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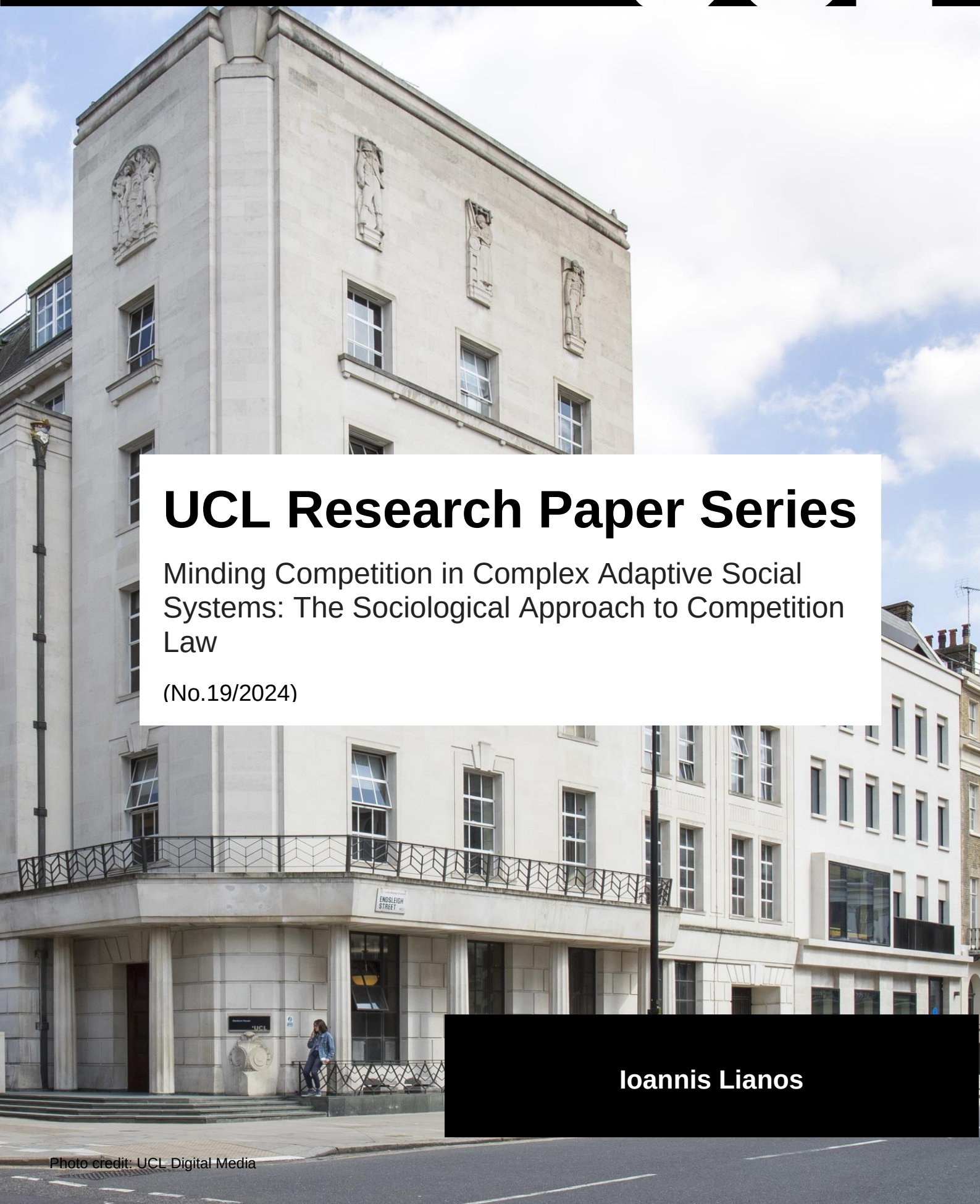

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Minding Competition in Complex Adaptive Social Systems: The Sociological Approach to Competition Law

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Minding Competition in Complex Adaptive Social Systems: The Sociological 'Approach' to Competition Law

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Abstract

Since the 1970s, the economic approach has transformed antitrust/competition law beyond recognition, developing a solid body of knowledge based on industrial organization and, more broadly, neoclassical economics. This framework relies on an asocial and abstract conception of markets, takes a narrow perspective on the meaning and assessment of competition, focuses on market power narrowly defined and measured, and carefully separates issues of economic efficiency from other broader policy objectives. This framework has been quite successful as it offers an overall approach that is theoretically appealing in its simplicity and empirically relevant. Economic approaches criticising equilibrium thinking and advancing a computational view of the economy have recently challenged the neoclassical economics consensus in competition law. Its significance in policy circles has also started to wane with the greater emphasis on Sustainable Development Goals (SDG) and the emergence of a polycentric competition law paradigm drawing on complexity science. However, no serious alternative systematic framework for a regulatory science of competition other than neoclassical economics has emerged, other than adjustments of the neoclassical paradigm to idiosyncratic situations and perceived policy 'anomalies.' Developing new approaches that mind competition in complex adaptive social systems becomes crucial. This study, for the first time in competition law and policy literature, explores the distinct contribution of sociology in developing a new regulatory science for competition law and policy, complementing and/or substituting the current neoclassical economics framework. By providing a selective yet holistic account of the different theories and approaches in economic sociology and organisational ecology regarding competition, the study sketches the contours of a distinct approach that could be relevant for both the theory and practice of competition law and which could evolve to a more inclusive of broader SDG concerns regulatory science of competition law, one that fits better complex adaptive social systems.

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I. Introduction

The current competition law framework has faced criticism for its inability to address the increasing economic concentration and inequality effectively, failure to consider the full social costs of structural exploitation in financialised surveillance capitalism, and its narrow focus on economic efficiency at the expense of sustainability[1]. This has prompted a reevaluation of the role of competition and broader calls to move away from the neoliberal neoclassical economics foundations of economic regulation since the 1990s[2]. The shift toward a 'more economic approach' in competition law in the late 1990s and early 2000s in Europe solidified the transformation of competition law in line with neoclassical price theory (NPT)[3].

However, this neoclassical economics consensus has recently been challenged, particularly as competition law aligns with Sustainable Development Goals (SDGs) and a new paradigm of 'polycentric competition law emerges[4]. Additionally, complexity economics and complex adaptive system approaches[5] have criticised equilibrium thinking and provided a new framework that acknowledges the economy's nonequilibrium nature emerging out of the actions of multiple players developing an 'ecology of strategies' or patterns of interactions[6]. These approaches focus on the meso-level, and acknowledge that a series of bubbles and crashes, 'clustered volatility' (with low activity periods followed by periods of high activity), and phenomena of 'sudden percolation' (where changes at one level of the system propagate at other levels) characterise the economy, thus requiring a more careful

[1] These calls are shared by many authors coming from different perspectives. For a selection, see O. Andriychuk, Between Microeconomics and Geopolitics: On the Reasonable Application of Competition Law, (2022) 85(3) Modern Law Review 598, A. Ezrachi, Sponge (2016) 5 (1) JAE 49; I. Lianos, Polycentric competition law (2018) 71 Current Legal Problems 161; A. Gebrandy, Rethinking Competition Law within the European Economic Constitution, (2019) 57(1) Journal of Common Market Studies 127; L.M. Khan, The End of Antitrust History Revisited, (2020) 133 Harvard Law Review 1655; T. Wu, *The Curse of Bigness: How Corporate Giants Came to Rule the World* (Columbia Global Reports, 2018); I. Lianos, Reorienting competition law, (2022) 10(1) *Journal of Antitrust Enforcement* 1; K. Stylianou & M. Iacovides, The goals of EU competition law: a comprehensive empirical investigation (2022) 42 Legal Studies 620.

[2] This framework relies on the learnings of neoclassical price theory and on the broad neoliberal agenda, competition law being considered as 'applied neoliberal policy': see, W. Davies, *The Limits of Neoliberalism – Authority, Sovereignty and the Logic of Competition* (Sage, 2014). 200.

[3] I. Lianos, *La transformation du droit de la concurrence par le recours á l'analyse économique* (Bruylant, 2007).

[4] I. Lianos, Polycentric Competition Law, (2018) 71(1) Current Legal Problems 161.

[5] For work on complex adaptive systems (CAS) see, among others, B. Arthur, S.N. Durlauf & D. Lane (eds.), The Economy as an Evolving Complex System II (CRC Press, 1997); J.H. Miller & S. Page, *Complex Adaptive Systems – An Introduction to Computational Models of Social Life* (Princeton Univ. Press, 2007); S. Lansing, Complex Adaptive Systems, (2003) 32 Annu. Rev. Anthropol. 183–204

[6] For a discussion see, W. B. Arthur, *Complexity and the Economy* (OUP, 2015), 7-12.

analysis of the propagation of changes and feedback loops[7]. However, no serious alternative 'regulatory science[8]' framework has yet emerged, other than adjustments of the neoclassical framework to idiosyncratic situations and policy 'anomalies'. Contributing to this critique of the neoclassical paradigm of competition law, this study explores the possibility of a more holistic framework drawing on economic sociology that would better embed, than the NPT approach, competition law into a Social Contract in which SDGs play an important role.

This effort stems from the belief that a positive program of change in competition law should engage with the increasingly more complex economy and society. The integration of Complex Adaptive System (CAS) thinking in economics, inspired by ecology and biology, provides powerful insights and an evolutionary approach that could be of great value in an economy marked by transformational technological innovations[9]. However, such approaches tend to overemphasise the autopoietic nature of the economy (the economy being perceived as a process unfolding on its own) or the role of technology in developing the economy. They advance that it is 'the collective of technology' that generates the economy and 'creates a structure within which decisions and activities and flows of goods and services take place'[10]. In other words, the economy 'emerges' and 'is an expression of its technologies'[11].

Such complex adaptive systems approaches do not engage with how institutions (formal or informal), including the legal system, may influence social change[12]. However, they accept that macro-patterns, and meso-patterns (higher-level structures, such as business ecosystems) may emerge from these micro-interactions between actors. The presence of institutions may lead to the development of punctuated equilibria emerging in certain circumstances and at a certain level of balance between the number and magnitude of agent interactions. The role of institutions in the context of technological innovation, and more broadly societal change, is also broadly recognised[13]. It becomes important to adjust the

[7] Ibid., 13-17.

[8] I am using here 'regulatory science' in the sense used by S. Jasanoff, *The Fifth Branch- Science Advisers as Policymakers* (Harvard Univ. Press, 1998).

[9] See, among others, P. Anderson, K.J. Arrow, D. Pines, *The Economy as an Evolving Complex System* (Addison-Wesley, Reading, MA, 1988); W.B. Arthur, S.N. Durlauf, D.A. Lane (eds.), *The Economy as an Evolving Complex System II* (Addison-Wesley, Reading, MA, 1997); L. Tesfatsion, Agent-based computational economics: modelling economies as complex adaptive systems, (2003) 149(4) Information Sciences 262.

[10] W.B. Arthur, *The Nature of Technology* (Penguin, 2009), 194.

[11] W. B. Arthur, *Complexity and the Economy* (OUP, 2015), 19.

[12] But see, E. Beinhocker, *The Origins of Wealth* (Harvard Business Reviews press, 2007), Ch. 12 & 368-379 (noting the importance of social technologies and culture).

[13] See, for instance, D. Acemoglu, D. Cantoni, S. Johnson, and J.A. Robinson, The Consequences of Radical Reform: The French Revolution, (2011) 101(7) *American Economic Review* 3286.

natural and techno-determinist bias in CAS thinking by integrating more institutions (formal and informal, market and nonmarket, technology-based or culture-based) in one's understanding of the economy. The economy is embedded in the social system and in the biophysical environment, which constrain and/or determine human ecology (social systems). One should therefore adopt a broader approach than CAS that engages with complex adaptive *social* systems (hereinafter CASS)[14] (see Figure 1). In this framework, importing the learnings of sociology (economic sociology and sociology of markets), among other disciplines, will be particularly important.

Turning to the subject of competition law, it becomes clear that in such complex adaptive social systems (CASS) one should opt for a more plural framework than that embodied by the neoclassical paradigm, particularly in terms of the goals, operational concepts and institutions of competition law[15]. This should also explore the idea that economic actors do not only interact indirectly via the intermediation of markets (which assumes that the agents make decisions in full autonomy from each other by maximising their objective functions in complete isolation); they also interact directly, through the establishment of close relations and eventually form (local) formal or informal institutions that *impact* economic exchange. Agents are situated/positioned to each other, as they struggle for survival or favourable positioning (relative success) in a complex environment (comprising different spheres of human interaction, such as the economy, politics, and culture).

According to this more holistic view, agents should be conceptualised as being (i.e., acting and reacting), at least as complex as their social environment'[16]. In contrast to the methodological individualism of neoclassical economics, sociological perspectives on competition law would incorporate some level of methodological holism. This involves focusing on meso (group)-level institutions and examining the influence of structural, cultural, and institutional embeddedness on group decision-making.[17].

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[14] We emphasize the word *social* here, as we also engage with the development and the important role of formal and informal institutions, and cultural norms in the development of such complex adaptive systems, something that is not, in our view, taken significantly into account by approaches focusing on CAS.

[15] See, I. Lianos, Competition Law for a Complex Economy, (2019) 50 *IIC* 643; I. Lianos, Competition Law for the Digital Era: A Complex Systems' Perspective (August 30, 2019), available at SSRN: https://ssrn.com/abstract=3492730 ; I. Lianos, Competition Law as a Form of Social Regulation, (2020) 65(1) The Antitrust Bulletin, 3-86; I. Lianos, Value extraction and institutions in digital capitalism: Towards a law and political economy synthesis for competition law, (2022) 1(4) European Law Open 852 (advancing a political economy synthesis in competition law); I. Lianos, *Polycentric Competition Law: a Competition Law for Complex Adaptive Social Systems* (forth. 2025).

[16] For a discussion, W. Elsner, T. Heinrich, H. Schwardt, *The Microeconomics of Complex Economies* (Elsevier, 2015), 258.

[17] G. Hodgson, Behind methodological individualism, (1986) 10(3) Cambridge Journal of Economics 211 (noting that 'the key element in the classic statements of methodological individualism is a refusal to examine the institutional or other forces which are involved in the moulding of individual

The examination of the potential influence of sociology on the development of competition law brings to light the dynamic interplay between sociological insights and economics. Traditionally, economics focused on the relationship between means and ends in social action, while sociology delved into the value aspect (the 'analytical factor view'). Nevertheless, both disciplines contribute to a comprehensive theory of social systems, with economics regarded as a sub-system alongside the polity, the integrative system, and the cultural-motivational subsystem. Initially, economic sociology concentrated on the social organisation of economic activities, exploring forms of organization beyond the price system traditionally studied by economics. However, the 'new economic sociology' movement challenged the traditional division of labour between economics and sociology and questioned the underlying assumptions of neoclassical price theory. This movement not only focused on economic organisations but also probed into core aspects of market structure such as production, pricing, distribution, and consumption, underscoring the necessity for a deeper understanding of the social fabric underpinning economic institutions, organisations, business groups, and the market mechanism as a whole. Others have argued that marketisation is viewed as a modality of economisation that may be subject to sociological analysis and critique: '(n)othing is inherently economics, but everything can become economic'[18].

Sociological analysis is founded on several key premises. Firstly, it recognises that economic action is a part of social action and should be examined using the tools and methodologies of general sociology. Secondly, economic action is socially situated, prompting the consideration of its embeddedness. Lastly, economic institutions, such as markets, network organisations, and firms, are products of social constructions and should be conceptualised as such, acknowledging that they may not always result from economically efficient processes of social interaction. This departure from the atomistic and under-socialized view of neoclassical price theory delves into the nature and structure of social interactions.

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preferences and purposes" and it is characterized by 'an extreme reluctance to give even partial explanations of individual behaviour in social or even psychological terms'). In contrast, methodological collectivism or holism is the view that 'meaningful social science knowledge is best or more appropriately derived through the study of group organizations, forces, processes and/or problems': W. Samuels, The scope of economics historically considered, (1972) 48(3) Land Economics 248, 249. On structural, cultural, and institutional embeddedness see, J.K. Hass, *Economic Sociology* (Routledge, 2nd ed., 2020), 12-17 (who defines the structural one as linkages to resources or people providing resources, the cultural one as how one conceived and understand legitimate, normal practices, and institutional one as 'the relations and motives of power that impinge on distribution of (material, economic) resources. He also coins the terms cognititive and political embeddedness, which we will explore in the last Section of this study).

[18] M. Callon, Revisiting marketization: from interface markets to market agencements, (2016) 19(1) Consumption Markets & Culture 17, 18, referring to F. Braudel, *La Dynamique du Capitalisme*. (Arthaud, 1985), 10.

It's crucial to contextualise this study within the broader landscape of sociological research contributions to the study of competition and competition law. It's worth noting that this study does not delve into the social theory contributions to the competition phenomenon within a neoliberal political framework at the macro level.[19], the role of the State in constructing competitive markets[20], nor does it delve into a theoretical analysis of the limits of neoliberalism, and the different understandings of the logic of competition that had prevailed in different periods[21]. At the meso-level, it does not engage with the emerging issue of the 'making of competition law', that is the construction of a distinct interdisciplinary cognitive identity that brings together the different 'professions' of competition law enforcement[22]. At the micro-level it does not examine the efforts made to provide micro-sociological foundations for competition law-related criminality, for instance by exploring the sociology of cartels[23], nor does it engage with the exciting work being done in the fields of feminist competition law[24], or on antitrust and race[25].

Finally, a word of caution: while the title of this contribution mentions 'the sociological approach' in competition law, there are multiple sociological perspectives and theories that may influence the field of competition law. The use of the term 'sociological approach' indicates the significant contrast we seek to draw between these sociological perspectives and the neoclassical economics approach in competition law. The study acknowledges the significance of economic sociology's contribution to the construction of the polycentric competition law paradigm along with other sources of wisdom, such as complexity science, law, and (global) political

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[19] See, for instance, M. Foucault, *The Birth of Biopolitics* (Palgrave, 2008). For a discussion, see N. Gane, Competition: A Critical History of a Concept, (2020) 37(2) Theory, Culture & Society 31; T. Ergen & S. Kohl, Rival views of economic competition, (2022) 20(3) Socio-Economic Review, 937.

[20] F. Dobbin & T.J. Dowd, The Market that Antitrust Built: Public Policy, private Coercion, and Railroad Acquisitions, 1825-1922, (2000) 65(2) American Sociological Review 631.

[21] W. Davies, *The Limits of Neoliberalism – Authority, Sovereignty and the Logic of Competition* (Sage, 2014); M. Fourcade & K. Healy, Moral Views of Market Society, (2007) 33 Annual Review of Sociology 285.

[22] I. Lianos, The Emergence of Forensic Economics in Competition Law: Foundations for a Sociological Analysis (September 1, 2012). CLES Working Paper No. 5/2012, Available at SSRN: https://ssrn.com/abstract=2197025 ; See also I. Lianos, *The Making of Competition Law* (forth. 2025).

[23] J.M. Polodny & F. Scott Morton, Social Status, Entry and Predation: the Case of British Shipping Cartels 1879-1929, (1999) 47(1) The Journal of Industrial Economics 41; C. Parker, The war on cartels and the social meaning of deterrence, (2013) 7(2) regulation & Governance 174; A. Stephan, Survey of Public Attitudes to price-Fixing and Cartel Enforcement in Britain, , (2008) 5(1) Competition Law Review 123.

[24] K. Cseres, Feminist Competition Law, this volume. See also the various projects on Competition Policy and Gender gender-inclusive-competition-policy-selected-proposals.pdf (oecd.org); OECD, Gender Inclusive Competition Toolkit (OECD, 2023), available at Gender Inclusive Competition Toolkit | OECD iLibrary (oecd-ilibrary.org) .

[25] B. Capers & G. Day, Race-ing Antitrust, (2023) 121 Mich. L. Rev. 523.

economy, legal institutionalism, and post-Keynesian institutionalism, behavioural sciences, feminist economics, (population) ecology[26]. We engage however with sociological analysis that could be relevant for a complexity-driven competition law, perceived as a complex adaptive social system (CASS) embedded in its institutional environment, but also co-evolving with it.

We structure our analysis in five sub-topics: (i) the meaning of competition from a sociological perspective, (ii) the linkage between this specific meaning of competition and the way sociological research has explored the market phenomenon, the market concept being of central importance as the topos of competition, (iii) the social structure of competition, exploring different approaches to model social interactions of competition, (iv) the ontology and metrics of power that play an important role in understanding more in-depth the social structure of economic interactions, and finally (v) the plurality of justification logics in operation for the actants in different spheres of social activity to reach a justifiable agreement on the common good. The final section will conclude.

II. Competition from a sociological point of view

We will first explore the foundations of sociological analysis of competition, before distinguishing it from the neoclassical economics' vision of competition.

A. Foundations for a sociological analysis of competition

Competition may result in both market decentralisation and bureaucratic centralisation. While the former is obvious, the latter is explained by the fact that competition among capitalist firms in the marketplace constitutes one of the principal causes of the bureaucratisation and organisational rationalisation of society[27]. Competitive interactions are not limited to the economy. As Bourdieu

[26] This is a distinct complexity agenda for competition law that I have put forward in recent years linked to the polycentric competition law paradigm. Inspired by legal institutionalism, economic sociology, human ecology (including urban sociology and ecosociology), and a political economy research agenda, it should be distinguished from the neo-liberal biopolitics of complexity. For a more recent and a narrower approach to competition law claiming a complexity perspective, drawing on the complex economics of the Santa Fe school: see N. Petit & T. Schrepel, Complexity-minded antitrust, (2023) 33 Journal of Evolutionary Economics 541. The complex economics of the Santa Fe school also criticise the neoclassical perspective, but seemingly from an internal (neoliberal) standpoint. For a rare Science and Technology Studies (STS) discussion of the links between the Santa Fe school and a Hayekian (in the libertarian sense) neo-liberal agenda, see F. Li Vigni. Hayek at the Santa Fe Institute: Origins, Models, and Organization of the Cradle of Complexity Sciences, (2022) 64(2) Centaurus, 443.

[27] M. Weber, Economy and Society- An Outline of interpretive sociology (1922) (1978 edition), 974 (noting 'the very large, modern capitalist enterprises are themselves unequalled models of strict bureaucratic organization').

points out, there are various independent 'fields of struggle' in politics, science, and the arts, each associated with different forms of 'capital' - be it social, cultural, economic, technological, or financial. In this introductory section, we will focus on the economic field, before exploring other fields in the final section of this study. It is worth noting, as Bourdieu acknowledges, the potential for different types of capital to be converted through strategies aimed at improving one's position in social space[28].

