the expression of emotions ("likes", "dislikes", "friends", "followers") in order to determine the "ties" between the various agents and the topography of the network.

Calibrating such models may take significant resources and naturally their degree of validity may depend on the way the model matches with the available data and on the initial conditions chosen to design the model. Although such tools also require significant sources of data, it is easier than it has ever before to gather in view of digitisation and the expansion of digital economy. The agent-based model will run on various simulations and other computations and will eventually provide important insights through the visualisation of the interactions between agents, and the predicted evolution and outcomes of such interactions in different virtual worlds. The economic process would thus be modelled as a dynamic system of interacting agents. The topology of such interactions between agents is complex as the scale of the system/environment the agent-based model aims to explain is driven by the specific social phenomenon of interest. The tool may

[99] J. Miller and S. Page, *Complex Adaptive Systems* (Princeton University Press, 2007), 101.
[100] *Ibid*, 66.
[101] *Ibid*, 69.

thus enable competition authorities to better capture emerging phenomena, and to improve their understanding of the broader social impact of the examined behaviour in the context of a specific jurisdiction, not only at a purely abstract level, but taking into account a more realistic depiction of the status and motives of the agents. One should also however note the limitations of such tools, in view of the important complexity of adaptive systems, and the evidential value of simulation methods in legal processes. However, the tool may be employed more safely for case selection and prioritization.

This approach contrasts with the top-down modelling of simple economics which "abstracts broadly over the entire behaviour of the system".[102] This computational modelling may seek to uncover a simple structure of interactions premised on the behaviour of artificial adaptive agents. Equally, it may seek to uncover a more complicated structure of interactions, which, in the case of computational modelling and the use of simulations, allows for the constitution of "artificial life" or artificial worlds. This latter type of structure would rely on a model of "adapting, communicating and multiple-game playing artificial agents".[103]

One may for instance consider reproducing the digital twin of a network or ecosystem to link the real and digital worlds and using AI to convert data into actionable insights. The first step would involve various sorts of data being harvested and then leveraging millions of examples of curated data to train deep-learning neural networks. The next step would involve neural networks being used to approximate parts of the computational model. This could potentially be used for evaluating the effectiveness of tailored treatments and for experimenting with various forms of intervention by using advanced simulation to develop more precise prognoses. These tools may enable a better and quicker filtering of the situations in which more elaborate competition law analysis is needed. They may also provide solid evidence upon counterfactuals for competition law investigations can be built.

With the recent recruitment of a chief technology officer and a team of data-scientists, as well as the development of research partnerships with a number of research teams in Greece and abroad, the HCC aims to invest heavily the following years in the systematic use of computational competition law and economics tools, to increasingly rely on agent-based modelling (at first for case generation and prioritization) and to produce the groundwork that could facilitate the transposition of such knowledge in its own competition assessment work, and eventually that of other competition authorities.

C. Experimentation and "responsive" competition law enforcement: the development of the competition law sandbox

One of the important challenges the HCC, as other NCAs, will be facing in the post-covid world consists in making decisions in the presence of increased uncertainty, in particular because of High Impact Low Probability (HILP) events (e.g. economic crisis, pandemics, environmental

[102] *Ibid.*
[103] *Ibid.*

disasters etc.). Competition authorities will thus need to rely on mapping and analytical tools that make more intensive use of various sources of evidence with the aim to assess inter-market spillovers and contagion effects.

The COVID-19 pandemic is probably the most significant HILP event, at least in the last few decades, which has led to a global demand and supply shock that affects financial, product and labour markets Competition authorities need to disentangle the various interdependencies between these markets and explain contagion on the basis of real channels of trade, at least regarding product markets and become more pro-active in their role in deterring anticompetitive activity and avoiding the establishment of bottlenecks that will harm the transition towards a "knowledge economy" and the "green deal".

In dealing with high impact-low probability events, business as usual is non-tenable and competition authorities need to take a more proactive role by providing guidance and enhancing legal certainty, so as to respond to the important uncertainty (and not just risk) that usually goes along with such events. This may require an institutional transformation of competition authorities that would need to adopt a more proactive approach (combining risk management and competition advocacy), rather than only focus on their traditional reactive approach in competition law enforcement.

This emerging proactive role for competition authorities in addition to their competition law enforcement work, may give rise to the use of new more flexible and programmatic legal tools than experiment with these new approaches and that would complete the traditional legal tools used by competition authorities, infringement decisions or bargaining approaches, such as commitment decisions or settlements. Of particular interest is the regulatory "sandbox" tool, originally used in the field of financial regulation in order to accommodate innovative projects[104]. The sandbox forms a supervised space for experimentation for the promotion of innovative business initiatives. It is an environment where undertakings from various industrial sectors, including pharmaceuticals and healthcare, can undertake initiatives that contribute significantly to the goals of sustainable development while not significantly impeding competition.