Competition plays a crucial role in Max Weber's analysis of the economic phenomenon of the market: competition on who will be the final seller or the final buyer (the struggle between competitors) is considered a prerequisite for the economic exchange itself to be realized (struggle over the exchange)[29]. Weber establishes a distinction between competition and exchange, a market existing whenever there is competition for opportunities to exchange among a plurality of economic actors. If competition does not exist, there is no market, or put differently a market is inconceivable without competition. In this view, the concept of competition denotes a peaceful struggle for a scarce good[30]. This approach appears close to the classical economics' perspective on competition, which focuses on rivalry for scarce resources[31], rather than the neoclassical price theory approach which conceives competition as cross-price substitutability of demand between (related) products in a (relevant) market[32].

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[28] P. Bourdieu, The Forms of Capital, in J. Richardson (ed.), *Handbook of Theory and Research for the Sociology of Education* (Greenwood, 1986), 241.

[29] M. Weber, *Economy and Society- An Outline of interpretive sociology* (1922) (1978 edition) 635-640 (noting that 'the goal of the whole endeavour is only achieved by the appearance of a value totally independent from the fight itself').

[30] Ibid., 636.

[31] This view of competition is according to G. Stigler that of Adam Smith: G. Stigler, Perfect Competition: historically contemplated, (1957) 65(1) The Journal of Political Economy 1, 1 (noting that competition takes the form of 'rivalry in a race').

[32] H. Demsetz, *Economic. Legal and Political Dimensions of Competition* (North Holland, 1982). The meaning of 'competition' in economics changed at some point during the nineteenth century. One may compare its conceptualization by classical economists, in particular Adam Smith, as a process of rivalry and the approach later followed by the mathematical economists of the neoclassical paradigm, in particular Augustin Cournot, who focused instead on an outcome/ situation. See, for instance, P. J McNulty, A Note on the History of Perfect Competition (1967) 75(4) J Political Economy 395, 398. Competition between substitutes usually defines the market arena, the economic theory of markets and competition being intrinsically linked to exchange and relying on the conceptual framework of cross-price elasticity of demand: G Stigler, *The Theory of Competitive Price* (Macmillan, 1942; revised ed, *The Theory of Price*), 92. Some economists however attempted to escape this reductionist perspective on markets by either focusing on a distinct conceptually social organization, the industry (see, for instance, J Robinson, The Industry and the Market (1956) 66(262) Economic J 360, 361) or by developing a theory that would attempt to address heterogeneity and reputational (brands) or personal links between the seller and the buyer, although without explicitly considering these factors in the market model of monopolistic competition they put forward (see, for instance, E Chamberlin, Product Heterogeneity and Public Policy (1950) 40 American Economic Rev (Papers & Proceedings) 85, 86– 87,

George Simmel's work is of particular interest here as it moves away from the idea of competition for scarce goods and introduces instead an approach emphasising the relation between the competitors and an audience (whose favour or attention may eventually be imagined as scarce)[33].

First, Simmel provides an insightful opposition between competition and conflict, a conflict involving a *direct* confrontation between two actors, without the presence of a third party to be 'won' by the contestants, while competition forms an 'indirect form of fighting' which implies 'parallel efforts of both parties focused on the one identical prize to be gained in the fight', this being 'not in the hands of one of the two adversaries'[34]. For Simmel, competition is conceived as a struggle for the favour of a third party in which one fights with the opponent 'without turning against him—without touching him, so to speak'[35]. This brings him to recognise that competition has a profound socialisation function and henceforth constitutes a principle of social organisation, rather than just a market form[36]. He argues that such efforts benefit the community, as competition, 'due to its unique combination of elements, usually results in added value, provided other types of conflict do not become intermingled with it'[37].

Second, for Simmel, competition not only concerns the competing actors, but also a third actor who benefits from it (*tertius gaudens*)[38]. To the extent that

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noting that ' "industry" or "commodity" boundaries are a snare and a delusion— in the highest degree arbitrarily drawn, and wherever drawn, establishing at once wholly false implications both as to competition of substitutes within their limits, which supposedly stops at their borders, and as to the possibility of ruling on the presence or absence of oligopolistic forces by the simple device of counting the number of producers included').

[33] As explained by Werron, 'with this model, the challenge is to show how the favor of third parties is constructed and distributed in social practice': T. Werron, On public forms of competition, (2014) 14(1) Cultural Studies ↔ Critical Methodologies 62, 64.

[34] G. Simmel, Sociology of Competition, (2008) 33(4) The Canadian Journal of Sociology / Cahiers canadiens de sociologie, 957, 958 (translation of 1903. *Neue Deutsche Rundschau* XIV: 1009–1023).

[35] G. Simmel, Sociology of Competition, 959 (1010-1011 in the original).

[36] N. Gane, Competition: A Critical History of a Concept, op. cit., 39-41 (arguing that for Simmel, '(c)ompetition is a social good [...] an animating force that promotes socialization and integration by forging new relationships and "connections" between competitors and the "third parties who are the subjects of their attention"). For a discussion of a similar point made about markets as mechanisms of socialization in economics and competition as a social cooperation process (in particular drawing on Adam Smith's work). See, A. Hirschman, Albert, Rival Interpretations of Market Society: Civilizing, Destructive, or Feeble? (1982) 20 Journal of Economic Literature 1463; P. Seabright, *The Company of Strangers: A Natural History of Economic Life* (Princeton Univ. press, 2010).

[37] G. Simmel, Sociology of Competition, op.cit., 960.

[38] Ibid., 961 (noting '(s)ince the goal of competition between parties in society is nearly always to attain the approval of one or many third persons, each of the two competing parties makes every effort to approach these third persons very closely'). This third person may be different in each competition tournament (Ibid., 962 'fighting one of one's fellow men to win over a third — against whom, incidentally, in another context one might well compete in order to win over the previous competitor'). In commercial relations this third party is the consumer (ibid., 971).

competitors put on display their rivalry to conquer/convince an audience (the third actor), the values in question become objectified as they escape from the inevitable subjectivism of a dyadic relationship, the audience playing an important role in the outcome of the contest[39]. In this conception, competition has the 'synthetic' power[40] to create a 'connex of minds between the competitors and third parties[41]. Simmel makes the comparison to 'a web of thousands of sociological threads brought about through concentrating the awareness on the wishes, feelings, and thoughts of fellow humans, through the sellers' adaptation to the buyers, through artfully multiplied opportunities to make connections and gain approval' [42]. This is not the only form of competition, as he recognises as another form that in which each competitor strives toward the finish line without devoting any energy to his adversary, her effort being 'maximized in the direction of utmost performance merely by the mutual awareness of the opponent's performance'[43].

Simmel describes different strategies of conflict in a triad (three-member group), other than the third who benefits (*tertius gaudens*). The latter is conceived as the essence of the concept of competition, to the extent that the buyer benefits from the disunion that prevails between sellers, competition being geared by the consumer. Simmel also adds the strategy of the third who mediates between the competing nodes and thus who joins (*tertius iungens*), or the strategy of the third who adopts a strategy of divide and *impera*, creating conflict to gain a dominating position[44].

In Simmel's thought rivalry should be distinguished from competition. While in situations of (religious) rivalry each 'is rewarded according to his works as they measure up to the transcendental norms', competition, on the other hand, 'actually rewards each according to the performance of the other person, according to the ratio of their respective worth[45]'. Competition is also opposed to other means to promote the common good, such as planning, Simmel questions 'whether satisfying a need, creating a value, shall be entrusted to competition between individual energies or to the rational organization of such energies, to antagonism or to cooperation among them'[46]. In contrast to corporatism, competition is characterised by the *principle of chance* which may result in that 'the principle of equality of each

[39] See also, A. Preda, Rivalry as a social relationship: conceptualizing the micro-foundations of competition, (2023) 24(1) Journal of Social Theory 87, 89.
[40] G. Simmel, Sociology of Competition, op.cit., 962 (1011-1012)
[41] T. Werron, On public forms of competition, (2014) 14(1) Cultural Studies ↔ Critical Methodologies 62, 64.
[42] G. Simmel, Sociology of Competition, op.cit., 957, 962.
[43] Ibid., 959.
[44] See the translated in English excrepts from G. Simmel, Treatise on the Triad (1908) in B. Nooteboom, Fragment, (2006) 2(3) Journal of Institutional Economics 365.
[45] . Simmel, Sociology of Competition, op.cit., 966.
[46] Ibid., 968.

member with regard to another is constantly shifted higher or lower', while other instances of rivalries that have an intrinsically relational dimension, such as guilds, were driven by the *principle of 'equal profit'* which keeps the guilds from allowing competition in production[47]. For him, guilds can also be distinguished from cartels, as in the latter 'companies are organized no longer for fighting for a share of the market, but rather for supplying the market according to a joint plan'[48] (a distinction that will not fare well from a competition perspective and which may not be well thought-through).

Finally, although Simmel acknowledges that the tools of competition may be restricted by legal and moral limitations[49], he also observes that punishing a victorious competitor for any damage incurred (collaterally) by its rival (even for negligence) is not logically consistent; this, not only for technical legal reasons but also for utilitarian ones, as 'society does not want to do without the advantages that competition between individuals entails for it, which by far exceed the disadvantages it incurs by the occasional annihilation of individuals in the course of competition'[50]. Simmel analyses the laws of unfair/disloyal competition prohibiting fraudulent behaviour adopted at the time in France and Germany to protect competitors, and explains that such legislation 'eliminate(s) from competition that which, from a social perspective, is not competition", the latter being 'a form of struggle fought by means of objective performances, to the advantage of third persons', while unfair competition acts such as unethical methods of advertising, 'are modes of behaviour without any objective profit, which by contrast signal a type of fight that is carried out directly, purely selfishly, and via no route capable of producing positive results for society'[51]. Punishing such behaviour protects the competitor but, as Simmel also notes, 'in fact one would have to do so, in order to stop the competing energies from

[47] Ibid., 970.

[48] Ibid. 972 (noting 'be-cause the guilds allowed individuals to maintain their independence, the principle of equality demanded that the level of performance be lowered to the point at which even the weakest guild member was able to com-pete; this is inevitably the means by which independent members of an association devoted to mechanical equality can arrive at their goal. However, in the case of cartels, the initial point of departure is not the position of the subjects concerned, but rather the objective utility for the company. The restriction of the means of competition is increasingly geared toward that utility, first removing those means that do not serve competition, and now even removing the remaining conditions for com-peting, since achieving complete control of the market results in making the consumer dependent and, as a consequence, in making competition as such superfluous').

[49] Ibid., 972 (noting that '(t)he law usually denies competing persons only those means which are also outlawed in all other interactions among humans: violence and wilful destruction, fraud and slander, threat and counterfeiting. Other than that, competition is the type of fighting whose forms and consequences are far less subject to legal interdictions than is the case with other types of fighting').

[50] Ibid., 973 (noting in particular that 'society condones it because such damage occurs via the detour of objective performances, valuable for an indefinite number of individuals').

[51] Ibid., 975.

becoming diverted, and keep them instead tied to the social and utilitarian form of competition'[52]. This may hint at the existence of some links between the prevention of unfair competition acts and the protection of free competition. Laws which protect competitors are designed to ensure that the fighting remains indirect (competition) and does not descend into more confrontational interactions from which no third party is likely to benefit.

We turn now to a juxtaposition of the sociological view of competition to that proffered by neoclassical economics.

B. Neoclassical v. sociological concepts of competition

In neoclassical price theory (NPT), a supplier competes for demand not only with suppliers of identical products but also with suppliers of products to which its customers might turn if it were to raise its price. This conception of competition results from the integration of a 'dynamic' perspective of the market and builds on NPT "devices", such as simulation and other econometric techniques (the SSNIP or hypothetical monopoly test) to 'imagine' the market that would have emerged out of the strategic interaction of existing market players[53]. An entity competes with suppliers who might start to supply the same or substitute goods if it were to raise its price to make an 'efficient' entry. US economist Jo Bain famously coined the concept, by defining the market boundaries as relating to the group of products that are not only 'identical or perfect substitutes' to each other, but also alternatively 'close substitute products', close substitutability therefore becoming the general criterion for inclusion in the relevant market[54]. A relation of competition (between products) is mainly measured by reference to cross-price elasticity of demand[55]. However, US economist Fritz Machlup also added the cross-price elasticity of the supply as an additional dimension for determining market boundaries[56].

Both demand and supply substitutability focus on the competitive constraints a firm faces in *pricing* its products. This assumes a single, unidimensional axis of competition whereby all parameters of competition are commensurable with the

[52] Ibid., 976.

[53] Communication from the Commission – Commission Notice on the definition of the relevant market for the purposes of Union competition law, [2024] OJ C 1645, para. 29 ('The theoretical criterion often used to determine whether the candidate market constitutes a relevant product market is whether a hypothetical monopolist in the candidate market could exercise market power. This question can be assessed by asking whether a hypothetical monopolist in the candidate market would find it profitable to implement a small but significant non-transitory increase in price (the 'SSNIP test').

[54] JS Bain, *Price Theory* (1952), 24– 25

[55] Following on this Cournot's suggestion that price uniformity within a particular product or geographic area signifies the existence of a market: see A. Cournot, *Research into the Mathematical Principles of the Theory of Wealth* (Macmillan, 1897), 51.

[56] F Machlup, *The Economics of Sellers' Competition* (Johns Hopkins University Press, 1952), 213– 4.

price system. The level of competition is explained by the 'stylized' opposition between the structural extremes of perfect competition and monopoly, from which the presence or absence of competition is presumed, although NPT also recognises a distinct category of intermediary structural situations ('imperfect competition' or 'monopolistic competition'), for which the presence or absence of competition may not be easily inferred. For these intermediary structural situations, which in essence describe the quasi-totality of real market configurations, the price/demand framework cannot always easily account for the gaps in the chain of substitute products that demarcate competitive boundaries.

An NPT approach presumably focuses on consumer welfare, familiar in all introductory microeconomic textbooks, from which one may conclude that the *tertius gaudens* is limited to the consumers of the relevant market. However, in reality, consumers of the relevant market come as an afterthought, to the extent that the market is defined taking into account the indirect interdependencies between the economic actors (operating as dyads) through the price vector, (e.g. the SSNIP or price correlation tests). Consumers (or other stakeholders – *tertius gaudens*) that do not form part of the specific relevant market (as defined previously by the operation of the price vector), are excluded from consideration, even if they may benefit (or not) from the competitive interactions in question.

A distinct characteristic of the neoclassical theory approach to competition is the emphasis put on transactions, and the opposition between markets and organisations driven by authority, in which competition is ultimately suppressed by hierarchy. Coase showed that the price mechanism is not the only way of coordinating the economic system, through a series of exchange transactions on a market, but that the firm, in which the coordinating function is the entrepreneur, constitutes an alternative method of coordination[57]. The choice between integrating an economic activity in the hierarchy (firm) or leaving it to the decentralised market depends on a trade-off between the costs of using the market mechanism (transaction costs) and the costs of carrying out the same transaction within the firm (the costs of organisation). The theory has been developed further by Oliver Williamson, who contrasted hierarchies and markets, as different methods of organising production, the choice between these being made according to the 'discrete alignment principle'[58], as 'agents operating in a competitive environment will adopt the mode of organisation that fits better with the *attributes of the transactions at stake'*[59]. Competition here is seen as a prerequisite for efficient (read

[57] R Coase, 'The Nature of the Firm' (1937) 4 *Economica* 387.

[58] O Williamson, *Markets and Hierarchies: Analysis and Antitrust Implications* (Free Press, 1st edn, 1975); O Williamson, *The Mechanisms of Governance* (OUP, 1st edn, 1996).

[59] O Williamson, 'Comparative Economic Organization: The Analysis of Discrete Structural Alternatives' (1991) 36 *Administrative Science Q* 269, 277 (emphasis added).

natural) organizational choice resulting from the consideration of the nature of the transactions and transaction costs.

In contrast, as discussed in the previous section, a sociological perspective views competitive interactions as a type of *social process* to the extent that these interactions are repeated and involve agents that are bound together in a system of mutual influence (and dependence), seeking the approval of a third beneficiary/*tertius gaudens*. Where sociological theories take the repeated nature of market interactions for granted, neoclassical approaches de-personify economic agents and mostly see interactions as a one-shot game. As such, the latter misses the notion that informal institutions can be created between players of the game when allowed to interact repeatedly (and the folk theorem according to which any Nash equilibrium is achievable in a repeated game with the same players is often invoked to account for this oversight)[60].

Competition is thus perceived as a form that such an interaction may take, among other forms of interaction, such as cooperation or conflict. In contrast to cooperation, which is a process involving an organised effort between individuals towards a common end, and thus involves some form of social contract, competition is an 'interaction without a social contact', to the extent that it is impersonal. Indeed, competitive rivalry is not directed against any individual or group in particular; it is unconscious (not deliberate) and observes certain rules (the rules of the game), leading eventually, if it is a continuous interaction, to the emergence of a pattern if not an equilibrium[61]. Competition should also be distinguished from conflict, as in the latter case one individual or group deliberately antagonises another (so a conscious action against someone in particular), doesn't observe the rules of the game, and often the relation lacks continuity, and thus is dissociative to the extent that it generates disequilibrium. The rules of the game emerge out of repeated social interactions and consequent broader cognitive, cultural, and political understandings that may evolve in the emergence of rules-setting formal or informal institutions.

Different sociological theories of competition have been put forward by the literature each time with a specific emphasis on the type of competition/ tournament taking place in the specific 'field' (the structure of actual and potential relations). What comes out of this literature is that competition is a social construction which may operate in different perspectives[62]: (i) at a more basic descriptive level, it may

[60] I am thanful to Todd Davies for this comment.

[61] M.T. Hannan & J. Freeman, *Organizational Ecology* (Harvard Univ. press, 1989), 103 ('Competition, unlike conflict, is difficult to observe directly because it is often indirect').

[62] Being a social construction, competition can be thought or designed differently according to the broader political economy of the specific polity (e.g. competition in capitalist societies takes a different dimension in competing versions of capitalism or even in non-capitalist economies), or even social conventions (or principles of justification).

relate to the presence of specific market actions, such as price-cutting, innovation, increased organisational effort and efficiency; (ii) it may indicate 'a particular structural constellation of actors in relation to a resource' and related to a position an actor has in network/status or brokerage position; (iii) it may result if one takes an actor-based perspective from 'the collective framing and sensemaking of a situation as competitive [...] competition [being'] the construction [in a cognitive community] of a relationship among actors that centres on something scarce and desired'[63]. This third constructivist actor-based approach may also explain why considering that a relation is characterised by competition would legitimate distributional outcomes that would be otherwise considered unjust in other forms of relationships (e.g. We might more easily accept an S1 allocation of resources as 'fair' or 'just' if it is the byproduct of a competitive process if we assume that the latter is a procedurally fair way of making such decisions).

The institutional basis for competition becomes particularly important in this context[64]. These views have also in common that they dissociate the concept of competition from the price vector, and focus on the interactions between actors, either looking to the different types of conduct adopted and the aims pursued by them, the positioning of the actors vis-à-vis other actors in the field, and if one takes the constructivist perspective, the existence of a cognitive community, formed by institutions or industry norms, that 'makes sense' of the relationship between different actors as being competitive, irrespective of any discussion on prices.

Having broadly defined the contours of the sociological approach to competition, and what distinguishes it from the NPT approach, we turn next to the discussion of the place, or more generally the topos, on which takes place this competitive tournament and is managed by competition law, the market.

III. The *topos* of competition: Markets as social arenas

The market is usually conceived as the topos (location) of competition in economic exchange. This is not just the meeting point of supply and demand, even if this has always been the reality of "marketplaces", but constitutes an analytically distinct

[63] S. Arora-Jonsson, N. Brunsson, R. Hasse, Where Does Competition Come From? The role of organization, (2020) 1 Organization Theory 1, 2 and 7 (advancing the share-sensemaking approach and providing as an illustration the idea that larger firms tend not to identify smaller firms as competitors, while the opposite may be true for smaller firms). The last perspective on competition accepts that 'competition is always about the future' and may be contrasted with the NPT cross-elasticities based approach to competition which is backwards-looking as it relies on past or existing pricing and purchasing behaviour. See also, D Sands, G Cattani, J Porac, and J Greenberg, Competition as Sense Making, in S. Arora- Jonsson, N. Brunsson, R. Hasse, and K. Lagerström (eds.) *Competition: What It Is and Why It Happens*, (Oxford University Press, 2021), 26-47.

[64] Ibid., 18.

concept[65], and a social construction to the extent that it emerges out of the social interactions between agents, and the meaning they ascribe to these. Understanding the embeddedness of markets becomes a key feature for the sociological approach to markets and explains its focus on institutions and arrangements/ 'socio-technical agencements'[66], facilitating, qualifying, but also *constructing* (providing meaning to) economic exchange.

A. Foundations for a sociological analysis of markets

The sociological perspective breaks with the neoclassical imagery of a market, perceived as the intersection of supply and demand curves under specific assumptions 'in a price-quantity trade-off'. Neoclassical economics analyses markets as a *topos* where interactions occur between perfectly informed agents deciding their market behaviour in full autonomy and isolation, the only dependence between them being *indirect*, in the sense of being dependent only on the sums of the quantity decisions of all suppliers and demanders in the specific market as this is expressed by the vector of price (partial market equilibrium). In this understanding, the cross effects between these different 'clearing prices and the quantity effects in these different partial markets' lead to 'simultaneous equilibrium in all partial

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[65] P. Aspers & A. Darr, The social infrastructure of online marketplaces: Trade, work and the interplay of decided and emergent orders, (2022) 73(4) British Journal of Sociology 822 (noting that even 'both markets and marketplaces facilitate trade [...] a key difference between a marketplace and a market is that markets can, but do not have to be organized. Historically, markets grew out of marketplaces and were characterized by the lack of a physical point of reference [...]. By the term "marketplace" we mean an organized place, whether physical [...] or virtual [...] for trade'. The author notes the existence of a 'social infrastructure' element in marketplaces, that is often partially organized from above, although they do not exclude the presence of 'grassroots elements of social infrastructure' for markets).

[66] On the concept of "market agencement", see *inter alia* M. Callon, *Markets in the Making – Rethinking Competition, Goods and Innovation* (Zone Books, 2021). K. Calıskan & M. Callon, Economization, part 2: a research programme for the study of markets, (2010) 39(1) Economy and Society 1, 3. Markets are defined as socio-technical arrangements that have the following characteristics:

> '1. Markets organize the conception, production and circulation of goods, as well as the voluntary transfer of some sorts of property rights attached to them. These transfers involve a monetary compensation which seals the goods' attachment to their new owners.
> 2. A market is an arrangement of heterogeneous constituents that deploys the following: rules and conventions; technical devices; metrological systems; logistical infrastructures; texts, discourses and narratives (e.g. on the pros and cons of competition); technical and scientific knowledge (including social scientific methods), as well as the competencies and skills embodied in living beings.
> 3. Markets delimit and construct a space of confrontation and power struggles. Multiple contradictory definitions and valuations of goods as well as agents oppose one another in markets until the terms of the transaction are peacefully determined by pricing mechanisms'.

markets' (the general equilibrium)[67]. This conception of market relies on the assumption of perfect competition, which is that 'the number of agents is always so large that no one's decision has any realizable impact on the decision parameters of anyone else so that agents can ignore its other and pretend they are isolated maximizers'[68]. These agents of NPT, consumers and producers, are representative, in the sense that their utility function (for the consumers) and profit function (for the suppliers) are the same for each *class* of agents, each agent being 'representative' of its class and perceived, at least in-class, as identical in terms of preferences – knowing one individual is knowing them all (the representative individual)[69].

A sociological perspective on markets begins with a 'different image' of the market[70]. Markets are conceptualised as 'social arenas where firms, their suppliers, customers, workers and governments interact', and 'the connectedness of social actors affects their behavior'[71]. A sociological analysis of markets underscores the direct interdependence among agents, who are part of a profession, industry, or a network of interacting individuals forming the social environment. As the social environment becomes more intricate, agents do not merely seek to maximise a one-dimensional objective function for efficiency; instead, they strive to survive in the short term and enhance their relative position in the long term within the population. This involves interacting on a range of parameters and objective functions to adapt to their social environment.[72]. Direct interdependencies give rise to non-linearity, hence traditional neoclassical economic models lose their predictive power.

Social theories of markets often find their foundation in relational data and engagement with the social networks formed. They imply studying different theoretical concepts than the dominant microeconomic discourse and price theory, such as 'power, resource dependence, co-optation, information, and trust to explain the social structures that emerge from their analyses'[73]. Social relations become crucial to the functioning of markets and market actors. But markets (or hierarchies) are not the only organisational structures in play. Economic/industrial 'sectors' may

[67] W. Elsner, T. Heinrich, H. Schwardt, *The Microeconomics of Complex Economies* (Elsevier, 2015), 252.
[68] Ibid., 253.
[69] AP Kirman, Whom or What Does the Representative Individual Represent?, (1992) 6(2) Journal of Economic Perspectives 117.
[70] J.M. Podolny, Status Signals – A Sociological Study of Market Competition (Princeton Univ. Press, 2008), 249.
[71] N. Fligstein & L. Dauter, The Sociology of Markets, (2007) 33 Annual Review of Sociology 6.1.-6.24, 6.3.
[72] W. Elsner, T. Heinrich, H. Schwardt, The Microeconomics of Complex Economies (Elsevier, 2015), 258.
[73] N. Fligstein & L. Dauter, The Sociology of Markets, (2007) 33 Annual Review of Sociology 6.1.-6.24, 6.3.

result from a socially constructed environment[74], by market and government actors or other actants that frame 'organizational fields' in which the various actors/actants interact, observe each other, and position their organisations vis-à-vis another[75]. Sociologists recognise that market exchange relies on a 'whole backdrop of social arrangements'[76].

Two key concepts emerge out of this work presenting a more 'embedded[77]' perspective on markets.

First, networks operate as concepts of the meso economy[78]. They have been conceptualised as new spatial forms of coordination, cooperation, or more generally interaction that either emerge out of spontaneous arm's length market actions or as deliberate conscious forms of dense relationships that are future-oriented and eventually enable some form of collective action. Furthering the focus on networks of social relations to unveil new nodes with a strategic character in a stabilised engineering-like structure, Bruno Latour's conception of networks is more fluid and does not only focus on the social relations of individual *human* actors, in terms of their frequency, distribution, homogeneity, proximity, but also extends "the word actor -or actant- to non-human, non-individual entities" (the Actor-Network Theory or ANT approach)[79].

The second concept is that of the "field". For Bourdieu, practice results from the relation between one's dispositions (habitus) and one's position in a field (capital) within the current state of play of that social arena (field) E.g. Practice = (habitus) (capital) + field. Each social field of practice can be understood as a competitive game or a field of struggles in which social agents strategically interact to improve their positioning (in the control of different forms of capital). Habitus consists of a structure comprising a system of dispositions that generate perceptions. It denotes a relation of knowledge or cognitive construction that contributes to the construction

[74] W.R. Scott & J. Meyer, The Organization of Societal Sectors , in J. Meyer and W.R. Scott (eds.) Organizational Environments: Ritual and Rationality (Sage, 1983), 129-153.

[75] P.J. DiMaggio, W.W. Powel, The iron cage revisited: institutional isomorphism and collective rationality in organizational fields, (1983) 48 American Sociological Review 147-160.

[76] N. Fligstein & L. Dauter, The Sociology of Markets, (2007) 33 Annual Review of Sociology 6.1.-6.24, 6.3.

[77] M. Granovetter, Economic Action and Social Structure: The Problem of Embeddedness, (1985) 91(3) American Journal of Sociology. 481-510.

[78] M. Davern, Social Networks and Economic Sociology: A Proposed Research Agenda for a More Complete Social Science, (1997) 56(3) The American Journal of Economics and Sociology 287.

[79] B. Latour, On actor-network theory. A few clarifications plus more than a few complications, Soziale Welt, 47. Jahrg., H. 4 (1996), pp. 369-381, 372 ("[...] ('A network in mathematics or in engineering is something that is traced or inscribed by some other entity -the mathematician, the engineer. An actor-network is an entity that does the tracing and the inscribing. It is an ontological definition and not a piece of inert matter in the hands of others, especially of human planners or designers').

of the field[80]. The social field consists of positions occupied by social agents, but also of the cognitive frames and the institutional environment established, the rules of the game providing stability to the field. Indeed, fields not only shape how people act but also establish a community of institutions and actors, a 'structured social context' that generates rules for competition/cooperation and offers possibilities for their contestation/change[81]. At stake in the field is the accumulation of capital. According to Bourdieu, this can take four forms: economic (e.g. money, assets), cultural (e.g. knowledge), social (e.g. networks, affiliation), and symbolic (e.g. credentials). Research using field theory attempts to map out the objective structures of relations between the positions occupied by the social agents or institutions competing for the legitimate forms of specific authority, but also to analyse the habitus of social agents, the different systems of dispositions (what we know to do and what we are inclined to do) these have acquired by internalising a determinate type of social and economic conditions (e.g. race, gender, social class, economic activity or profession).

In conclusion, it is possible to conceive the social arena of competition as a specific field on which different 'actants' (in the ANT tradition), human (entrepreneurs, workers, consumers, finance people, regulators) and non-human (companies, technologies such as AI) develop strategies and/or act. Each of these groups detains a position in the field that is in part determined by their habitus. Each of them competes with another for the acquisition of symbolic, economic, and social capital. Yet, despite their different dispositions and strategies, these actors should be conceived as being entangled in a mutual process of influence that contributes to the ongoing co-construction of the field of competition.

Different research strategies emerged from this effort to escape from the asocial vision of competition by neoclassical economists. Fligstein and Dauter[82] note the presence of three 'theory groups' that engage with a sociological analysis of markets. The first group comprises sociologists working on networks, these being defined in slightly different ways[83], the second group focuses on institutions, formal and informal, that are necessary for markets to function[84], the third group takes a more

[80] P. Bourdieu & L. Wacquant, *An Invitation to Reflexive Sociology*, vol. 1 (Polity Press: Cambridge,1992), pp. 127.
[81] J.K. Hass, *Economic Sociology*, op. cit., 20-21.
[82] N. Fligstein & L. Dauter, The Sociology of Markets, (2007) 33 Annual Review of Sociology 6.1.-6.24, 6.3.
[83] See, for instance, R.S. Burt, *Structural Holes: The Social Structure of Competition* (Harvard Univ. Press, 1992); M. Granovetter, M, The strength of weak ties, (1973) 78(6) American journal of sociology, 1360-1380; M. Granovetter, The impact of social structure on economic outcomes (2005) 19 Journal of Economic Perspectives 33-50; H.C. White, Where do Markets Come From?, (1981) 87(3) American Journal of Sociology 517.
[84] See, for instance, N. Fligstein, *The Architecture of Markets: An Economic Sociology of Twenty-First-Century Capitalist Societies* (Princeton Univ. press, 2001); W.W. Powel & P. DiMaggio, *The Institutionalism in Organizational Analysis* (Univ. Chicago Press, 1991). One may also refer to work in

critical perspective and emphasises the role of cultural understanding and scientific disciplines in providing market actors calculative capabilities that enable them not only to interact with each other but also to *realise* markets, that is to enact ideas about how economic activity does or should operate (the performative tradition[85]). We will explore separately their contribution to the understanding of markets.

B. Markets as Networks

In his seminal work on embeddedness, Marc Granovetter argued that 'the usual neoclassical accounts provide an 'undersocialized' or atomised-actor explanation of economic activity and do not integrate the fact that economic action is 'embedded' in structures of social relations, in particular in modern industrial societies[86]. The concept of embeddedness, first put forward by Polanyi[87] (in a political economy framework) and later developed by Granovetter[88] in the context of the 'New Economic Sociology', serves as a middle-of-the-road sociological framework in which different forms of social action, including competition, may be analysed: it

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population ecology that has emerged as a useful paradigm in the study of organizations by sociologists, and consequently of their adaptation and/or selection: M. T. Hannan & J. Freeman, Structural Inertia and Organizational Change, (1984) 49(2) American Sociological Review 149; R.C. Young, Is Population Ecology a Useful Paradigm for the Study of Organizations?, (1988) 94(1) American Journal of Sociology 1; N. Fligstein & L. Dauter, The Sociology of Markets, (2007) 33 Annual Review of Sociology 6.1.-6.24, 6.3.

[85] M. Callon, The embeddedness of economic markets in economics, in M. Callon (ed.) *The Laws of the Markets* (Blacwell, 1998); M. Callon & F. Muniesa, Economic markets as calculative collective devices, (2005) 26 Organization Studies 1229-1250.

[86] M. Granovetter, Economic Action and Social Structure: The Problem of Embeddedness, (1985) 91(3) American Journal of Sociology. 481-510.

[87] K. Polanyi, *The Great Transformation – The Political and Economic Origins of Our Time*. (2nd ed., Beacon Press, 2000, first published in 1944), 77 ('Instead of economy being embedded in social relations, social relations are embedded in the economic system'); K. Polanyi, Aristotle Discovers the Economy, *in* Karl Polanyi, Conrad Arensberg & Harry Pearson (eds.), *Trade and Market in the Early Empires* (Henry Regnery, 1957), 64, 67-68 ('The conceptual tool with which to tackle this transition from namelessness to a separate existence [of the economy] we submit, is the distinction between the embedded and the disembedded condition of the economy in relation to society. The disembedded economy of the nineteenth century stood apart from the rest of society, more especially from the political and governmental system. In a market economy the production and distribution of material goods in principle is carried on through a self-regulating system of price-making markets. It is governed by laws of its own, the so-called laws of supply and demand, and motivated by fear of hunger and hope of gain. Not blood-tie, legal compulsion, religious obligation, fealty or magic creates the sociological situations which make individuals partake in economic life but specifically economic institutions such as private enterprise and the wage system'*)*.

[88] M. Granovetter, Economic Action and Social Structure: The Problem of Embeddedness, (1985) 91(3) *The American Journal of Sociology*,481. Granovetter challenged Polanyi's opposition between the disembedded economy of the 19th century and the past embedded economy, arguing that both were embedded in the social structure of the time. He also advanced the view that all economic actions are embedded in networks of social relations. R. Swedberg, Richard, New Economic Sociology: What Has Been Accomplished, What Is Ahead?, (1997) 40 Acta Sociologica, 161.

avoids both the abstract, undersocialised view of atomistic markets in neoclassical economics and an oversocialised view that would perceive the agency of actors are completely dependent on social norms and structures[89]. Embeddedness relies on different mechanisms: Social, cultural, and historical considerations but also mental constructs (norms of trust and power) that explain economic action and the emergence of institutions[90]. Social embeddedness in economic exchange advances the view that the market is a socially constructed institution evolving over time and geographical space. Embeddedness may be relational in the context of a dyadic relation or structural in the context of a network[91].

Zurkin and DiMaggio explain the crisis of confidence in neoclassical economics and the development of a different agenda in which economic institutions are 'thoroughly integrated with social relations'[92]. They also view embeddedness broadly as referring to the contingent nature of economic action concerning cognition, culture ('the role of shared collective understandings in shaping economic strategies and goals'), political institutions (e.g. inequalities of power) and social structure ('the contextualisation of economic exchange in patterns of ongoing interpersonal relations')[93].

Other work focuses on the structural embeddedness of transactions and finds that transactions within embedded relationships result in higher performance of the governance structure[94]. Structural embeddedness may emerge, first, from social relations of trust as opposed to simple arm's length market ties, and second, from the systematic fine-grained information transfers that are more detailed and broader than the information provided by price data in arm's length market ties[95]. These 'embedded' ties may 'assemble into extended networks. The level of embeddedness in a network increases with the density of the embedded ties[96]. A network of embedded ties shapes not only expectations of efficiency but also of 'fairness and

[89] Embeddedness is also absent from the new institutional economics perspectives on markets, which by focusing on transaction costs in the context of a dyadic relation between two economic units, do not consider the social structure of the dyad, and assume away issues of distribution of resources, the social bonds between sellers and buyers, relations of dependence etc.

[90] M. Granovetter, The Impact of Social Structure on Economic Outcomes, (2015) 19(1) The Journal of Economic Perspectives 33-50; M. Granovetter, *Society and Economy: Framework and Principles* (Harvard Univ. Press, 2017).

[91] P. Moran, Structural vs. Relational Embeddedness: Social Capital and Managerial Performance, (2005) 26(12) Strategic Management Journal 1129.

[92] S. Zurkin & P. DiMaggio, Introduction in S. Zurkin & P. DiMaggio (eds.), *Structures of Capital – The Social Organization of the Economy* (CUP, 1990), 1, 14.

[93] Ibid., 15-23.

[94] B. Uzzi, Social Structure and Competition in Interfirm Networks: The Paradox of Embeddedness, (1997) 42(1) Administrative Science Quarterly 35.

[95] B. Uzzi, Social Structure and Competition in Interfirm Networks: The Paradox of Embeddedness, (1997) 42(1) Administrative Science Quarterly 35, 43-46.

[96] Ibid., 48.

aspiration levels, such that actors search "deeply" for solutions within a relationship rather than "widely" for solutions across relationships'[97]. This generates positive effects on risk-taking and investment, particularly as 'networks ties link actors in multiple ways (e.g. business partners, friends, agents, mentors), providing a means by which resources from one relationship can be engaged for another'[98].

In conclusion, this research refocuses the analysis from the qualities of a transaction to the qualities of the social relationship between the actors entering into transactions. This inverts the logic of transaction cost economics. It also brings to the fore the issue of 'how markets function and competitive dynamics unfold when organisations compete based on their ability to access and reconfigure an *external pool of resources and partners* rather than firm-based competences'[99], which is the kind of dynamic capabilities we observe in business ecosystems[100].

Noting that 'most economic analyses [...] do not study the market, they assume it[101]', and recognising that 'most real organizational firms fall between the ideal types of market and hierarchy and mix the two', sociological research in this tradition also explores the organization-market interface, in particular how market ties or connections between economic players and the density of connections between actors may explain differences in performance[102]. All types of economic exchange, market and non-market, are thus, viewed from a social network perspective[103], and are, in theory, analysable using network analytic techniques[104]. These networks result from the deliberate management of the relationship *interfaces* between the various actors. These manipulate the number and intensity of market ties 'to reduce dependence and exploit power in interorganiational relations' but also to reduce uncertainty and to increase efficiency[105]. The positioning of market actors derives

[97] Ibid., 50.
[98] Ibid., 52.
[99] Ibid., 64 (emphasis added).
[100] M. G Jacobides & I. Lianos, Ecosystems and competition law in theory and practice, (2021) 30(5) Industrial and Corporate Change, 1199.
[101] W.E. Baker, *Markets as Networks:A Multi method Study of Trading Networks in a Securities Market* (PhD thesis, 1981), 3.
[102] See, W.E. Baker, *Markets as Networks: A Multi method Study of Trading Networks in a Securities Market* (PhD thesis, 1981); W.E. Baker, The Social Structure of a National Securities Market, (1984) 89(4) American Journal of Sociology 775; W.E. Baker, Market networks and Corporate Behavior, (1990) 96(3) American Journal of Sociology 589.
[103] According to Baker (1981), 14, 'a social network [is] a specific set of linkages among a defined set of persons, with the additional property that the characteristics of these linkages as a whole may be used to interpret the social behaviour of the persons involved'.
[104] W.E. Baker, *Markets as Networks: A Multi method Study of Trading Networks in a Securities Market* (PhD thesis, 1981), 6.
[105] W.E. Baker, Market networks and Corporate Behavior, op.cit., 618

from the (observed) patterns of their interaction in a network. This enables the use of sociometrics analysis and social exchange theory[106].

Baker distinguishes between positional and relational approaches in social networks. The first focuses on the study of the position of an actor in a social structure, and emphasizes patterns of relationships, searching for actors that have similar patterns to others (structurally equivalent actors). It may thus establish the network of influence in the community and locate those of the actors that hold leadership positions. The second examines the extent of cohesive bonds (patterns of actual links/interconnectivity) between nodes (actors) in a network (e.g. director interlocks)[107], and in essence explores the existence of cliques (subgroups of actors that form clusters of densely interconnected nodes)[108]. Research on companies' interdependence in business markets or on production networks (e.g. enduring relationships, repeated interactions) has confirmed that interactions in networks may take an identity of their own, which is different from the simple addition of the individual characteristics of the network members, thus putting forward a more holistic view of markets as networks[109].

C. Markets as fields

Fields theory offers, in our view, a more elaborate theory of markets in sociological research, as it integrates networks of social interactions *and* institutions developing common cognitive understandings. We will focus here on Fligstein's concept of field, rather than that of Bourdieu, to the extent that the former integrates more a collective action element as it does not only examine action by individuals but also by groups that may not just aim to stability, but also to social change; these do not only face competition from other groups but also the additional complication of maintaining their cohesion[110].

Moving beyond simple structural embeddedness, Fligstein analyses markets as a form of 'structured exchange[111]' or a 'strategic action field', that is 'a constructed mesolevel social order in which actors (who can be individual or collective) are atuned to and interact with one another based on shared (which is not to say consensual) understandings about the purposes of the field, relationships to others

[106] W.E. Baker (1981), 45- 48.
[107] For a concrete example, see W.E. Baker, Market networks and Corporate Behavior, op.cit.
[108] W.E. Baker (1981), Chapter 2.
[109] See, M. Sytch, R. Gulati, Markets as Networks. In: Augier, M., Teece, D.J. (eds) *The Palgrave Encyclopedia of Strategic Management* (Palgrave Macmillan, 2018), 1010.
[110] N. Fligstein & D. McAdam, Towards a General Theory of Strategic Action Fields, (2011) 29(1) Sociological Theory 1, 20-21.
[111] N. Fligstein, *The Architecture of Markets: An Economic Sociology of Twenty-First Century Capitalist Societies* (Princeton Univ. press, 2001), 68.

in the field (including who has power and why), and the rules governing legitimate action in the field'[112]. A stable field is one 'in which the main actors are able to reproduce themselves and the field over a fairly long period of time'[113]. For a field to emerge there should be shared understandings among its actors, on what is really going on and what is at stake, a generalised sense of how the positions of actors relate to that of others in the field (the governance of the field bearing the imprint of its most powerful incumbents), a shared understanding of the rules of the game and the existence of a 'broad interpretive frame that individual and collective strategic actors bring to make sense of what others within the strategic action field are doing'[114].

Taking a 'political-cultural approach' that aims to unify micro- and macro-market phenomena and does not limit itself to the positioning of the actors in the context of a network of ties with other actors, this perspective recognises that '(f)ields contain collective actors who try to produce a system of domination in that space' and therefore cognitive elements will define social relationships helping the actors to realise their position within the set of a social relationship[115]. In this view, 'the dominant and dominated coexist under a set of understandings about what makes one set of organizations dominant'[116]. Indeed, in the words of Fligstein, '(m)arkets produce local cultures that define who is an incumbent and who is a challenger and why (i.e., they define the social structure) [...] (t)hey prescribe how competition will work in a given market' [and] 'also provide actors with cognitive frames to interpret the actions of other organizations', what he calls 'conceptions of control'[117]. There are different conceptions of control, such as the effort to make one's product an industry-standard in high-technology markets, moving into existing markets through mergers or a financial conception of control, cooperate with competitors to share markets or co-opt their rivals by forming joint product-alliances or pursuing non-pricing forms of competition, or forming relations through networks to principal suppliers, customers or competitors[118]. Firms aim to control their field to survive[119]. As Fligstein notes,

> '(f)irms try to find ways to control the worst aspects of competition in order to continue to exist. Much of the market-making project is to find ways to stabilize and routinize competition. Much of the history of the largest corporations can be read as attempts to stabilize markets for these firms in the face of ruinous

[112] N. Fligstein & D. McAdam, *A Theory of Fields* (Oxford Univ, press, 2012), 9.
[113] Ibid.
[114] Ibid., 10-11.
[115] N. Fligstein, *The Architecture of Markets: An Economic Sociology of Twenty-First Century Capitalist Societies* (Princeton Univ. press, 2001), 15.
[116] Ibid., 68.
[117] Ibid., 18.
[118] Ibid., 72-73.
[119] On the concept of control, and its empirical dimension, see N. Fligstein, *The Transformation of Corporate Control* (Harvard Univ. Press, 1990).

competition and economic downturn. Firms can avoid direct competition by pursuing different market segments (i.e., high or low quality) and by diversifying product lines into related products. They can also use social relations, that is networks, to co-opt suppliers and competitors and attain legitimacy with governments and the financial sector'[120].