In July 2021, the HCC launched a public consultation for a "sustainability sandbox"[105] in order, for the industry to experiment with new business formats that aim to realize more quickly and efficiently sustainability goals, and which involve cooperation between competing undertakings or even more permanent changes in market structure in order to be accomplished.[106] This could be done under the condition of some form of time-constrained authorisation and a periodical targeted supervision of the HCC, specifically after balancing the possible

[104] See, https://www.fca.org.uk/firms/innovation/regulatory-sandbox .

[105] Hellenic Competition Commission, 'Sustainability Sandbox- Public Consultation: Proposal for the creation of a sandbox for sustainability and competition in the Greek Market' (July 2021) <https://www.epant.gr/en/enimerosi/sandbox.html>.

[106] There is experience with regulatory sandboxes in the financial industry field, in particular Fintech. See, Industry Sandbox, 'A Blueprint for an Industry-Led Virtual Sandbox for Financial Innovation Consultation Guide' (2016). The UK Financial Conduct Authority also recommended the establishment of sandboxes, with the support of 'Project Innovate', a Fintech industry-led virtual sandbox.

anticompetitive effects with the need to provide incentives for the sustainability investment, and following a process of public participation, as is the best practice for environmental infrastructure projects. In addition, even if such arrangements produce anticompetitive effects, the HCC will not proceed to impose any fines and sanctions if the arrangements form part of the 'sandbox', although it will proceed with other remedies.

In this context, the proposal's effects on both competition and sustainable development may be assessed by the HCC *ex ante* (even before the project gets implemented) in order to enhance legal certainty and reduce regulatory risk for investments in line with the broader public interest goal for sustainable development. An additional problem justifying such intervention by the HCC arises from the presence of imperfect financial markets in Greece, in particular following the decade-long economic crisis, which either do not provide the required investments in view of their narrowness or, due to regulatory risk, require additional guarantees. In this environment SMEs would have found it increasingly difficult to attract investment for the green transformation of their activities. Hence, the sustainable development competition law sandbox forms part of the HCC's efforts to enhance the dynamic efficiency of the economy and innovation, thus acting in accordance to the competition principle.

The constitution of the sandbox does not aim to avoid the application of competition rules in the market, nor can it be used for anti-competitive practices that simply contain some reference or a low contribution to sustainable development without overcoming the damage to competition caused (e.g. in the context of environmental sustainability these are called "green-washing" practices). On the contrary, it makes it possible to fully evaluate practices, which make a significant contribution to the public interest by enhancing sustainable development. Due to the innovative nature of the project for competition policy and competition enforcement, there is no direct comparison with other proposals/actions in other jurisdictions, in order to draw useful conclusions and take into account information. However, such a tool may offer additional avenues for monitoring business cooperation between undertakings on specific innovative projects or the development of mandatory collective industry standards with the aim to respond to sustainability challenges.

Conclusion

Reorienting competition law does not require, even for an academic turned practitioner, to design new ontologies that would better account for the social reality in transition. Ontology and the definition of new concepts, categories and the relation between the various properties of a system, remains of course an important venture to undertake, but policy-making and implementation in the field of competition law constitutes an exercise in pragmatism, in which practical solutions are selected in view of their "responsiveness" to the challenges faced but also after dialectic interaction with stakeholders, to the extent of course that all voices are heard and provided equal weight. The institutional steps that a National Competition Authority makes are tightly choreographed by the overall EU law framework and the limits set by the specific socio-

economic and political conditions that prevail in a jurisdiction as well as the institutional capabilities and human resources of the competition authority. However, some policy discretion always exists in order to experiment with new approaches. Policy variation will therefore emerge (e.g. the priority areas, the way the substantive competition rules will be implemented in the specific circumstances of each case and legal system or the technologies of enforcement that will be employed, to cite a few).

These differences set aside, the complexity of the challenges that competition law regimes are called to tackle in the current period make, in my view, a strong case in favour of the necessary reorientation of competition law. This effort is driven by the search for pragmatic solutions to the problems set by the complex institutional setting that is needed for the attainment of the goals of sustainable development, the need to adjust competition law enforcement to the complexity of the new economic structures of production, as well as the need to take advantage of the development of enforcement technologies that may increase its effectiveness and expand the remit of competition law.