One may conclude from this that the competitive game is multidimensional and does not confine itself in the context of a specific market, defined in terms of cross-price substitutability. It also includes strategies of producing rules, the 'social conditions of economic exchange' to stabilize the interactions of the firm with its suppliers, clients, workers, and principal competitors, these being formal or informal[121]. This may for instance occur through the constitution of private business ecosystems, in which central actors (the orchestrators) will define rules that would be implemented by the members of the ecosystem, and will provide stability as to the demand, to the extent that interactions within the ecosystem members, often through the intermediary of a digital platform that also operates as the orchestrator of the ecosystem, will be linked to the specific ecosystem's social infrastructure, thus avoiding situations of Knightian uncertainty[122]. A different way to understand this craving for stable outcomes vis-à-vis situations of uncertainty is to view stability as a form of organisational survival, which is the real focus of competition, rather than the pursuit of efficiency in the sense of optimal allocation of resources in a market[123].

Field theory also aims to include all relevant actors to the field who are 'vying for whatever is centrally at stake in the field' and are thus interested in an outcome. This includes the 'extensive social organization' needed for markets to emerge, including technology, the social relations between the firms and their relations to government[124]. More than a social network, which focuses on the ties that link the different economic actors or set of positions in the network, the field presents 'a mesolevel set of social relationships[125]' that does not only focus on stratification (and domination), the habitus and resources of an *individual actor* (including competition

[120] N. Fligstein, *The Architetcure of Markets: An Economic Sociology of Twenty-First Century Capitalist Societies*, 5.
[121] Ibid., 11.
[122] Knightian uncertainty refers to the "unknowable unknowns", the risks 'not susceptible to measurement' and for which odds may be determined based on previous experience. See F. Knight, *Risk, Uncertainty and Profit* (Houghton Mifflin, 1921).
[123] Ibid. According to Fligstein, four threats menace the survival of firms as economic organizations: 'suppliers can control inputs, raise prices, and make firms who require their inputs unprofitable, [...] competitor can engage in price competition, take over market share, and eventually drive the firm out of business, [...] gaining cooperation from managers and workers in the firm presents problems of interpersonal conflict and politics that can jeopardize the ability to produce goods and services' [...] 'products may become obsolete': ibid., 17.
[124] Ibid., 4.
[125] N. Fligstein & D. McAdam, *A Theory of Fields,* op.cit., 217.

for resources), as Bourdieu would understand the concept of field[126], but also accepts that actors are social creatures and from that realization results a *collective experience* as forming part of a group that is particularly important in order to understand how order is established and maintained within that group and in particular how actors may seek cooperation with other actors[127].

The development of common cognitive structures is also visible in the third group mentioned above focusing on performativity, which goes even further as it accepts that the cognitive framework may not just influence but also shape the reality of markets and (beliefs) on their performance.

D. Market Devices and Performativity

Research focusing on market institutions explores the way 'prices are culturally constructed within relations of power in socially and politically embedded markets' and argues that 'instead of focusing narrowly on price-setting, policy-makers and researchers should attend to the conditions of price realization', prices being realized 'in multiple forms, each form having gone through a complex, yet identifiable process'[128] Price realization is not the same as price-setting. In his insightful research on the realization of world prices in the cotton commodity, Çalişkan explores the importance of 'prosthetic prices', which, in contrast to the linear relation of causality between the abstractions of supply and demand, as imagined by neoclassical price theory (and Alfred Marshall's dominant representation of the market), depend on and result from 'a set of technical devices and artificial equipment, which is almost never described in economic theory'[129]. Prosthetic prices are produced by a diverse universe of collective human and non-human agents, helping the realization of the actual price of the cotton commodity in global markets with a combination of spot prices, options, and futures. This underscores the social construction of the concept of demand which does not always relate to the price of a specific quantity and variety of cotton in the context of an actual spot market, but increasingly so, accounts for 'right to own cotton at a future date', cotton becoming a commodity in the context of

[126] P. Bourdieu & L.J.D. Wacquant, *An Invitation to Reflexive Sociology* (Univ. Chicago press, 1992).
[127] N. Fligstein & D. McAdam, *A Theory of Fields* (Oxford Univ, press, 2012), 25.
[128] K. Çalişkan, *Market Threads – How Cotton Farmers and Traders Create a Global Commodity* (Princeton University Press, 2010), 22-23; See also in the same vein, P. Di Maggio & H. Louch, Socially Embedded Consumer Transactions: For What kind of Purchases Do People Most Often Use Networks?, (1998) 63 American Sociological Review 619; B. Uzzi & R. Lancaster, Embeddednesss and Price Formation in the Corporate Law Market, (2004) 69 American Sociological Review 26; O. Velthuis, *Talking Prices* (Princeton University Press, 2005), 10 (noting that prices emerge from the 'established rules of the game' to which producers obey).
[129] K. ÇalIşkan, *Market Threads – How Cotton Farmers and Traders Create a Global Commodity* (Princeton University Press, 2010), 23.

futures markets[130]. With such hedging and other risk management techniques, firms are trading money for future reductions in risk (i.e. commensurating the monetary and temporal axes of competition) these forming strategies to 'stabilise and routinise competition'[131].

In futures markets, parties agree to buy or sell an agreed quantity of an asset (commodity) at a future date for a pre-determined price. This allows them to trade expectations on supply and demand patterns and to trade the commodity without owning it. These sophisticated markets offer risk transfer hedging against potential changes in inventory levels over a period, allowing market players to adjust their positions in the spot market to the futures market. They also provide an avenue for speculation, with certain economic agents (speculators) making monetary gains by predicting the future value of the commodity.[132]. Speculators make profits by trading not commodities but risk. As Çallşkan notes, 'futures markets serve as bridges between different moments of price realization', the future price being 'the basis for making a price real': it is a prosthetic price to the extent that it 'enables market actors to negotiate once it is used during trading on the ground': helping them as a prosthetic limb to realise the actual price of the commodity[133]. As the market does not trade on reality but on perceptions, the research question becomes if 'factors determining how we perceive markets have an actual effect' on global market prices[134].

This brings attention to the role market reports, rumours spread by the news, or indexes, play to the extent that 'the quest for price in global markets is an engagement with the future, not with the past'[135]. We may refer here to the concept of futurity or 'going concerns' coined by John Commons to emphasise the role in economics of expectations of future earnings[136]. International indexes realised in a pricing routine, based on quotations 'regarded and edited individually and brought together by arithmetical framing' play an important role in this process of price realisation and produce a "map of relations of exchange that occur within the field of power relations'[137]. Often, this process of realising an index is located in specific geographic locations around the globe with particular significance as to the history of dominant trade flows during the time of the colonial empires or the development of the industry

[130] Ibid., 27.
[131] N. Fligstein, *The Architetcure of Markets: An Economic Sociology of Twenty-First Century Capitalist Societies* (Princeton Univ. press, 2001), 5.
[132] K. Çallşkan, *Market Threads – How Cotton Farmers and Traders Create a Global Commodity*, op.cit., 28-29.
[133] Ibid., 33.
[134] Ibid., 34.
[135] Ibid., 43.
[136] J.R. Commons, *Institutional Economics* (Routledge, 1990), 259; .R. Commons, *The Foundations of Capitalism* (2012, first ub. 1924), Ch. V .
[137] K. Çallşkan, *Market Threads – How Cotton Farmers and Traders Create a Global Commodity*, op.cit., 46.

and does not necessarily represent the actual topography of trade. However, the fact that public authorities in hegemonic states, regard them as references and thus capable of presenting the world price of the commodity provides them credence and universality[138].

It is possible to move even further from the importance of the reality of exchange influenced by a series of exogenous factors resulting from "diverse interacting dynamics", to that of perceptions, in commodity options trading, which relies on assumptions about the functioning of markets but also scientific input in the form of a formula (in this context the Black-Scholes formula) which is a partial differential equation devised to understand and represent random walk in physics but has since made its way in the economics of bond and commodity markets[139]. One of the formula's assumptions is profoundly normative: that markets, from which the options markets are derived, are perfect 'in the sense that the prices they produce represent the free interaction of the forces of supply and demand, without any interference from factors other than these two forces during the exchange', market equilibrium being the equilibrium of these forces balancing themselves on price[140]. These assumptions help determine, not how the market actually works, but how it *should* work, reducing by the same a complex social process to a simplistic model of the reality of synthetic (to the extent they are not *natural)* prices.

It is essential for competition law to delve into the social dynamics behind price determination, in order to comprehend the power dynamics that influence pricing. Three key aspects are worth noting. Firstly, understanding the role of indices and other market mechanisms in shaping prices is crucial. In the case of commodity prices like fuels, competition authorities must grasp how the selection of specific indices, such as Argus or Platts, by market participants, can impact price levels and trends. Therefore, it's vital to reveal how pricing systems are established and selected by industry players, often at the industry's inception.[141]. Second, to the extent that in a financialized economy it is the combined effect of spot markets, forward markets and futures markets that enables the process of price formation in international commodities markets, the ratio of benchmark futures contracts volumes over

[138] Ibid., 48.

[139] The formula focuses on eliminating risks associated with the volatility of markets and takes into account a number of variables such as volatility of returns of the underlying asset, cumulative distribution function of the standard normal distribution, the type of option, spot price of the underlying asset, strike price, time to maturity and risk free rate. One of the assumptions of the formula is that stock prices follow a lognormal distribution based on the principle that asset prices cannot take a negative value, that stocks do not pay any dividends or returns, that the option can be exercised on its expiration or maturity date, that there are no transaction costs, the volatility of the market is constant over time and that there is no arbitrage so profit is not risk-free.

[140] Ibid., 53.

[141] See as an example the interesting work of V. Yakubovich, M. Granovetter & P. McGuire, Electric Charges: The Social Construction of Rate Systems, (2005) 34 Theory and Society 579.

equivalent physical production exchanged in spot markets may eventually have impact on the process of price formation. The exact level of this ratio is an empirical exercise that may produce different results in each market, but it may for some commodities exceed 10%[142]. If this level is important, it may raise questions, and this is the third point, as to the role in the process of price formation for international commodities of speculators, such as commodity index traders[143]. We need approaches to price formation that explicitly account for the presence of these intermediaries, and in particular index traders as passive investors in commodity futures markets, and explore their role and (market) power, individually or jointly[144]. Recent research suggests that while the prevailing assumption is that the futures price of a commodity only follows the spot price, a more nuanced approach should be considered. An updated view of competition law should investigate the interplay between the spot and futures markets, as these markets attract different groups of participants and can have mutual feedback effects.[145]. This is particularly important for global commodity oligopolies, such as global seed or grains trade, fuels refineries etc, with some of the major firms operating as spot market players but also as non-bank financial institutions investing in the futures and derivatives markets[146], and

[142] I. Goldstein & L. Yang, Commodity Financialization and Information Transmission, (2022) 77(5) The Journal of Finance 2613.

[143] As noted in UNCTAD, Trade Development Report 2023, p. 77 "(u)nder certain conditions, excessive speculation can become an independent driver of those price fluctuations". The report further adds (p. 91) "profiteering is not limited to a specific sector but is specific to individual firms. There are concerns that excess profits may be linked to market concentration, benefiting only a few global players in the commodity trading community. This reinforces the need to consider group membership and the evolving behaviour of major international players in the sector". The Asset Dominance Ration aims "to capture financial (as opposed to "real") economic activity carried out inside a corporate structure".

[144] Note for instance I. Lianos, A. Velias, D. Katalevsky & G. Ovchinnikov (2020) Financialization of the food value chain, common ownership and competition law, (2020) 16(1) European Competition Journal, 149.

[145] See, for instance, H.B. Ameur, Z. Ftiti, & W. Louhichi, Revisiting the relationship between spot and futures markets: evidence from commodity markets and NARDL framework, (2022) 313 Annals of Operations Research , 171–189 (showing a "bidirectional relationship between both markets over the short and long run, with a greater lead for the futures market" and confirming the future market's dominant contribution to price discovery in commodities).

[146] The process of financialization englobes situations in which not just regulated financial institutions but also situations in which non-financial firms have an increasingly important financial activity. See, More generally, see G Epstein, *Financialization and the World Economy* (Edward Elgar 2005); R Shiller, *The New Financial Order. Risk in the 21st Century* (Princeton University Press 2003); J Montgomerie and K Williams, 'Financialised Capitalism: After the Crisis and Beyond Neoliberalism' (2009) 13 Competition and Change 99; E Engelen, 'The Case for Financialization' (2008) 12 Compet Chang 111; N van der Zwan, 'Making Sense of Financialization' (2014) 12(1) Socio-Economic Review 99. For the large grain companies see, S. Murphy, D. Burch and J. Clapp, Cereal Secrets. The world's largest grain traders and global agriculture. (Oxfam Research Reports, 2012).

which seemingly may try to take advantage of periods of market volatility to corporate profiteer through the use of financial instruments[147].

Research on performativity emphasizes the role of market devices and market agencements that, in addition to human interactions, may shape market behaviour and performance[148]. Research on market devices is based on Bruno Latour's Actor Network Theory (ANT)[149], but also more broadly forms part of the 'pragmatic turn' in the study of markets and economic activity exploring the emergence of "multiple regimes of worth or multiple conventions of valuation" and the 'performative capacities of economic knowledge'[150]. As Callon notes, performativity 'consists in maintaining that economics, in the broad sense of the term, performs, shapes and formats the economy, rather than observing how it functions'[151]. It follows that '(the) economy is embedded not in society but in economics', to the extent that the economy is *realised* or configured by codified economic knowledge[152]. Markets are understood as framed by economic theories. Agents follow these economic theories when they *perform* the economy[153]. Market devices such as the Black-Scholes mathematical formula used to analyse option markets, are influential and play a role in shaping markets through a historically contingent and debatable process of economisation[154]. The notion of an institution is therefore flexible and emerges from a social exchange or construction that establishes a path-dependent valuation network, allowing goods to be economically comparable and exchangeable within a market. As the process of economisation reshapes existing social structures and reconstitutes the market(s) and society, it is crucial to identify the rhetorical and

[147] See, for instance, UNCTAD, Trade Development Report 2023, p. 77 ('there is ample evidence that banks, asset managers, hedge funds and other financial institutions continue to profit from the most recent bout of commodity market volatility [...] Second, by actively managing risk, commodity trading firms have assumed many financing, insurance and investment functions typically associated with the activity of banks. In this context, very large international trading firms, or ABCD-type companies [the grain oligopolies] have come to occupy a privileged position in terms of setting prices, accessing funding, and participating directly in the financial markets. This not only enables speculative trades in organized market platforms, but a growing volume of transactions between individuals, or over-the-counter trades, over which most governments in the advanced countries have no authority or control". UNCTAD's report also draws attention to the "relationship between companies' profits and price volatility'). See also, A. Ivanov & M. Orlof, The Global Grain Trade, in I. Lianos, A. Ivanov, D. Davis (eds.), *Global Food Value Chains and Competition Law* (CUP, 2022), 590.

[148] D. McKenzie, F. Muniesa & L. Siu, Introduction, in D. McKenzie, F. Muniesa & L. Siu (eds.) *Do Economists Make Markets?- On the Performativity of Economics* (Princeton Univ. Press, 2007), 1, 4-6.

[149] B. Latour, *Re-Assembling the Social – An Introduction to Actor Network Theory* (Oxford University press, 2005).

[150] F. Muniesa, Y. Millo, M. Callon, An introduction to market devices, in M. Callon, Y. Millo and F. Muniesa (eds.) *Market Devices* (Blackwell, 2007), 1.

[151] M. Callon, *The Laws of the Market* (Blackwell, 1998), 2.

[152] Ibid., 30.

[153] Ibid.

[154] Ibid., 2. See also, D. MacKenzie, *An Engine. Not a Camera: How Financial Models Shape Markets* (MIT Press, 2006).

performative tools through which powerful entities can influence institutional and technological frameworks, directly impacting individual and group behaviour.

IV. The Social Structure of Competition

The neoclassical models of competition provide a unified theoretical framework focused on micro- and macro-levels using a well-defined methodological toolkit. In contrast, sociological approaches to model competition have developed independently to address different research questions and do not offer an integrated theoretical framework of the micro and macro-levels, but do provide insights for the meso-level. Structuralist approaches model competition in a network context, often with a static perspective. In contrast, evolutionary approaches inspired by ecology models and adapted to human-made organisations engage with isomorphism[155] and organisational variety from different perspectives. The emergence of the network economy has led to new interactions mixing competition and cooperation, shaping a new understanding of competition, especially within business ecosystems.

A. Structuralist Approaches

1. Modelling sociologically competition: a structuralist perspective for production markets

In his seminal work "Where do Markets Come From?"[156], Harrison White put forward a purely sociological theory of markets and competition that breaks with the neoclassical understanding of markets (and competition) as a form of impersonal exchange[157]. He laments that the neoclassical approach only focuses on exchange markets and does not engage with the reality of production markets in which different

[155] By that is meant 'the constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions': P. J. DiMaggio & W. Powell, The iron cage revisited" institutional isomorphism and collective rationality in organizational fields, (1983) 48(2) American Sociological Review 147, 149 (referring to a description by A. Hawley, Human ecology, in D. L. Sills (ed.), *International Encyclopedia of the Social Sciences* (Macmillan, 1968), 328).

[156] H.C. White, Where do Markets Come From?, (1981) 87(3) American Journal of Sociology 517.

[157] As is stated by Kenneth Arrow, '(t)he theoretical picture of the market is one of impersonal exchange. I confine myself to the competitive case. At a given price (or, more precisely, given all prices), individual agents choose how much to supply and how much to demand. These supplies and demands are simply added up; when the prices are such that total supply equals total demand in each market, equilibrium prevails. There is no particular relation between a supplier and a demander, that is a supplier is indifferent about supplying one demander or another, and vice versa': see K. Arrow, What has economics to say about racial discrimination?, (1998) 12(2) Journal of Economic Pespectives 91, 94.

economic actors manufacturing goods and services, usually no more than a dozen producers, continuously interact and are perceived as interacting by the buyer. These interactions form social structures (the markets) which emerge and develop, through continuous signalling between the participants[158], each of them checking what the other is doing and adjusting their behaviour accordingly[159]. As White explains, 'markets are self-reproducing social structures among specific cliques of firms and other actors who evolve roles from observations of each other's behavior', hence they are 'not defined by a set of buyers [...] nor are the producers obsessed with speculations on an amorphous demand''[160]. This departs from Simmel's emphasis on the triad and the role of *tertius gaudens*, as White argues that '(m)arkets are tangible cliques of producers watching each other [...] (p)ressure from the buyer side creates a mirror in which the producers see themselves not consumers'[161]. The central mechanism of these markets is not, as in neoclassical economics, the price system, but the 'market schedule', which externalizes this social structure of producer markets. This denotes the 'social topography of the market field[162]' in which a different price, production volume, quality or levels of innovation differentiates each producer.

The 'market schedule' forms a 'shared social construction incorporating all the interaction effects' (between market participants)[163]. This is formalised as W(y), where revenue (W) is considered as function of market volume (v). The producers do not know how the consumers view their products, in other words, they have no information on the precise elasticity of the demand curve for a specific configuration of their product; they only know how much a specific configuration of their product will cost. They will thus attempt to maximize their revenue by locating a niche in the market for their product, the niche being understood as a specific positioning in the social topography of a market in relation to their competitors[164], and producing the 'right' volume. The description does not only apply to homogeneous products markets but also concerns '(h)eterogeneous producers with their differentiated products' who 'may find and maintain stable roles or niches' and '(s)elf-interested optimizing by each of them can sustain a global market schedule W(y)[165]. In the words

[158] H.C. White, *Production Markets as Induced Role Structures*, in S. Leinhardt (ed.) Sociological Methodology (Jossey Bass, 1981), 1-57.
[159] H.C. White, Where do Markets Come From?, (1981) 87(3) American Journal of Sociology 517.
[160] Ibid., 518.
[161] Ibid., 543.
[162] J. Beckert, Where do prices come from? Sociological approaches to price formation, MPIfG Discussion Paper, No. 11/3, Max Planck Institute for the Study of Societies, Cologne (2011), 9.
[163] H.C. White, Where do Markets Come From?, op.cit., 519
[164] J. Beckert, Where do prices come from? Sociological approaches to price formation, MPIfG Discussion Paper, No. 11/3, Max Planck Institute for the Study of Societies, Cologne, 8
[165] H.C. White, Where do Markets Come From?, op.cit., 544.

of White, seeking to differentiate this approach from the Walrasian approach and the general equilibrium model[166],

> 'firms seek niches in a market in much the same way as organisms seek niches in an ecology. Because each firm is distinctive, they are engaged not in pure competition but in finding and sustaining roles with respect to one another given an environment of discerning buyers. But there is no auctioneer to shape the market; instead, its structure depends on the interlocking of local orders. This leads to the postulate that firms with neighboring cost schedules (amount of variable cost to produce various volumes) must also have, in the eyes of buyers, neighboring schedules of valuation with respect to volume. If the postulate is not satisfied, the nascent market situation, a set of producers with an attendant population of buyers attracted by them, cannot sustain itself: W(y) will not be reproduced through the self-interested actions of firms, checked by buyers'[167].

Such approach focusing on interactions constitutes, according to White, a far more realistic model of markets than the demand-supply interaction envisaged in neoclassical economics[168], although it could be argued that his description of markets as a process of trial and error by a small community of producers aiming to maximize their revenue based on the information they dispose about their costs, while facing uncertainty with regard to how consumers view their products, Walras' process of tatonnement (without however the centrally organized auctioneer)[169]. The social nature of markets also highlights the importance of dimensions other than price, in particular volume, but also the quality of products (including innovation). White explains that firms in the market differ in the way buyers may evaluate the quality of their products. In his words, 'firms may seek niches in a market in much the same way as organisms seek niches in an ecology. Because each firm is distinctive,

[166] The Walrasian framework postulates a price-supported economic system organised on the basis of decentralised markets in which there is private ownership of productive assets. There is a finite number of profit-maximising producers and a finite number of consumers who maximise their utility of consumption and whose preferences are exogenously determined. The trades are cleared (arrived at equilibrium) at a price and dividend payment determined by a clearing house (the Walrasian auctioneer). The auctioneer uses tatonnement, an iterative process to discover equilibrium prices and dividend payments. A general equilibrium model is a system of equations denoting a centralised way of thinking about interactions in an economy, once a price vector solves these equations. Each of the equations represents a stylised aggregate decision process between two classes of representative agents playing a specific role in the economy (consumers/households and producers/firms). Competition economics relies on partial equilibrium models, which consider only one market at a time, and ignore potential interaction across markets. The tool of market definition ensures discipline in the sense that the competition assessment only focuses on the effects of a restrictive practice on a market, with other effects in distinct relevant markets (e.g. spillover effects) being ignored at this stage of the competition assessment.

[167] H.C. White, Where do Markets Come From?, op.cit., 520.

[168] R. Swedberg, *Principles of Economic Sociology* (Princeton University Press, 2003), 122

[169] Although one should be conscious that the way Walras' theory may be understood is still a matter of controversy.

they are engaged not in 'pure' competition but in finding and sustaining roles with respect to one another given an environment of discerning buyers'[170]. We will also encounter this 'niche' analogy also in the evolutionary approaches of organizational ecology examined in the next Section.

White's emphasis on social roles explains his conclusion as to how the set number of firms in a market 'coalesce into stable market aggregations'[171]. He also argues that such market aggregations should not be studied by focusing on *averages*, as is done by neoclassical economics and 'suggested by the cliché that supply equals demand', but on *dispersions*, for instance, unequal market shares or firms moving away from the market schedule[172]. Again, the focus on dispersions rather than averages also characterizes complexity economics and chaos theory approaches, characterized by fractals and feedback loops[173]. White draws on models of imperfect or monopolistic competition of Robinson and Chamberlin[174], developed further by models of 'endogenous product variety',[175] with the difference here that instead of having firms using conjectures on buyer taste to decide their market offers, in White's approach, 'firms decide on the basis of observed positions of all other producers'[176].

From this follows the conclusion that the 'assessment of market share distribution should (i) be made based on an explicit theory of market *formation* and (ii) be assessed in a more general comparative framework for the study of social inequality'[177]. According to White, as firms constitute 'social actors', the analysis of their interactions may benefit from a measure of inequality also widely used in social sciences, such as the Gini index[178]. The point made is that 'various degrees of inequality among producers into their market shares yield quite different sorts of *roles* for firms, as well as [a] different overall atmosphere': the dominant firm, for instance, is able in some configurations to completely overwhelm the others with its presence, while in others not[179].

Crucially, White's concept of "market" involves the mutual observation of the cliques of producers, but as mentioned above also focuses on the evolving *roles* of

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[170] Ibid., 520.
[171] Ibid., 526.
[172] Ibid., 544 ('markets are shaped by trade-offs between dispersions, not by averages as suggested by the cliche that supply equals demand').
[173] See, for a recent accessible presentation, among others, J. Doyne Farmer, *Making Sense of Chaos* (Allen Lane, 2024).
[174] J. Robinson, The economics of imperfect competition (Macmillan, 1933); E.H. Chamberlin, The theory of monopolistic competition (Harvard Univ. press, 1933).
[175] A.K. Dixit & J.E. Stiglitz, Monopolistic competition and optimum product diversity, (1977) 67(3) The American Economic Review 297.
[176] H.C. White, Where do Markets Come From?, op.cit., 520.
[177] Ibid., 541 (emphasis added).
[178] Ibid., 541.
[179] Ibid.

the different market players. Producers of differentiated products will aim to find and maintain stable roles or niches and optimize each of them with the development of a global market schedule W(y)[180]. Establishing market niches through this role-playing game provides stability to firms, ensuring their survival.

Although self-reproducing, role structures markets may nevertheless also 'get shaken up and settle in different configurations'[181], White draws inspiration from the French economics of convention tradition[182], and advances four market regions (interrelations) between the actors and the environments they constitute, to explore how the advantage of the buyers varies across industries. He thus proceeds by building formal market models focusing on 'a topology of reproducible structures'[183]. Among these are the crowded region (where the aggregate market size decreases with the addition of further producers/firms, this applying 'both across producers within a given market and across distinct markets that are in structurally equivalent positions'[184]), the paradox region (in which rising production costs are accompanied by declining quality as perceived by consumers), the explosive region (where the aggregate market size keeps growing if more producers enter the market), or the ordinary market region.

In his analysis, White places significant emphasis on the social construction of markets, viewing them as interfaces that connect various actors. He observes that companies collaboratively construct their market interface to mitigate the uncertainties of business, known as Knightian uncertainty[185]. Notably, his model takes a broader approach by examining entire sequences of markets ordered along upstream (supplier side) and downstream (buyers' side) axes, thus delving into interactions across relevant markets. As he explains, 'firms become contextualized not only by their competitors but also by supply and demand chains, and markets become contextualized by what goes on in upstream and downstream domains'[186].

His market approach does not center on stable equilibrium states but rather emphasises the dynamics of markets as a 'reproducible role structure' arising from

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[180] Ibid.

[181] H.C. White, *Markets from Networks – Socioeconomic models of production* (Princeton Univ. press, 2002), 152.

[182] O. Favoreau & E. Lazega (eds.), *Conventions and Structures in Economic Organization* (Edward Elgar, 2002), in particular Ch. 8; S. Jagd, Economics of Convention and New Economic Sociology: Mutual Inspiration and Dialogue. (2007) 55(1) *Current Sociology* 75.

[183] E.M. Leifer & H.C. White, A Structural Approach to Markets, In M. Schwartz, and Mark Mizruchi (eds.), Structural Analysis of Business, Academic Press, 1985), Ch. 11.

[184] H.C. White, *Markets from Networks – Socioeconomic models of production* (Princeton Univ. press, 2002), 140

[185] H.C. White, Markets from Networks – Socioeconomic Models of Production (Princeton Univ. press, 2002), 2.

[186] K Knor Cetina, Capturing markets? A review essay on Harrison White on producer markets, (2004) 2 Socio-economics Review 137, 139.

producer interactions. This sets his approach apart from the equilibrium models of imperfect and monopolistic competition, which rely on economic efficiency as a criterion. His approach also bears similarity to population and organisational ecology models. As Fligstein and Dauter observe, the concept of 'punctuated equilibrium' employed by the field of population ecology and biology resembles White's approach in describing the operation of markets[187]. This is not the same as the stable equilibria envisaged by neoclassical economics. In punctuated equilibria, change is a process of 'homeostatic equilibria', these being interrupted by rare rapid events of speciation: omeostasis enables an activity to maintain a stable internal environment, while punctuation and speciation (a process of discontinuous change) take place randomly through time and in terms of the direction of change[188]. A lot of evolutionary change will therefore take place in short periods of time tied to speciation events. However, Fligstein and Dauter also distinguish White's approach from that of evolutionary economics according to which 'markets are always fluid with products, processes, and advantage in flux' and which do not envisage the establishment of equilibria[189].

2. A social networks perspective on competition: 'structural holes' and 'weak ties'

Structuralist approaches to markets study how the positioning of an actor in a market social structure may affect his performance, as the links between the economic actors constitute a factor, among others, determining their (social) performance[190]. Ronald Burt's work continues this social networks-based foray on the origins of competition, arguing for the importance of 'structural holes' as an explanatory factor for how the structure of an actor's network and the location of the actor's contacts in the social structure of the competition arena define the actor's chances of getting higher rates of return on investment[191]. Burth employs concepts of network theory, such as local bridges and/or structural holes, to describe the social

[187] N. Fligstein & L. Dauter, The Sociology of Markets, (2007) 33 Annual Review of Sociology 105, 108.
[188] For further discussion, S.J. Gould, *The Structure of Evolutionary Theory* (Harvard Univ. Press, 2022), Chapter 9.
[189] N. Fligstein & L. Dauter, The Sociology of Markets, (2007) 33 Annual Review of Sociology 6.1.-6.24, 6.4: 'At the beginning of markets, there is often a period of turmoil and change followed by some stasis, and perhaps a second period of turmoil. The alternative view is the assertion that markets are always fluid with products, processes, and advantage in flux. Here, equilibrium solutions to the problem of what other market actors will do never form' [citing Nelson and Winter, 1982].
[190] See, for instance, the criticisms of V. Zelizer, Beyond the Polemics of the Market: Establishing a Theoretical and Empirical Agenda. (1988) 3 Sociological Forum 614 advancing the need to consider the moral foundations of the economy (see M. FourcadeReview of *The Moral Sociology of Viviana Zelizer*, by Viviana Zelizer (2012) 27(4) *Sociological Forum* 1055. See also the emphasis put on the legal institutional dimensions that frame the content of the links between the various actors (for instance, antitrust law): see N. Fligstein, *The Transformation of Corporate Control* (Harvard Univ. press, 1990).
[191] R. Burt, *Structural Holes – The Social Structure of Competition* (Harvard Univ. press, 1992), 45.

structure of the mostly local interactions between the agents, following in that the seminal work of Granovetter and moving beyond the simple focus on triads[192]. Local bridges connect various nodes within triads, while structural holes maintain connections between these local bridges. Holding a centralising position allows an entity to gain informational advantages by having privileged access to different clusters via these local bridges. This position also provides innovation advantages by enabling the combination of ideas generated in different clusters of triads and the ability to experiment with new strategies. As a result, the entity becomes a chokepoint, capable of filtering communication between nodes located in different clusters of triads[193].

A 'structural hole' is defined by Burt as a relationship of non-redundancy between two contacts, that is contacts 'that are disconnected in some way -either directly in the sense that they have no direct contact with one another, or indirectly, in the sense that one has contacts that exclude the others'[194]. In other words, 'structural holes are the gaps between nonredundant contacts [...] as a result of the hole between them, the two contacts provide network benefits that are in some degree additive rather than overlapping'[195]. Implicit in the structural holes' argument is that what matters in the competitive game is the 'entrepreneurial opportunities for information access, timing, referrals, and control' that benefit various network actors[196]. A network usually provides an actor access to information well beyond what the actor could process alone[197]. In Burt's view, the richer a social network is in structural holes, the more the actors in this network will enjoy high structural autonomy and thus high rates of return on investments. This understanding of competition relies on the following four premises:

First, 'competition is a matter of relations, not player/actor attributes' to the extent that it is about 'securing productive relationships' rather than the characteristics of the actor/player. The important point here is that to understand these productive relations, one needs to 'cut past the spurious correlation between attributes and outcomes to reach the underlying social structural factors that cause the outcome'[198].

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[192] M. Granovetter, The Strength of Weak Ties, (1973) 78(6) American Journal of Sociology 1360.

[193] For a discussion, see G. Castañeda, *The paradigm of Social Complexity* (Vol. I, CEEY, 2003), 455-456; S. Goyala & F. Vega-Redondoa, Structural Holes in Social Networks, (2007) 137 Journal of Economic Theory 460; L. Zihang, Y. Zhang, Q. Gong, Y. Chen, A. Oksanen, A. Yi Ding, Structural Hole Theory in Social Network Analysis: A Review, (2020) XX(YY) IEEE Transactions on Computational Social Systems 1.

[194] R. Burt, *Structural Holes – The Social Structure of Competition* (Harvard Univ. press, 1992), 8.

[195] Ibid. 47.

[196] Ibid., 2.

[197] Ibid., 47.

[198] Ibid., 3-4.

Second, 'competition is a relation emergent, not observed' to the extent that '(t)he structural holes in which competition develops are invisible relations of nonredundancy, relations visible only by their absence': Burt notes that '(c)ompetition is an intense, intimate, transitory, invisible relationship created between players by their visible relations with others', economic actors (people or organizations) being 'not the source of action so much as they are the vehicles for structurally induced action'[199]. A relation between the same actors can be competitive in some social context ('the attendant network of relations with relevant others') and not be competitive in another[200]. Hence, 'the social structure of competition is not about the structure of competitive relations'; it is 'the social structure of the relations for which players compete', in other words, it is 'theory about competition for the benefits of relationships'[201]. This provides content to the concept of 'structural autonomy' as this does not depend on specific attributes of the players but on the social structure of competition, that is the 'negotiability of the relationships on which competitors *survive*'[202].

Third, 'competition is a process, not just a result': Burt criticizes the economic theory of competition which focuses on 'what is left when competition is over' assuming that price is constant with output and then assuming a certain number of circumstances (e.g. infinite number of players who are free to exchange without interference from their parties) to derive conditions of 'perfect competition' in which equilibrium prices will clear the market, and argues that one should start 'with the process of competition and work towards its result'[203]. In the structural hole argument, 'no mechanism is proposed to define the prices that "clear" the imperfectly competitive market, but about how the social structure of competition determines 'the extent and nature of a player's competitive advantage" in the process of negotiating the relationships on which competitors survive[204].

Fourth, 'imperfect competition is a matter of freedom, not just power'; here Burt relies on the concept of imperfect competition, which is contrasted to the social structure prevailing in 'perfect competition'. Burt views perfect competition as a situation of 'relational chaos' in which players 'are free to withdraw from existing relations to join with anyone who better serves their interests', this freedom of choice driving prices to a minimum. The structural image that corresponds to imperfect competition is 'one of completely and rigidly interconnected system of people and establishments within the market' and in which 'high-obligations relations, with

[199] Ibid., 4-5
[200] Ibid., 5.
[201] Ibid., 5.
[202] Ibid., 5. Emphasis added.
[203] Ibid., 6.
[204] Ibid. 6.

obligations enforced by authority or convention, allow neither negotiation nor the strategic replacement of partners'[205].

Opposing the extremes of 'perfect competition' and 'regulated competition' Burt takes into account the reality of observed behaviour to conclude that they both represent 'images of dominance', in which the lack of negotiation within a relationship 'denies the individuality of buyer and seller'. Indeed, '(p)layers are homogeneously trivial under the competitive market pricing, and, at the other extreme, homogeneously trivial under the dicta of the dominant player' as '(b)uyer and seller are locked into exchange relations by the dicta of the dominant player'[206]. The central question then for the imperfect competition paradigm becomes 'how players escape domination, whether it is domination *by the market* or domination by *another player*'[207]. The added value of the structural hole argument is thus that it develops 'a theory of freedom, instead of power, of negotiated instead of absolute control'[208], and that it explores 'the extent to which the social structure of a competitive arena creates *entrepreneurial opportunities* for certain players to affect the terms of their relationships'[209]. This is of particular interest in our discussion of 'opportunity niches' in the following Section, as the important thing for market actors is to escape the domination either of the market schedule (that is the domination of the market as in the perfect competition paradigm) or that of another economic actor (the domination of a lead firm or central player holding a structural hole position).

Burt also employs the 'structural holes' theory to draw conclusions on the market (and firms') performance. He recognises that various factors contribute to a company's profits, including the initial capital investment (financial, human, and social). This can vary due to each player's network of contacts in the industry, and how the structure of their network and the positioning of their contacts within the industry provide a competitive advantage in generating greater returns on investments. Additionally, this should be considered in relation to the return rate, which is influenced by the availability of lucrative opportunities. The focus is not just on capital, but also on entrepreneurial opportunities in a broader sense. When it comes to investment, social capital (the relationships with other players in the industry) is a critical factor in determining the return rate.[210]. It is not however important that a player has a large social network but if this social network is 'well-structured' and provides rewarding opportunities.

An important variable here is the information benefits a specific network positioning provides, in terms of *access*, *timing*, and *referrals* of pieces of information

[205] Ibid., 6.
[206] Ibid., 7.
[207] Ibid., 7. Emphasis added.
[208] Ibid., 7.
[209] Ibid. Emphasis added.
[210] Ibid., 10.

(the diversity of the network always being a plus). As most overlapping contacts lead to the same people[211], and provide the same information benefits, a large network of redundant contacts may not always add adequate opportunities. What matters is 'the number of nonredundant contacts' (structural holes). Structural holes provide exposure to diverse sources of information, each cluster of contacts being a source of information, and thus information benefits. As mentioned earlier, the rate of return on the investment of capital usually increases with the structural holes. A great number of nonredundant contacts (e.g. access to customers or suppliers not linked to anyone else in the network) will increase the size of the network. At the same time although structural holes are key to information benefits, this leads to higher cost for managing an expanded network. That is, for each expansion of the network, 'the time and energy required to maintain a productive relationship with the contact'[212], will be balanced by access to people who were unreached before[213].

However, this effect may also be relativised as structural holes do not only generate information benefits but also produce control benefits, that is, advantages provided to the various actors in negotiating their relationship with other actors, which may also generate entrepreneurial opportunities. Indeed, the effectiveness of the network may be enhanced by focusing resources on preserving primary contacts, which are 'ports of access to clusters of people beyond' and therefore may increase the information benefits of the network with less coordination costs[214].

Burt's argument joins Granovetter's work on the 'strength of weak ties[215]'. However, the concept of 'structural holes' directly captures the causal agent in operation to explain these information benefits (which may result from bridges of either strong or weak links) and also focuses on the control benefits that structural holes provide to certain agents (the *tertius gaudens*) to negotiate their relations. These control benefits are not adequately accounted well by the more static perspective provided by the focus on the strength of the tie[216]. Control benefits may emerge from a *tertius gaudens* role, someone 'brokering tensions between other players' and exploiting the uncertainty about whose preferences would dominate a relationship to negotiate for him/her favourable terms[217]. As Burt explains, when a player is positioned at the centre of the network he is transformed into a more or less 'influential bystander whose function is to highlight the conflicting demands by

[211] That is, the situation is structurally equivalent. Two people are structurally equivalent if they have the same contacts. Ibid., 19. This does not lead however to situations of complete equivalence.
[212] Ibid., 45.
[213] Ibid, 20-25.
[214] Ibid., 23.
[215] M. Granovetter, The strength of weak ties, (1973) 78 American Journal of Sociology 1360.
[216] R. Burt, Structural Holes – The Social Structure of Competition (Harvard Univ. press, 1992), 27-28.
[217] Ibid., 32-33.

members of his role-set and to make it a problem for them [the other actors], rather than for him, to resolve *their* contradictory demands'[218].

An actor with a network rich in structural holes gains structural autonomy. Actors with networks optimised for structural holes (thus networks that provide high structural autonomy) enjoy higher rates of return on their investments 'because they know about, have a hand in, and exercise control over, more rewarding opportunities'[219]. Competitive advantage is thus empirically translated in terms of structural holes. Following up the discussion of White's approach, one may venture that '(t)he lower the structural autonomy of players in a market, the greater their commitment to the market schedule characteristic of their market'[220]. In contrast, the structural autonomous actors may escape the tyranny of the market schedule (but also that of another actor) and make higher profits[221].

3. Status and Quality Competition

The quest for status and social hierarchy in social interactions is a crucial aspect of sociological analysis of competition, especially as competition extends beyond price to encompass factors like quality. Podolny's work has delved into how 'high-status firms exert a disproportionate influence' on the evolution of technology and, consequently, the underlying factors that determine market quality.[222]. High-status signals may also affect the perception of the products of a firm. Indeed, '[...] when a firm occupies a niche in which there was uncertainty about the quality of inventions in that niche, a firm's status in the technological domain is a signal of quality that positively affects its sales growth' and in reality 'spill over into the market domain', bringing greater economic rewards[223]. High market status also 'lowers the transaction costs of producing a good of a given quality' to the extent that it may attract to the high-status firm better-quality employees[224]. This also enables 'higher-status' actors in a market to break from industry norms, 'without risking the loss of their status'[225], or their survival[226].

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[218][218] Ibid., 31 (citing Roberrt Merton).
[219] Ibid. 49.
[220] Ibid., 208.
[221] See also, R. Burt, *Corporate Profits and Cooptation: Networks of Market Constraints and Directorate Ties in the American Economy (*Academic Press, 1983)
[222] J.M. Podolny, *Status Signals – A Sociological Study of Market Competition* (Princeton Univ. Press, 2008),
[223] Ibid., 250.
[224] Ibid., 251.
[225] Ibid., 252.
[226] J.M. Polodny, T.E. Stuart, M.T. Hannan, Networks, knowledge and niches: Competition in the worldwide semi-conductor industry 1984-1991, (1996) 102 American Journal of Sociology 659 (noting

High status adds a further source of economic inequality than lower costs and offers a more expansive view of the competitive process, focusing on quality. Polodny also observes that 'the mechanism of status-based homophily (that actors associate and bond with similar others) in exchange relations implies market segmentation, with lower-status firms being relegated to the less desirable segments'[227]. The market is thus presented as 'an *ecology* of status orderings', with firms competing 'in terms of their capacity for the quick consummation of exchanges', 'velocity', being the efficiency criterion by which to judge a specific status ordering'[228].

B. Evolutionary approaches

The structural holes approach to competition emphasises information and control of entrepreneurial opportunities, while theories focusing on status consider the identities of the parties involved in market exchange. In contrast, the distinct population ecology approach to competition places survival and viability at the core. An important assertion is that producers with low autonomy may struggle to survive if they deviate from the market schedule[229]. Additionally, this research seeks to understand why various types of organisations exist, despite environmental isomorphism being a guiding principle[230]. Note that the organisation ecology version of the population ecology approach explores as units of analysis organisations, populations (aggregate) of organisations having some unit character for instance being relatively homogeneous in terms of environmental vulnerability, and communities of organisations[231].

1. Population/organisational ecology approaches: the 'principle of competitive exclusion' and environmental isomorphism

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that 'crowded' niches suppress an organization's life chances, whereas status enhances life chances, especially for those organizations in uncrowded niches).

[227] J.M. Podolny, *Status Signals – A Sociological Study of Market Competition*, op.cit., 251.

[228] Ibid., 263.

[229] In this view, 'survival describes the fate of individual organizations' and viability 'the share of market of a given organizational form': M.T. Hannan & J. H Freeman, The population ecology of organizations, (1977) 83 American Journal of Sociology 929, 938.

[230] J.A.C. Baum & A.V. Shipilov, Ecological Approaches to Organizations, in *Handbook of Organization Studies*, 55.

[231] M.T. Hannan & J. H Freeman, The population ecology of organizations, (1977) 83 American Journal of Sociology 929, 933 (noting that ecological analysis is conducted at three levels: individual (here organizations), population, and community and that '(e)vents at one level almost always have consequences at other levels. Organizational analysis decomposes organizations into constituent parts, such as members of the organization and subunits).

Organisational ecology is one of the different approaches to organisation that emerged in reaction to the 1970s closed-system organisational theory, to explore links between organisations and macro-sociological approaches that could explain structural inertia limiting the ability of organisations to change[232]. Drawing on ecology in the natural world[233] it focuses on the environmental *selection* process (eventually leading to replacement at the population level) and not only on adaptation by existing organisations (e.g. differentiation through the creation of a new niche), as did older approaches to organisations[234]. This approach presents some distinct characteristics.

First, in contrast to social Darwinism, this perspective does not conflate fitness (expected reproductive success) with progress and social virtue. While it acknowledges an overall historical trend toward organisational diversity, it does not assume this trend to be irreversible[235]. Population ecology constructs a comprehensive measure of fitness that encompasses both selection (the actual loss of organisations that fail to survive) and mobility among various organisational forms. Fitness is defined as 'the probability that a given form of organisation would persist in a certain environment'[236]. As such, organisational survival becomes the central focus of the theory.

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[232] Ibid. 33. As Baum and Shipilov explain, '(s)tructural inertia theory asserts that existing organizations frequently have difficulty changing strategy and structure quickly enough to keep pace with the demands of uncertain, changing environments and emphasizes that major organizational innovations often occur early in the life histories of organizations and populations'. J.A.C. Baum & A.V. Shipilov, Ecological Approaches to Organizations, in Handbook of Organization Studies, 56.

[233] Theorists of organizational ecology recognize that there are differences between human and non-human organizations to the extent that '(b)iological analyses are greatly simplified by the fact that the most useful information concerning adaptation to the environment [...] is transmitted genetically' and thus any adaptiveness of structure can be 'unambigiously identified with net reproduction rates'. In contrast, human social organizations reflect a greater degree of learning and adaptation and thus it becomes more difficult 'to define fitness in a precise way'. Furthermore, unlike biological organisms, individual organizations and populations of organizations have the potential to expand 'almost without limit': M.T. Hannan & J. H Freeman, The population ecology of organizations, (1977) 83 American Journal of Sociology 929, 936-938. Note however that if population ecology in the past focused on the transmission of genetic information, the extended evolutionary synthesis now acknowledges that genetic information is not the only mode of transition. I am thankful to Todd Davies for this remark.

[234] M.T. Hannan & J. H Freeman, The population ecology of organizations, (1977) 83 American Journal of Sociology 929 (noting the existence of a 'subtle relation' between selection and adaptation', both being complementary processes. While adaptive learning for individuals involves selection among behavioral responses, adaptation for a population consists in selection among types of members. The population ecology of organizations focuses however on the study of selection 'in favor of organizations with one set of properties to the disfavor of those with others' seen as an adaptive process'; M.T. Hannan & J. Freeman, *Organizational Ecology* (Harvard Univ. press, 1989), 28.

[235] Ibid., 36.

[236] M.T. Hannan & J. H Freeman, The population ecology of organizations, (1977) 83 American Journal of Sociology 929, 937.

Second, the theory differs from evolutionary economics in that it does not assume the selection process in the population (of firms) favours efficient organisations. Instead, it argues that the selection processes are 'multidimensional and that efficiency in production and marketing, defined broadly, is only one of the relevant dimensions'[237]. Organisational ecology's models diverge from the assumption of individual rationality put forth by methodological individualism. They embrace the concept that populations are influenced by environmental conditions, which they furthermore have the capacity to shape through their actions. Within this framework, competitive advantages may not solely arise from efficient scale and productive efficiency; rather, relationships with key institutions and political ties may play a more crucial role in determining success than productive efficiency alone.[238].

Third, 'evolutionary change does not appear to be gradual and continuous' but 'episodic, with sharp divergence in character', what has been characterised as a situation of punctuated equilibrium, in which there is rapid speciation and great increases in diversity in brief periods or punctuations[239].

Fourth, evolutionary approaches view the process of change as non-deterministic, acknowledging that it is contingent and random, rather than being solely linked to specific social structures[240].

Hence, the organisational or population ecology approaches do not rely on the abstract definition of efficiency or the optimisation thinking inspired by the expected utility framework. Instead, they view organisational survival as a problem of 'satisficing', taking into account evolving aspirational levels and the costs of gathering sequential information.[241]. In essence, organizational ecology seeks to understand 'the distributions of organizations across environmental conditions and the limitations on organizational structures in different environments'[242]. Recognising that 'the diversity of organizational forms is isomorphic to the diversity of the environments', organisational ecology explores the role of competition in this selection process.

Hannan and Freeman refer to the principle of 'competitive exclusion' to assert that 'no two populations can continuously occupy the same niche to the extent that they depend on identical environmental resources' and 'the greater the similarity of

[237] M.T. Hannan & J. Freeman, *Organizational Ecology* (Harvard Univ. press, 1989), 37.
[238] See, for instance, M. Faccio Politically connected firms, (2006) 96(1) American Economic Review, 369; W. Zheng, K. Singh & W. Mitchell, Buffering and Enabling: The Impact of Interlocking Political Ties on Firm Survival and Sales Growth, (2015) 36(1) Strategic Management Journal,1615.
[239] M.T. Hannan & J. Freeman, *Organizational Ecology* (Harvard Univ. press, 1989), 38.
[240] M.T. Hannan & J. Freeman, *Organizational Ecology* (Harvard Univ. press, 1989), 40.
[241] H.A. Simon, Rational Decision Making in Business Organizations. (1979) 69(4) American Economic Review 493; H.A. Simon, A Behavioral Model of Rational Choice, (1955) 69(1) Quarterly Journal of Economics 99.
[242] M.T. Hannan & J. H Freeman, The population ecology of organizations, (1977) 83 American Journal of Sociology 929, 936.

two-resource limited competitors, the less feasible it is that a single environment can support both of them in equilibrium'[243]. This framework applies in social science research on organisations the learnings from biological sciences of the Lotka-Volterra model - the natural world version of the competitive exclusion principle – which recognises that two species cannot coexist unless their niches are sufficiently different so that each limits its population growth more than it limits that of the other[244]. According to Hardin, the 'weak' hypothesis of the principle of competitive exclusion is that 'if two non-interbreeding populations (i) "do the same thing"-that is, occupy precisely the same ecological niche [...] (ii) if they are "sympatric"- that is, if they occupy the same geographic territory-and (iii) if population A multiplies even the least bit faster than population B, then ultimately A will completely displace B, which will become extinct'[245].

In nature, we often see competing populations sharing similar resources and coexisting, which may seem paradoxical. This apparent contradiction can be explained by Hardin's reformulation of the theory, suggesting that complete competitors cannot coexist or that ecological differentiation is necessary for coexistence[246]. Hardin follows up with the following interesting observation with regard to the implementation of this theory in economics:

> 'Any competitor knows that unrestrained competition will ultimately result in but one victor. If he is confident that he is that one, he may plump for "rugged individualism." If, on the other hand, he has doubts, then he will seek to restrain or restrict competition. He can restrain it by forming a cartel with his competitors, or by maneuvering the passage of "fair trade" laws. (Laboring men achieve a similar end-though the problem is somewhat different-by the formation of unions and the passage of minimum wage laws.) Or he may restrict competition by "ecological differentiation," by putting out a slightly different product (aided by restrictive patent and copyright laws). All this may be regarded as individualistic action.
>
> Society as a whole may take action. The end of unrestricted competition is a monopoly. It is well known that monopoly breeds power which acts to insure and extend the monopoly; the system has "positive feedback" and hence is always a threat to those aspects of society still "outside" the monopoly.
>
> For this reason, men may, in the interest of "society" (rather than of themselves as individual competitors), band together to insure continued competition; this they do by passing antimonopoly laws which prevent

[243] Ibid., 943.

[244] V. Volterra, Fluctuations in the abundance of a species considered mathematically, (1926) 118(2972) Nature 558; A.J. Lotka, The growth of mixed populations: Two species competing for a common food supply, (1932) 22 (16/17) Journal of the Washington Academy of Sciences 461.

[245] G. Hardin, The Competitive Exclusion Principle, (1960) 141(3409) Science 1292, 1292

[246] G. Hardin, The Competitive Exclusion Principle, op. cit., 1296.

competition from proceeding to its "naturally" inevitable conclusion. Or "society" may permit monopolies but seek to remove the power element by the "socialization" of the monopoly (expropriation or regulation)'[247].

The principle of competitive exclusion essentially explains that if two populations of organisations, both relying on identical environmental resources, have differing organisational characteristics, the population with the less adaptive characteristic to the environment will likely be eliminated. This process leads to a stable equilibrium consisting of a single population that is well-suited to the environmental conditions.[248]. From this perspective, competition constitutes 'a mechanism producing isomorphism'. The organisational characteristics are adjusted to become more comparable to environmental characteristics. Competitive exclusion isn't a universal principle; rather, it serves as a reminder of the significance of niche overlap in competitive processes. It suggests that the environment may become more complex with the emergence of subenvironments, providing a safe haven for an inferior competitor or offering them an adaptive advantage.[249].

In a similar vein, Baum and Singh propose that the level of competition between organisations is determined by the degree of overlap in their targeted resource requirements or organisational niches, known as the overlap density. They suggest that each organisation occupies a unique niche, defining its position in a multidimensional resource space."[250]. Population density in this context refers to the number of organisations which are competing with each other relative to the maximum number of organisations which could co-exist. The survival chances of organisations are also sensitive to the population density levels at the time of their founding, as higher density creates a liability of resource scarcity and 'tight niche packaging' which pushes new or emergent organisations to use inferior or marginal resources and thus affects their chance of future success[251].

This model holds significant implications for organisational diversity. It suggests that the level of resource availability imposes limits on the diversity within the system.[252]. Additionally, it indicates that organisations of varying sizes, while involved in similar activities, rely on different resources. As a result, the competition between large and small organisations is likely to be less intense than the

[247] G. Hardin, The Competitive Exclusion Principle, op. cit., 1296.
[248] M.T. Hannan & J. H Freeman, The population ecology of organizations, (1977) 83 American Journal of Sociology 929, 943.
[249] M.T. Hannan & J. Freeman, *Organizational Ecology* (Harvard Univ. press, 1989), 98.
[250] J.A.C. Baum & J.V. Singh, Organizational niche overlap and the dynamics of organizational mortality, (1994) 100 American Journal of Sociology 346.
[251] G.R. Carroll & M.T. Hannan, Density delay in the evolution of organizational population: A model and five empirical tests, (1989) 34 Administrative Science Quarterly 411.
[252] M.T. Hannan & J. H Freeman, The population ecology of organizations, (1977) 83 American Journal of Sociology 929, 944.

competition among organisations of the same size[253]. In other words, competition will be 'localized' between large-sized players who will compete with other large-sized players, eventually also with medium-sized organisations, whose numbers are expected to decline due to their lack of resources[254]. This in turn brings positive implications for small organisations, as the competitive pressure from medium-sized organisations is expected to decrease. Therefore, both the number and size of organisations are important factors in determining the level of competition. These findings can be integrated with previous research on competition-driven repositioning in management literature exploring how firms seek 'alignment' with the intensity of the competitive threats in the environment[255].

2. The Niche theory of competition

Of particular interest is the conceptualization by organizational ecology of competition between organizations from the perspective of 'niche theory' or 'niche width theory'[256] . This concept is closely linked to the competitive exclusion principle, which, in the economic context, poses the question of whether two different economic institutions with distinct technologies can stably coexist within a given market structure[257]. The theory of niche aims, *inter alia*, to explain the prevalence of exceptions to the 'principle of competitive exclusion', which is indeed a form of

[253] A.C. Baum & A.V. Shipilov, Ecological Approaches to Organizations, in *Handbook of Organization Studies,* 91.

[254] Ibid., 91 This is in phase with the way we understand the concept of competitive advantage in strategic management literature, as a competitive advantage is deemed to exist 'only relative to a set of other firms that are considered comparable in enough ways to make a performance comparison meaningful: G. Cattani, J. F. Porac, H. Thomas, Categories and Competition, (2017) 38 Strategic Management Journal 64, 64.

[255] J. Gimeno, M.-J. Chen, & J. Bae, Dynamics of competitive repositioning: A multidimensional approach, (2006) 23 Advances in Strategic Management 399; R. Seamans & F. Zhu, Repositioning and Cost-Cutting: The Impact of Competition on Platform Strategies, (2017) 2(2) Strategy Science 83.

[256] For a more elaborate discussion, see P. A. Popielarz & Z. P. Neal, The Niche as a Theoretical Tool, (2007) 33 Annual Review of Sociology 65.

[257] See, S. Amir, On the ecological meaning of the competitive exclusion principle in the context of an economic analogy, (1981) 4(3) Journal of Social and Biological Structures 237, 237.

resource competition, in a natural[258] but also in an economic context[259], and explain the differential survival of specialists (those concentrating on a narrow range of customers) compared to generalists (which appeal to the mass market)[260]. Niche differentiation or cooperation between inferior competitors may indeed become a critical element for avoiding the implications in terms of displacement of the principle of competitive exclusion[261].

Borrowing from biology, Hannan and Freeman develop the concept of 'niche' to denote all the resource levels at which a population can survive and reproduce itself, and in which it may outcompete all other local populations[262]. The important issue is survival due to environmental fluctuations over time (environmental variability). Survival strategies may differ if these fluctuations are frequent (fine-grained) or periodic (coarse-grained)[263]. One strategy is to maximize the exploitation of the environment occupying a broad niche ('generalism'), by relying on a wide variety of resources simultaneously. This requires the organization to maintain excess capacity at any given time and thus accept the risk of environmental change. Firms

[258] Despite the theory's prediction that because only one species can be the superior competitor for a single limited resource, there is a considerable diversity in natural environments which may be explained by the presence of predators that remove dominant competitors, the development of mutually beneficial cooperative strategies between the inferior competitors leading to co-existence with the dominant actor, strategies of differentiation and creation of a new niche, thus explaining biodiversity. Other approaches, such as the neutral theory of biodiversity challenge the sole reliance on 'niche theory' to explain biodiversity and co-existence, relying instead on stochastic and random processes, and more generally ecological drift (due to random births or deaths). For a discussion, see, for instance, K.H. Morrow, Neutral and niche theory in community ecology: a framework for comparing model realism, (2024) 39(4) Biology and Philosophy https://doi.org/10.1007/s10539-024-09941-5 . In a community ecology context co-existence has a distinct meaning as referring to the embeddedness of a species in an ecosystem or a community and the possibility of a species to 'maintain a population in the local ecological conditions it experiences': MA. McPeek, *Coexistence in Ecology: A Mechanistic Perspective* (Princeton Univ. press, 2022), 5.

[259] See, for instance, G. Hardin, The Competitive Exclusion Principle, op. cit., 1296 (noting that 'Bertrand's, not Cournot's, reasoning is correct, it is assumed that the consequences of the exclusion principle can be indefinitely postponed by a rapid and endless multiplication of "ecological niches" (largely unprotected though they are by copyright and patent)').

[260] For discussion, see M.T. Hannan & J. H Freeman, The population ecology of organizations, (1977) 83 American Journal of Sociology 929; J.A.C. Baum & A.V. Shipilov, Ecological Approaches to Organizations, *Handbook of Organization Studies* 55-110; M.T. Hannan & J. Freeman, *Organizational Ecology* (Harvard Univ. press, 1989), 91-116.

[261] The concept of 'niche' and its exact meaning have been a debated issue in ecology. Some approaches focus on the spatial element while others conceive niche as a functional concept. In essence the concept denotes an equilibrium situation resulting from the co-existence of species, which do not need identical resources. See, S. Amir, On the ecological meaning of the competitive exclusion principle in the context of an economic analogy, (1981) 4(3) Journal of Social and Biological Structures 237, 239-240 (referring to work in ecology distinguishing between fundamental and realized niche of species).

[262] M.T. Hannan & J. H Freeman, The population ecology of organizations, (1977), op. cit., 947.

[263] J.A.C. Baum & A.V. Shipilov, Ecological Approaches to Organizations, *Handbook of Organization Studies* 55, 81.

with wide niches may benefit from risk spreading and economies of scale, but they are simultaneously exposed to more competition and are subject to higher mortality hazards/survival risks[264]. Accepting lower levels of exploitation of the environment by concentrating the organisation's fitness 'on a very narrow band of environmental variation' (specialism) and thus lowering levels of excess capacity in return for greater security forms another possible strategy[265].

For instance, a firm may choose to be present and expand in all possible adjacent markets to the one which it had developed as its core competence, proceeding to vertical or conglomerate integration of new activities, and relying on a wide variety of resources simultaneously to keep its presence in all these different areas. It may benefit in this case from scale economies and will be able to spread the risk of expansion, but it is also simultaneously exposed to more competition (in all areas covered) and thus to higher survival risks (unless there are significant network and ecosystemic effects resulting, for instance, from the use of a general-purpose technology that may entrench the position of this firm in this 'opportunity niche'[266]).

The niche theory suggests that specialists may thrive in stable or highly variable but finely grained environments ((agents experience multiple environments), where they can rapidly adapt to changes and 'ride out the fluctuations'. On the other hand, high environmental variability that is coarse-grained (the entity spending most of its time in a single environment) conveys an advantage to generalists which have excess resources they may employ to deal with the uncertainties over time[267]. At the same time, in economic niches, 'differences reduce inter-firm competition and enhance the number of coexisting firms'[268]. This diversity generates more organisational diversity.

3. Competitive exclusion, resource-partitioning and density-dependence

The interconnection between macro-elements, such as population size and density, and the level of competition, has been a fundamental aspect of early sociological research[269]. Population ecology approaches further elaborate on this

[264] S.D. Dobrev, T.-Young Kim, MT. Hannan, Dynamics of Niche Width and Resource Partitioning, (2001) 105(5) American Journal of Sociology 1299.
[265] M.T. Hannan & J. H Freeman, The population ecology of organizations, (1977) 83 American Journal of Sociology 929, 947-949.
[266] On the concept of 'opportunity niche' see W. B. Arthur, The Nature of Technology (Penguin, 2009) 195 discussing the ways a new technology 'may set up opportunity niches for further technologies'. On ecossytems, see our analysis in the following Section.
[267] M.T. Hannan & J. Freeman, *Organizational Ecology* (Harvard Univ. press, 1989), 81.
[268] R. Cazzolla Gatti, R. Koppl, B.D. Fath, S. Kauffman, W. Hordijk, R.E. Ulanowicz, On the emergence of ecological and economic niches, (2020) 22 Journal of Bioeconomics 99, 107.
[269] This is one of the major implications of E. Durkheim's thesis on specialization/division of labour in society, as the more the population size (the number of interactions) and density increase the more

connection by examining the mechanisms of the competitive exclusion principle and emphasising the differentiation between generalists and specialists, as outlined above.

The 'resource partitioning theory' is closely related to niche theory[270]. The central idea is that in economies of scale-driven environments, competition tends to center around areas with greater resources. However, in this scenario, generalists have the upper hand because the advantages of economies of scale and scope are substantial enough to offset any costs associated with maintaining a broad niche and sustaining additional capacity.[271]. In concentrated markets with only a few generalists, competition among generalists intensifies, which in turn allows specialists on the periphery to exploit resources more effectively. This leads to resource partitioning, as specialists don't directly compete with generalists but actually benefit from the heightened competition among generalists at the center of the market.[272]. The theory predicts that increasing market concentration raises the failure rate of generalists operating in the center of the market (field) but lowers the failure rate of specialists at the periphery, as these face less intense competition[273]. This may offer interesting insights for analysing competition in the context of business ecosystems, where platforms and complementors are active.

The theory of density dependence proposed by organisational ecology delves into how the growth of a self-contained population may be influenced by the population's density[274]. In this context, growth is influenced by the interaction of two opposing forces. First, it is important to consider the population's institutional standing, the extent to which it is accepted and valued as a desirable partner for other organisations in forming exchange relations (referred to as the degree of population legitimisation). As the population density increases, the legitimising effect of additional new organisations diminishes, thereby impacting their survival rate. Second, the intensity of competition between population members should also be

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specialization/division of labour (and thus competitive interactions) increase. P. See E. Durkheim, *Division of Labor in Society*, trans. G. Simpson. (Free Press, 1893, 1947).

[270] G.R. Carroll, Concentration and specialization: dynamics of niche width in populations of organizations, (1985) 90 American Journal of Sociology 262; S.D. Dobrev, T.Y. Kim, M.T. Hannan, Dynamics of niche width and resource partitioning, (2001) 106 American Journal of Sociology 1299.

[271] J.A.C. Baum & A.V. Shipilov, Ecological Approaches to Organizations, *Handbook of Organization Studies* 55, 82.

[272] G.R. Carroll, Concentration and Specialization: Dynamics of niche width in populations of organizations, (1985) 90 American Journal of Sociology 1262.

[273] J.A.C. Baum & A.V. Shipilov, Ecological Approaches to Organizations, *Handbook of Organization Studies* 55, 82. The authors mention, inter alia, a study by A. Swaminathan, The proliferation of specialist organizations in the American wine industry: 1941–1990, (1995) 40 Administrative Science Quarterly, 653, finding that increasing concentration of large mass-producers entities (generalists) increased the farm winery founding rate (specialists).

[274] M. T. Hannan & G.R. Carroll, *Dynamics of Organizational Populations: Density, Elimination and Competition* (OUP, 1992).

considered, as the intensity of competition is directly proportional to the mortality rate of new organisations and inversely proportional to their founding rate. In less densely populated areas, the positive impacts of legitimacy are more significant, while in high-density areas, the adverse effects of competition are more pronounced. As a result, the founding rate rises within the lower density range and decreases beyond a certain threshold, while the mortality rate declines at low densities but increases later on. According to the theory, when these two rates become equal, the population attains its equilibrium size, also known as the carrying capacity of the given resource environment.

The nature of competition adjusts based on population density and the life cycle of the population. In discussing the evolving nature of competition, organisational ecologists often utilize the formalization of the principle of competitive exclusion by the Lotka-Volterra growth model. This model investigates how competition impacts the abundance of two competing species and has the potential to predict the result of interspecific competition (competition between two species) in theory.[275]. According to this model as applied in organizational ecology, organizational populations undergo a transition from (natural rate-growth) competition resulting from first-mover advantage to organizational effort-based competition to reduce costs and prices (efficiency-based competition) as population density increases[276]. Hence, when population density is initially low, the natural rate-growth (r) dominates and 'organizations enter at a slow but exponentially increasing rate', which works to the advantage of smaller organizations, due to their capacity 'to move quickly and exploit new resource opportunities in the resource-rich but dispersed and uncertain environments that characterize low-density conditions'[277]. However, as the population continues to grow and its markets become connected, and thus demand becomes more predictable, organizations aim to expand their market share and appeal to all customers, in which case large generalist organizations competing based on efficiency (efficient use of resources) will have the advantage. This orients competition among the population members toward cost and price reduction, that is the more efficient use of resources. Consequently, as

[275] On the issue of the 'paternity' of the principle of competitive exclusion, see G. Hardin, The Competitive Exclusion Principle, (1960) 141(3409) Science 1292, 1294-1295 (venturing that this principle may result from the French mathematician Bertand and Ricardian economics and therefore has its roots in economic thinking).

[276] According to the Lotka-Volterra growth model

dN/dt =rN K-N/K where K is the carrying capacity of the population's environment, r is the natural growth rate of the population, N is the population density and t is ta time interval: J.A.C. Baum & A.V. Shipilov, Ecological Approaches to Organizations, Handbook of Organization Studies 55, 96.

[277] J.A.C. Baum & A.V. Shipilov, Ecological Approaches to Organizations, *Handbook of Organization Studies* 55, 96

population density increases, the carrying capacity of the population (K) that is, the more efficient use of the resource dominates[278].

This in turn decreases the number of active organisations but ultimately, as the increasing market concentration forces large organisations to compete more intensively with one another for central markets capable of sustaining their large-scale operations, this opens, as discussed above, more opportunities for smaller organisations that may exploit peripheral resources without entering in competition with the larger generalists[279]. This also creates organisational sub-groupings of organisations based on functional or territorial differentiation which fulfil complementary roles, 'in which they are dependent on, but non-competitive with each other'[280]. This eventually reduces potential competition by limiting the number of direct competitors. The deceleration of population growth as it nears its maximum capacity, determined by environmental constraints, doesn't signify a decline in the size or scale of the organisation. The scale may continue to expand, even as the number of organisations decreases, especially if larger organisations take measures to inhibit the emergence of new competitors.[281].

These theories provide a more comprehensive understanding of competition in intricate environments, such as business ecosystems, compared to the NPT theory of perfect competition. An advantage of ecological approaches to competition is their integration of the institutional environment when addressing the issue of selection and 'fitness'. They incorporate the concept of environmental isomorphism and envisage it in a dynamic perspective, allowing for institutional (environmental) adaptation and change in their models.

4. Competition, organisational diversity and change: organisational institutional theory

The competitive type of isomorphism in organisational ecology is based on a system rationality that prioritises market competition, niche change, and fitness measures. This perspective is particularly applicable to fields where free and open competition is present. However, it does not address the ways in which institutional change processes may lead to organisational diversity. Organisational institutional theory advances an institutional view of isomorphism, which predicts that 'once disparate organisations in the same line of business are structured into an actual field

[278] Ibid.
[279] Ibid.
[280] Ibid.
[281] D. N. Barron, The Structuring of Organizational Populations, (1999) 64(3) American Sociological Review 421.

[...] powerful forces emerge that lead them to become more similar to one another'[282]. Naturally, organisations may alter their objectives or adopt new methods, and new entities may also emerge within the sector. However, as time passes, stakeholders within organisations, making rational decisions, often inadvertently create a setting that limits their ability to implement significant changes in the future. The combined effects of these individual choices lead to institutional changes that constrain 'the diversity within the sector'[283].Consequently, institutional change remains uniform and does not foster organisational diversity.

According to this view, institutional isomorphic change may come in three forms: (i) *coercive isomorphism* stems from 'both formal and informal pressures exerted on organizations by other organizations upon which they are dependent and by cultural expectations in the society within which organizations function' (e.g. coercion from powerful suppliers on which a firm is dependent), (ii) *mimetic isomorphism* may result from common responses to uncertainty, as organizations model themselves on other organizations to deal with new organizational technologies or ambiguous goals (e.g. the expansion of the ecosystem logic from the digital economy to the way non-digital firms determine their competitive strategy), and (iii) *normative isomorphism*, associated with professionalization and the monopoly of the professions, due to the development of a similar cognitive base in the form of academic training as well as the hiring of individuals from firms within the same industry or participation to professional networks that span different organizations (e.g. the diffusion of the start-up organizational structure in the broader economy)[284].

Isomorphism arises from both competitive and institutional factors, including pressure from dominant or monopolistic entities, coordinated imitation schemes, and the cognitive control exerted by professions or other social groups. Consequently, it is challenging to draw definitive conclusions about the presence or absence of competition based on the observed outcomes, as these tend to be consistent within each specific context.[285]. Therefore, focusing solely on outcomes doesn't provide insight into the presence, absence, or strength of competition. This highlights the importance of embracing a concept of competition associated with the rise of several distinct economic actors, which should promote diversity rather than accelerate uniformity[286]. By highlighting the importance of cultivating/engineering diversity, as a reaction to the isomorphic tendencies of (natural) organisational competition, this approach escapes the naturalism of the invisible hand hypothesis

[282] P.J. DiMaggio, W.W. Powel, The iron cage revisited: institutional isomorphism and collective rationality in organizational fields, (1983) 48 American Sociological Review 147, 148.
[283] Ibid., 148-149.
[284] Ibid., 150-153.
[285] Ibid., 157.
[286] Ibid., 158.

and may call for the visible hand of the State to maintain organisational diversity. It also brings into the picture the role of institutions in framing change.

C. Competition in a Connexionist World: Ecosystems and co-opetition

The evolutionary approaches outlined above emphasise the significance of environmental fitness and institutional change, offering a macro- and meso-level perspective on analysing the competition phenomenon. This highlights the need for a multi-level paradigm to study the adaptive strategies of agents, such as firms, and the establishment of multilevel functional organisations that facilitate their interaction within complex systems. Networks serve as the meso-level concept that functions as the 'interface' between various social and economic actors, situated between the dynamism of markets and more structured hierarchies – 'the visible hand of organizational authority'[287]. To the extent that 'networks are a relational form of governance' the analytical focus is on the nature of the relationships rather than the attributes of the actors, and to the extent that they offer access to parties that provide information, resources and referrals, an important element to study should be the location or position within the larger context in which information and resources flow[288].

Motivated by the development of computer networks, enabling economic actors to collaborate in real-time and from distance, Boltanski and Chiapello explored the emergence of a 'connexionist' world, which is exemplified by the paradigm of the 'projective city'[289]. This world is founded 'on the mediating activity employed in the creation of networks', mediation being 'a value in itself'; in this world, the goal pursued is the establishment of networks, 'independent of the goals pursued or the substantive properties of the entities between which the mediation is conducted'[290]. The network metaphor does not therefore aim to describe the social interactions (economic transactions) occurring between the various actors of interest, as in the markets as networks perspective, but takes a normative dimension and becomes the essence of economic interactions: in a network world, the game is to 'multiplying connections and proliferating links, the succession of projects' having the effect of 'extending networks'[291]. As Boltanski and Chiapello put it, everyone is contactable, in essence the world is 'a network of potential connections'[292].

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[287] L. Smith-Doerr & W. W. Powel, Networks and Economic Life, in N.J. Smelser & R. Swedberg (eds.), *The Handbook of Economic Sociology* (2nd, ed., 2005), 379.
[288] Ibid., 380.
[289] L. Boltansli & E. Chiapello, *The New Spirit of Capitalism* (Verso, 2007), 107.
[290] Ibid., 107.
[291] Ibid., 111.
[292] Ibid., 114.

The network-based form of organization of the capitalist project that emerged from the middle of the 1970s has therefore distinct characteristics than the typical market exchange, as conceived in Boltanski & Thevenot's paradigm of the 'commercial city' which they link to the classical and neoclassical economics' worldview[293]. First, '(w)hereas the purely market transaction is of moment, and ignores time, organization of collaboration and exchanges in network form assumes establishing relations between partners which, without being stabilized by plans or regulations, nevertheless possess a relative enduring character'[294]. Second, '(w)hereas the market is assumed to be transparent for the purposes of price formation' and information is available and transmittable to all, in networks information is not available to everyone 'simultaneously in its entirety' and is only available at the point of connections, thus highlighting the local character of networks[295]. Third, in contrast to markets which function anonymously, or 'with personal relations that are reduced to a minimum', networks rely on relations of interdependence and trust that become consolidated over the long term[296]. Fourth, in a connexionist world products are not separated, as in the 'commercial city' regime of justification, from the persons engaged in the exchange and stabilised by conventions and standards that define the qualities of the product (e.g. brands), but they are shaped by the links between the persons who enter into relationships[297].

Finally, whereas competition plays a crucial role in the commercial city/market world, relationships in a connexionist world are characterised by a mixture of simultaneous cooperation *and* competition between network affiliates, a situation portrayed by the concept of 'co-opetition'[298]. In this context, independent firms are linked operationally across multiple tiers in a network, in which they *compete* (for the attention of or to the benefit of a third party) but also *cooperate* to fulfil a common set of tasks increasing the value of the network[299]. However, as economics was made for

[293] See, L. Boltanski & L. Thévenot, *On Justification: Economies of Worth* (Princeton, 2006), (putting forward different models of 'cities' according to predominant regimes of justification of action, such as the commercial city, the industrial city, the city of political power, the city of dwelling etc.).
[294] L. Boltansli & E. Chiapello, *The New Spirit of Capitalism* (Verso, 2007), 129.
[295] Ibid.
[296] Ibid., 130
[297] Ibid., 130.
[298] Ibid. 132.
[299] The concept originates from game theory (see, and has been popularized by A Brandenburger and BJ Nalebuff, *Co-opetition* (Doubleday, 1997) (describing the situations where businesses become more competitive trying to maximize their interests by cooperating with each other and developing unique capabilities that add value and complement those of their competitors). See also, M. Bengtsson & S. Kock, Coopetition—Quo vadis? Past accomplishments and future challenges, (2014) 43(2) Industrial Marketing Management 180.

and provides the disciplinary foundations of the 'commercial city', there is relatively little on co-opetition, let alone a proper theory of co-opetion to draw upon[300].

Co-opetition places the entities in question in a 'paradoxical' situation. In contrast to strategies of market competition, described since Simmel as a triadic relation of competition between two actors (dyad) for the attention of a third who benefits (the *tertius gaudens*), the absence of a link between the two parties suggesting a competitive tension whenever they produce products with equivalent functionality, requiring similar scare resources, and relying on overlapping technologies, network competition also includes a strategy of mediation or matchmaking. This is, in essence, a strategy of *tertius iungens*, as the non-partisan broker establishes an indirect connection between the disconnected nodes within the triad, these not being in direct link with each other, but only through the intermediation of the broker.

The intricate relationships within a connectionist framework cannot be fully explained by the market concept, which categorises relationships as either competitive or cooperative - resembling the binary nature of using discrete values of zero (0) or one (1). A more comprehensive understanding of strategic action requires a conceptualization akin to quantum computing, where values can simultaneously hold both zero (0) and one (1), enabling systems to engage in both simultaneous and/or sequential competition and cooperation. These complex dynamics align more closely with the concept of a business ecosystem, which captures a network of actors engaging in relationships that encompass elements of both cooperation and competition.[301]. As Moore explains, '(i)n a business ecosystem, the leaders of a multitude of firms come together around a broad vision of a future they want to make happen' and 'understand that establishing this future will require both cooperation and competition among their firms'[302]. However, the concept englobes not just economic actors competing and cooperating, but also the broader environment – the habitat factors from which, due to their specific characteristics, the organisations in question cannot be separated from, and which also becomes the source of their vulnerability and instability[303].

This more complex setting calls for different strategies than in the simple market/'commercial city' context to assess power, but also to answer the question of

[300] See the analysis by G. Dagnino & G. Padula, Co-opetition Strategy – A New Kind of interfirm Dynamics for value Creation (EURAM, 2002) of the limitations of Brandenburger's and BJ Nalebuff's approach.

[301] J.F. Moore, Predators and Prey: A New Ecology of Competition, (1993) 71(3) Harvard Business Review 75; M. Iansiti & R. Levien, Strategy as Ecology, (2004) 82(3) Harvard Business Review 68; J.F. Moore, Business ecosystems and the view from the firm, (2006) 51(1) The Antitrust Bulletin 31; MJ. Jacobides, C. Cennamo & A. Gawer, Towards a Theory of Ecosystems, (2018) 39(8) Strategic Management Journal 2255.

[302] J.F. Moore, Business ecosystems and the view from the firm, op.cit., 73.

[303] A.G. Tansley, The Use and Abuse of Vegetational Concepts and Terms, (1935) 16(3) Ecology 284.

what would be a fair allocation of the surplus generated by co-opetition. To the extent that the ability to forge relations and to move around, between different network geographies, actors and ideas, becomes a source of profit in a connexionist world[304], those actors benefit from structural (wealth of links) and other substantial benefits thus dominating the network, and the other actors. High status presupposes displacement, or as Boltanski and Chiapello explain, 'the immobile are exploited in relation to the mobile': '(t)hey are exploited in the sense that the role they play as a factor in production does not receive the acknowledgment it merits; and that their contribution to the creation of value added is not remunerated at the requisite level for its distribution to be deemed fair'[305]. Cut by indispensable 'keyholders' and relegated to more remote locations at the edge of a network, the 'immobile' do not profit from the relational capital amassed by the central node of the network, although they contribute to it, and they suffer from unequal chances of rent extraction in networks. This raises interesting questions as to the determination of what may constitute exploitation and unfairness in a connexionist world. Loyalty, stability and dependence on one central actor may become a source of network disadvantage and differential rents[306]. These issues will become increasingly important as regulations enforce Fair, Reasonable and Non-Discriminatory (FRAND) terms for accessing the resources and infrastructure of gatekeepers or digital platforms. This aims to ensure fairness in the distribution of the surplus value created by the expansion of the network between them and their partners, taking into account the network-related added value and the collective contributions of all ecosystem members[307].

The topic of exploitative behaviour in such complex social and economic systems is also noted by complexity theorists, such as Brian Arthur who laments the way equilibrium economics contains a bias inhibiting economists from seeing future

[304] L. Boltansli & E. Chiapello, *The New Spirit of Capitalism* (Verso, 2007), 361.
[305] Ibid., 363.
[306] Sociological research has analyzed profits as a 'social rent', defined as 'a remuneration for inhibiting a special position in the social structure of markets and production fields', and thus not 'micro-founded' (at the individual level, for instance because of higher efficiency) as conceived by neoclassical economics , but in this context are 'meso-founded' on the local structure of networks. See, S. Muennich, A sociology of profit – Economic Sociology and the Profit Puzzle in Economics (American Economic Association); S. Muennich, Profit as Social Rent: Embeddedness and Stratification in Markets, (2019) 37(2) Sociological Theory, 162-183.
[307] In this context the value does not stem from the technological component but from the organizational arrangements – the alignment of business strategies made- to co-produce value. I. Lianos, Value extraction and institutions in digital capitalism: Towards a law and political economy synthesis for competition law, (2022) 1(4) European Law Open 852, 856-859. On FRAND obligations in the context of the recent EU regulatory framework of the Digital Markets Act see, D. Mantzari, FRAND in Article 6(12) DMA: a pragmatic approach with unintended consequences, (2024) *Journal of Antitrust Enforcement*, jnae019, https://doi.org/10.1093/jaenfo/jnae019 ; E. Habich, FRAND Access to Data: Perspectives from the FRAND Licensing of Standard-Essential Patents for the Data Act Proposal and the Digital Markets Act, (2022) 53 *IIC* , 1343, https://doi.org/10.1007/s40319-022-01255-x

potential exploitation as 'by definition equilibrium is a condition where no agent has any incentive to diverge from its present behavior' and who makes suggestions as to the construction of artificially intelligent methods that could automatically anticipate the possible exploitation of economic and social systems[308]. Among a non-exhaustive list of exploitative behaviour, Arthur notes the use of asymmetric information, the gaming by the agents of the performance criteria under which agents' behaviour is evaluated, the control of some significant portion of the resources of a system for the agent's own egoistic purposes, the use of the behaviour of the system, to manipulate the system, such as 'using a website's rating possibilities to manipulate others' ratings'[309].

D. Implications for Competition Law and Policy Analysis

When approaching competition from the standpoint of embeddedness rather than the abstract view of atomistic markets, it has numerous implications for the focus of the analysis in competition law and policy. A few of these implications are discussed below[310].

First, while neoclassical economics focuses on the characteristics of the economic transaction (or the exchange), the most important being the price vector, or other characteristics such as quality, variety, innovation[311], sociological approaches focus on the social relations and interactions between the various actors interacting in the market or other organizational field. This is common to all sociological approaches to competition. Focusing on the social relation makes sense in the era of 'mass personalisation', predictive marketing algorithms and 'markets for attention', in which establishing a personalised bilateral relation between a digital platform and a 'user' may be a source of significant present and future value, sometimes generated by a process of monetization in 'behavioural futures markets'[312].

Second, conceiving markets as interfaces between various economic actors, structural approaches depart from the supply and demand-focused versions of competition in neoclassical economics, and integrate as a crucial factor the positioning of producers/actors, and the strategies with which these *construct* (and *frame*) these interfaces, not necessarily to respond to demand, which of course

[308] W. B. Arthur, *Complexity and the Economy* (OUP, 2015), 104.
[309] Ibid., 107-109.
[310] A more elaborate discussion on the topic is offered in I. Lianos, *Polycentric Competition Law: a Competition Law for Complex Adaptive Social Systems* (forth. 2025).
[311] See, for instance, R.S. Markovits, *Economics and the Interpretation and Application of U.S. and E.U. Antitrust Law* (1st ed, Springer, 2004) (advancing the Quality-Variety Investment competition framework).
[312] S. Zuboff, *The Age of Surveillance Capitalism* (Profile Books, 2019), 140.

generates uncertainty, but in relation to the action of other producers, whose strategies they *observe*. The term producer is meant broadly to include not just what would qualify in competition economics as horizontal competitors (as determined by the substitutability of their products from the perspective of the demand as measured by a price vector), but also anyone that could eventually threaten their survival or reproduction (in the economic sense expansion in different geographic or product markets). In this context, elements of singularisation, such as different prices, quality, and innovation, enable the producers to move away from the market schedule which forms, as explained above, the 'shared social construction incorporating all the interaction effects' (between market participants). This leads them to reinforce their position, gain market share and hence improve their chances of survival[313]. This idea of market as a 'reproducible role structure' brings attention to the emergence of relatively stable social hierarchies in markets[314], in which high-status firms only compete with other high-status firms or competition between generalists leaves some competitive space for specialists to emerge and to survive.

Third, the social structure of competition involves studying the interactions that form a network using tools of computational sociology and agent-based modeling to measure and visualize the connections between different actors. The positioning of an actor's connections in the social structure of competition can determine entrepreneurial opportunities, access to information, and control benefits, ultimately influencing the actor's autonomy and power. These connections are not only assessed at the market level but also encompass intra-organizational relations within firms. The sociological approach therefore enables the assessment of competitive interactions in a larger variety of mechanisms of coordination on which any society relies than just markets[315]. This may be more realistic than just focusing on markets

[313] Cultural approaches to markets in the performativity tradition challenge the market-interfaces conception of competition, in which lower prices or higher innovation constitute an avoidance strategy to move away from the market schedule, and advance a market-agencement perspective in which innovation becomes the 'very nature of competition' and in which 'collective action structured by socio-technical devices' intends to establish successful bilateral commercial transactions and to promote their proliferation, for instance through the 'framing' (design and articulation activities, sometimes resulting from 'political engineering' of the structure of these agencements) that feed this singularization process: M. Callon, Revisiting marketization: from interface markets to market agencements, (2016) 19(1) Consumption Markets & Culture 17.

[314] This focus on market hierarchies has recently found its way in competition law: see, Commission Decision, Case AT-39740 - Google Search (Shopping) (June 27, 2017), para. 267 ('(i)n fast-growing sectors characterised by short innovation cycles, large market shares may sometimes turn out to be ephemeral and not necessarily indicative of a dominant position. However, this fact cannot preclude application of the competition rules, in particular Article 102 of the Treaty, especially if a fast-growing market does not show signs of marked instability during the period at issue and, on the contrary, a rather stable hierarchy is established');

[315] As Herbert Simon reminds us, '(r)oughly eighty percent of the human economic activity in the America economy, usually regarded as almost the epitome of a "market" economy, takes place in the internal environments of business and other organizations and not in the external, between-

which leaves outside from the analysis of competitive interactions the 'black box' of the firm, although this may be of significance for competition, as the recent literature on the competition implications of common and joint ownership has shown us[316].

Fourth, while some sociological approaches incorporate the concept of equilibrium, it is not grounded in optimization strategies as seen in neoclassical economics. In neoclassical economics, all choices are assumed to be consistent and transitive, with alternatives measurable in terms of a common utility function. This leads to the identification of an optimal equilibrium point, where either all equations (in the general equilibrium model) or the relevant equations (in the partial equilibrium model) are solved and the market is cleared. It's important to note that not all economists accept this approach. As Herbert Simon observed, markets are 'populated by consumers and producers who satisfice instead of optimizing', and although they do not usually optimize, markets often clear[317]. Actors/firms strive for satisfactory pay offs rather than optimal ones[318]. This may lead to the emergence of multiple satisficing equilibria or, as mentioned above, of a punctuated equilibrium. Prioritising satisficing over optimising is attractive from a normative standpoint as it allows for the incorporation of a wider range of evaluation criteria. This approach also facilitates the development of multi-performance indicators and broader concepts of well-being and happiness, such as functioning and capability approaches. The concept of satisficing, as opposed to optimising, raises questions about the traditional role of the auctioneer in Walrasian equilibrium models. It emphasises the emergence of market dynamics from local interactions and feedback loops to 'correct for unexpected or incorrectly predicted events' (the Knightian uncertainty)[319]. This can lead to the development of temporary steady states or chaotic behaviour, resulting in a variety of evolutionary patterns. These feedback loops and path dependence also explain why economic actors 'feedforward' in their actions and competitive strategies, which can cause speculation and sometimes systemic

organization environments of markets', arguing that 'it would be appropriate to call such a society and organization-&-market economy': H.A. Simon, *The Sciences of the Artificial* (MIT press, 2019, 3d ed. 1996), 31-32.

[316] See, for instance, M. Antón, F. Ederer, M. Giné & M. Schmalz, Common ownership, Competition, and Top Management Incentives, (2023) 131(5) Journal of Political Economy 1294.

[317] H.A. Simon, *The Sciences of the Artificial* (MIT press, 2019, 3d ed. 1996), 33.

[318] Simon, op. cit., 38 citing R. Radner, Satisficing, (1975) 2 Journal of Mathematical Economics 253. See also, S.G. Winter, Economic "Natural Selection" and the Theory of the Firm, (1964) Yale Economic Essays, 225 (noting with regard to firms that 'The typical response to the highly complex decision problem confronting a large organization-with the attendant uncertainties, the necessity for dividing the task of decision making among several individuals, and so forth-is said to be a process of search which terminates when some satisfactory solution to the problem is found. rather than when an optimal solution is found').

[319] H.A. Simon, op.cit., 34-35 (noting how computational limits of human beings (and organizations) led market actors to make decisions based on information that is available to them locally, without knowing much about what is going on in the rest of the economy 'apart from the prices and properties of the goods they are purchasing and the costs of the goods they are producing').

instability[320]. The actors' expectations or aspirations, are adaptive, as they gradually learn from the unfolding events around them, including the strategies followed by their peers, and more broadly their evolving socio-economic and biological environments. 'Fitness' should therefore be judged at the outmost at the local environment level ('the local maxima') rather than at the level of the whole system[321].

Fifth, evolutionary approaches to competition insist on this adaptation or selection of the actors to their environment that characterises the competitive game. Using again Herbert Simon's terminology, the environment operates metaphorically as a 'mold' providing a certain sense of purpose to the way the artifact (in our case competition) performs[322]. Pushing further the metaphor, one may argue that this perspective breaks with the perception of markets and competition as a natural order or something naturally emerging, and instead views them as artificial interfaces (artifacts) between 'an inner environment' (e.g. the substance and the organization of competitive actors), and an 'outer environment', 'the surroundings in which it operates'[323]. In contrast to some approaches in complex economics[324], markets and the nature competition are thus shaped by cultural norms and institutions, among which the legal system (including competition law), play an important role[325]. The competing behaviour will in this case attempt to respond to, and take on the shape of, the outside (task) environment, considering the limiting properties of the inner environment (e.g. limited dynamic capabilities).

Among evolutionary thinking, population and organisational ecology approaches to competition draw attention to its role as a selection process, the principle of competitive exclusion explaining that a population is isomorphic to its environment, and that a population (e.g. of firms) with characteristics less fit to their environment will be eliminated by a fitter (to the environment) competitor. The principle explains the importance of the strategy of developing "niches" enabling differentiation and diversification, firms constructing an environment in which they may thrive and survive competition. This explains organisational diversity, as niches, sometimes formed by mutualistic interactions or beneficial cooperation between inferior

[320] Ibid., 36.
[321] Ibid., 47.
[322] Ibid., 5.
[323] Ibid., 6-7.
[324] See, for instance, W.B. Arthur, *The Nature of Technology* (Free Press & Shuster, 2009) (not examining the role of institutions, such as DARPA for instance, in technological evolution); J. Doyne Farmer, Making Sense of Chaos (Allen Lane, 2024) (which mentions only 'interacting institutions' when examining the financial system, without however integrating institutions in the analysis); R. Cazzolla Gatti, R. Koppl, B.D. Fath, S. Kauffman, W. Hordijk, R.E. Ulanowicz, On the emergence of ecological and economic niches, (2020) 22 Journal of Bioeconomics 99, 118 (noting that 'social institutions such as legal systems are relatively unimportant in economic growth').
[325] See, for instance, F. Dobbin, The Market That Antitrust Built: Public Policy, Private Coercion, and Railroad Acquisitions, 1825 to 1922, (2000) 65(5) American Sociological Review 631.

competitors, or through the development by inferior competitors of different competitive abilities, allow smaller or low-status firms and specialists to survive vis-à-vis competition by larger or high-status firms and/or generalists. 'Niche differentiation' is not the only contribution of population ecology approaches, but also other theories such as resource-partitioning and population density may enable the development of economic models that are inspired by natural ecology learnings[326], considering of course the idiosyncrasies of complex adaptive *social* systems as explained in the introductory part of this study.

The rise of the network economy has redefined competition. The focus is no longer solely on generating profits from product design, production, and distribution but on creating value through expanding networks, establishing new connections, and fostering interactions. In this networked world, the emphasis is on broadening and strengthening connections. This underscores the concept of 'co-opetition' among economic players, creating business ecosystems characterised by both cooperation and competition among network affiliates. This complexity challenges the assessment of competitive interactions, exploitation, and power within an ecosystemic framework[327].

V. Topology and Varieties of Power: A Sociological Perspective[328]

The insights of sociological analysis on the 'amorphous' concept of power may be quite relevant for competition law and policy research, in particular as this moves away from narrow neoclassical price theory-inspired definitions of power defined as the ability to raise prices profitably and reduce output to a conception that position in a network may empower (or constrain) action, as it reinforces or reduces dependencies. By allowing the integration of different competition parameters than price, a sociological approach to power may better engage first with the mapping of the interactions between the various heterogeneous actors that have competitive interactions in different organisational settings (markets and economic organisations, such as firms and ecosystems), thus providing a fuller and more realistic depiction of power relations, but also, second, with the broader question of the values pursued by the specific community of inquiry (e.g. consumers,

[326] See, for instance, S. Amir, On the ecological meaning of the competitive exclusion principle in the context of an economic analogy, (1981) 4(3) Journal of Social and Biological Structures 237.
[327] I. Lianos, Ecosystems and Competition Law: A Law and Political Economy Approach, Competition Policy International (CPI) (May 9, 2024), available at Ecosystems and Competition Law: A Law and Political Economy Approach (pymnts.com) .
[328] Part of this section draws on I. Lianos & B. Carballa-Schmichowski, A Coat of Many Colours—New Concepts and Metrics of Economic Power in Competition Law and Economics, (2022) 18(4) Journal of Competition Law & Economics, 795.

stakeholders, citizens, and the public at large), which is important as what counts as a parameter of competition is a value-laden issue[329].

By expanding the scope of competition beyond traditional markets and taking into account the various challenges to a firm's survival, it is possible to broaden the range of competitive interactions relevant to competition law. This includes not only horizontal competition between similar product rivals but also competition across markets and industries, vertical competition between suppliers and distributors for the value created by their collaboration, and innovation competition that may render an incumbent firm's product obsolete. White reminds us that substitutability constitutes 'an issue not only within a market but also between markets, especially those that share similar structurally equivalent locations in the networks of a production economy'[330]. He accepts however that even this 'second level of substitutability' may be conceived as substitutability with other markets within the same sector, '(t)here will be little or no substitutability with industries that are downstream or upstream from the given one'[331]. Others have put forward the political economy-inspired concept of (global) value chain, and the different regimes of governance this may take, as an additional approach to explore the power relations between economic actors[332].

A. Different dimensions of power

The Weberian definition of power focuses on 'the probability that one actor within a social relationship will be in a position to carry out his own will despite resistance, regardless of the basis on which this probability rests'[333]. Weber acknowledged that power is formed through social interactions between individuals and that it is wielded by one person to affect others. However, his approach did not delve into the particular origins or aspects of power within the economy, nor did it explore the reasons for complying with the directives of those holding power[334]. Subsequently, conceptions of power have evolved from more visible dimensions of dependence linked to the ability (power to) control vital inputs thus providing power over others dependent on

[329] See, S. Makris, Openness and Integrity in Antitrust, (2021) 17(1) Journal of Competition Law & Economics, 1.
[330] H.S. White, *Markets from Networks – Socioeconomic Models of Production* (Princeton univ. press, 2002) 128.
[331] Ibid., 130.
[332] See, G. Gereffi, J. Humphrey and T. Sturgeon, "The Governance of Global Value Chains", (2005) 12 *Review of International Political Economy*, 78-104. For an application in competition law, see I. Lianos, *Global Food Value Chains and Competition Law* (CUP, 2022).
[333] M. Weber, *Economy and Society* (Bedminster Press, 1968, first published in 1921), 53.
[334] M. Granovetter, Society and Economy – Framework and Principles (Harvard Univ. Press, 2017), 91-92.

these resources[335] to less visible dimensions over the ability to shape the preferences, desires, beliefs and the agenda of other actors, eventually contrary to their interests (conduct-shaping power)[336], but also more broadly social structures that may discipline human behaviour (context-shaping power)[337].

Resource dependence theory (RDT)[338] understands organisations, such as the firm, as depending on resources external to it and on the uncertainty, constraints, and contingencies of its external environment; hence it perceives power as *control* over these critical external resources that a firm needs to operate[339]. The focus here is on resource imbalances between actors. The theory expands the power dependency theory (PDT), which relies on the broad idea that the power of one actor is based on the opponent's dependence on that actor, or more specifically 'the dependence of an actor B upon an actor A , is (1) directly proportional to A's amount of motivational investments in goals mediated by B and (2) inversely proportional to the availability of those goals to A outside the A-B relation'[340]. The linkage between power and reducing dependence on the environment also characterises ecology perspectives which explain organisational selection and survival as linked to an organisation's ability to reduce environmental dependencies while gaining power over other actors[341]. In this view, power may be understood as the ability to resist selection pressures linked to higher structural inertia. A different perspective on power results from organisational institutional theories which emphasized the compliance of organisational actors to institutional rules and norms, this power being based on legitimacy, as 'reliance on established, legitimated procedures enhances organisational legitimacy and survival characteristic"[342]. Institutional organisation approaches develop a 'bifocal'

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[335] On the power to and power over distinction, see P. Pansardi, Power to and power over: two distinct concepts of power?, (2012) 5(1) Journal of Political Power 73.

[336] M. Granovetter, Society and Economy – Framework and Principles (Harvard Univ. Press, 2017), 100-102.

[337] C. Hayward & S. Lukes, Nobody to shoot? Power, structure, and agency: a dialogue, (2008) 1(1) Journal of Political Power 5. (opposing an agent-centered definition of power to a structural view and arguing that actors may be powerless, not because they are in someone else's power (someone to shoot), but because of the underlying social institutions and networks).

[338] J. Pfeffer & G. Salancik, *The External Control of Organizations: A Resource Dependence Perspective* (Stanford University press, 2003); J. Pfeffer, *Power in Organizations* (Pitman, 1981)

[339] D. Ulrich, J.B. & Barney, Perspectives in organizations: Resource dependence, efficiency, and population, (1984) 9 Academy of Management Review, 471. In the RDT framework criticality of a resource denotes 'the ability of the organization to continue functioning in the absence of the resource or in the absence of the market for the output': J. Pfeffer & G. Salancik, *The External Control of Organizations: A Resource Dependence Perspective* (Stanford University press, 2003), 46. What is a critical resource 'is a matter of social definition': J. Pfeffer, *Power in Organizations* (Pitman, 1981, 125.

[340] R.M. Emerson, Power-Dependence Relations, (1962) 27 American Sociological Review 32.

[341] D. Ulrich, J.B. & Barney, Perspectives in organizations: Resource dependence, efficiency, and population, (1984) 9 Academy of Management Review, 471.

[342] P.J. DiMaggio, W.W. Powel, The iron cage revisited: institutional isomorphism and collective rationality in organizational fields, (1983) 48 American Sociological Review 147, 155.

perspective on power, perceived as 'the power to set premises, to define the norms and standards which shape and channel behavior' and that of defining 'models of organizational structure and policy which then go unquestioned for years to come'[343]. As Pfeffer observes, 'the exercise of power frequently involves controlling the agenda of what is considered for decision'[344]. The power to set the agenda forms part of these less visible forms of power than material economic power. This includes 'symbolic power'[345], power that translates to symbolic capital, the power to impose the legitimate vision of the world[346], or subtle-power mechanisms such as the disciplinary form of power[347]. We will not venture here for lack of space in the exploration of other dimensions of power, that of bypassing people's capacity to choose or of undermining that very capacity[348], which merit specific attention[349].

As power is evaluated within a social framework, the placement of an economic actor in the social networks in which she operates can provide valuable insights into her influence over other actors[350]. However, it is also clear that central positioning in a network is not itself conclusive as to the existence of power if it does not give rise to some form of direct or indirect dependency[351]. Being positioned at the center of a social network does not immediately result in holding more power, Granovetter observes, 'as this depends in part upon whether a network of exchange is connected negatively or positively: in the former, exchange with one partner precludes exchange with others, whereas in the latter, exchange in one relationship facilitates that in others'[352]. This is explained, in part, by the fact that if central actors are connected to others who are also central, this reduces their ability to gain an advantage in exchange in negatively connected networks, while in positive connected networks central actors may serve

[343] Ibid., 157.
[344] J. Pfeffer, *Power in Organizations* (Pitman, 1981), 146.
[345] P. Bourdieu, Symbolic Power, (1979) 4 Critique of Anthropology 77, 79 (noting that 'Symbolic power is a power to construct reality which tends to establish a gnoseological order; the immediate meaning (sens) of the world particularly of the social world) presupposes what Durkheim calls logical conformism, i.e. 'a homogeneous conception of time, space, number, and ' cause which makes agreement possible between intelligences').
[346] C. Cronin, Bourdieu and Foucault on power and modernity, (1996) 22(6) Philosophy and Social Criticism 55, 68.
[347] M. Foucault, *Discipline and punish - The birth of the prison* (Random House, 1991), 200 (referring to the Panopticon of J. Bentham as an example of this disciplinary power which is a correlative to juridical power which flows from a central source and is repressive (relying on sanctions) noting that 'in order to be exercised, this [disciplinary] power had to be given the instrument of permanent, exhaustive, omnipresent surveillance, capable of making all visible, as long as it could itself remain invisible').
[348] S. Lukes, *Power – A Radical View* (Bloomsbury, 3d ed.), 170.
[349] These forms of power (and their proposed criteria/metrics) will be examined in I. Lianos, *Polycentric Competition Law: a Competition Law for Complex Adaptive Social Systems* (forth. 2025).
[350] M. Granovetter, *Society and Economy* (Belknap Press of Harvard University press, 2017), 104.
[351] L. Smith-Doerr & W. W. Powel, Networks and Economic Life, in N.J. Smelser & R. Swedberg (eds.), *The Handbook of Economic Sociology* (2nd, ed., 2005), 379, 383
[352] M. Granovetter, *Society and Economy,* op.cit., 105.

as brokers in cooperative relations[353]. This argument seems reminiscent of the structural holes argument which explains how nonredundant contacts may increase the structural autonomy of the agent.

Given the elaborate methodology and metrics emerging from this literature, we examine resource dependency theories of power. However, we also recognize that it would be valuable to invest in other approaches, for instance relying on social network analysis[354], agent-based models[355], and other related computational sociology tools (such as artificial societies/worlds and applied simulations)[356] that could be of relevance for competition law enforcement[357].

B. Power based on resource dependence

Dominant conceptions of economic power link power to dependence: 'someone who controls resources that you value has power over you – can cause you to modify your behaviour in an attempt to obtain more of those resources than otherwise'[358]. Hence, power in the economy may derive from 'dependency arising from some particular distribution of resources'[359]. Resource dependence between two firms may precede their business relationship, coincide with their relation (and the contract that incepts such relationship), or arise in implementing that relationship. Most often we have a situation of unbalance in the business relationship

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[353] Ibid.

[354] For an application of advanced social network analysis in competition law, see I. Lianos, A. Velias, D. Katalevsky & G. Ovchinnikov, Financialization of the Food Value Chain, Common Ownership and Competition Law, (2020) 16(1) European Competition Journal 149.

[355] See, for instance, M.W. Macy & R. Willer, From Factors to Actors: Computational Sociology and Agent-Based Modeling, (2002) 28 Annual Review of Sociology 143.

[356] See, for a discussion, F. Squazzoni, *Agent-Based Computational Sociology* (Wiley, 2012).

[357] The application of agent-based modelling in competition law and policy was mentioned by I. Lianos, Polycentric Competition Law, (2018) 71(1) Current Legal Problems 161, 207 and discussed further in I. Lianos, Competition Law for the Digital Era: A Complex Systems' Perspective (August 30, 2019). Available at SSRN: https://ssrn.com/abstract=3492730 11-12; I. Lianos & A. McLean, Competition Law, Big Tech and Financialisation, in M. Corradi & J. Nowag (eds.), *Intersections between Corporate and Antitrust Law* (Cambridge Univ. Press, 2023), 319. For one of the few applications in the economics of competition and mark-ups of a rigorous agent-based model see, R. Terranova & E. Tuco, Concentration, Stagnation and Inequality: An Agent-based approach, (2022) 193 Journal of Economic Behavior and Organization 569. See also, For the first agent-based model application in antitrust economics, see, C. Marsupino, An agent-based simulation of cartels formation in a market with heterogeneous firms (University of Turin, 2014), available at https://terna.to.it/tesi/marsupino.pdf . For a more recent discussion of a simple ABM model in antitrust, see, T. Schrepel & J. Schuler, The End of Average: Deploying Agent-Based Modeling to Antitrust (March 3, 2024). Amsterdam Law & Technology Institute Working Paper Series 2024, VU University Amsterdam Legal Studies Paper Series, available at SSRN: https://ssrn.com/abstract=4752578. Thank you to F. Bassi and A. Russo for attracting my attention to these papers and for useful discussion.

[358] M. Granovetter, *Society and Economy* (Belknap Press of Harvard University press, 2017), 92.

[359] Ibid., 94.

between two firms, which makes it impossible or excessively difficult for one to continue with the business without the other, because of a high degree of interdependence between them, given the intra-organizational relation between them, in the context of a supply or value chain. Resource dependence may also result from market conditions that precede the stipulation of the relation, for instance, the high number of users or market share of an entity forces its business partners to accept the terms imposed by it and to undertake specific investments or actions to maintain and develop that business relationship.

The definition of a situation of resource dependence relates to the framework of analysis used, e.g. social exchange theory or standard economics, and in particular the conceptualisation of the asymmetrical relation as a binary relation, a network or an anonymous spot market(s) interaction.

Resource dependence can also arise from a social exchange scenario, where two economic actors are involved, and one of them controls a crucial resource or asset. It is important to examine the connection between social exchange theory and the power dynamics that emerge from a situation of dependence. Social exchange theory views power as a form of social interaction. In his seminal conceptualisation of power, Emmerson notes that the 'power to control or influence the other resides in control over the things he (the other) values' and that are not available elsewhere. The concept of dependence under the social exchange theory is therefore linked to resource differentials or unbalances between entities (individuals or firms)[360]. Under this conception, the power capability of B, in relation to A, is the inverse of A's dependence on B. B is dependent on A to the degree that A has power over B. A and B are at the same time of course inter-dependent, or mutually dependent, but this, on its own, cannot be a source of power, which as we have described above is associated with the existence of some asymmetrical control of resources or asymmetry in the underlying exchange.

For some, Emerson's exchange theory 'yields two distinct theoretical dimensions of resource dependence: power imbalance, or the power differential between two organizations, and mutual dependence, or the sum of their dependencies'[361]. This needs further elaboration, taking into account that social exchange theory does not analyse the resource differential linked to the individual characteristics of the actor in abstract, but conceives power as a 'property of the social relation'[362]. Blau has indeed observed that exchange relations between a person or entity with another may take different forms: (i) independence (if the outcomes of the exchange depend on one's sole effort), (ii) dependence (if the

[360] R.M. Emerson, Power dependence relations, (1962) 27(1) American Sociological Review 31.
[361] T. Casciaro & M. Jan Piskorski, Power Imbalance, Mutual Dependence, and Constraint Absorption: A Closer Look at Resource Dependence Theory, (2005) 50 Administrative Science Quarterly 167, 168.
[362] R.M. Emerson, Power dependence relations, (1962) 27(1) American Sociological Review 31, 32.

outcomes depend on the other entity's effort and (iii) interdependence (the outcomes are based on a combination of the partners' efforts)[363].

If we define power in the context of a dyadic relation as the potential of one party (A) to obtain favourable outcomes at the other party's expense (B), then the dependence of A upon B is a function of the value of B's product to A and of the availability of B's product to A from alternate resources[364]. Hence, the power of A over B equates to the dependence of B over A. The source of the power is relational as it is linked to the difference in the power of actor A over actor B, and the inverse. This dyadic (relational) perspective on power is expressed in the two dimensions/metrics previously referred to.

The first dimension, power imbalance, 'captures the difference in the power of each actor over the other', which may be measured concretely, in the context of a dyadic relation, 'by the difference between two actors dependencies, or the ratio of the power of the more powerful actor (or that of the less powerful actor)'[365]. For instance, this could relate to the difference in resources/assets controlled by specific actors, such as market shares, technology, etc.

The second dimension, mutual dependence, 'captures the existence of bilateral dependencies in the dyad, regardless of whether the two actors' dependencies are balanced or imbalanced'[366]. Technically, this measure may be defined as 'the sum, or the average of actor's A's dependence on actor B and actor B's dependence on actor's A'[367]. It may be possible indeed that a power imbalance, in the sense of the amount of resources controlled, does not necessarily lead to holding power, as both actors are mutually dependent to each other. Both these dimensions need to be considered simultaneously because 'for any value of power imbalance, a power-dependence relation can be characterized by varying levels of mutual dependence' and conversely, 'for any given level of mutual dependence, there can be different levels of power imbalance in the dyad'[368]. However, it is expected that the more the power imbalance increases, the easier it will be for the party that benefits from it to appropriate a larger portion of the surplus value produced by the exchange.

In examining power dynamics, it's essential to consider not only the specific attributes of the individuals involved in a given relationship – like their access to advanced technology or critical resources – but also the broader social context of the

[363] P.M. Blau, *Exchange and power in social life* (John Wiley, 1964); R. Cropanzano & M.S. Mitchell, Social Exchange theory: An Interdisciplinary review, (2005) 31 Journal of Management 874, 876.
[364] K.S. Cook, R.M. Emerson, M.R. Gillmore, T. Yamagishi, The distribution of power in Exchange Networks: theory and experimental results, (1983) 89(2) American Journal of Sociology 275 (hereinafter Cook et al. 1983) 275, 285.
[365] T. Casciaro & M. Jan Piskorski, Power Imbalance, Mutual Dependence, and Consraint Absorption: A Closer Look at Resource Dependence Theory, (2005) 50 Administrative Science Quarterly 167, 170.
[366] Ibid.
[367] Ibid.
[368] Ibid.

interaction. This includes the position of each party within the larger social network in which they operate (known as positional power). As Willer explains, 'power as potential is located in structures', '(s)ubsequently, actors in structures produce power as activity'[369]. Similarly, others have focused on the network position of the economic actors to determine the power dependence not in the context of a dyadic relation, but in the context of a network[370].

Positioning in a social structure (or a niche in the population ecology perspective[371]) becomes key for determining power[372]. Cook et al. focus on social structure as a possible source of power. Social structure is defined as a configuration of social relations and positions among actors, 'where the relations involve the exchange of valued items (which can be material, informational, symbolic, etc.)'[373]. These relations are not only linking actors directly but also indirectly[374]. An exchange relation may thus not only occur directly between two actors but could relate to more complex exchange networks, viewed as 'connected sets of exchange relations'[375]. This calls for an analysis of resource dependence in the context of a network, or a broader ecosystem[376], with the assistance of the tool of social network analysis to explore the patterns of interaction between actors. Networks analysis participates to structural analysis, to the extent that it aims to explain phenomena primarily, if not completely, by social structure. However, it cannot only be subsumed to structuralism, to the extent that it also explores the creation and/or maintenance of

[369] D. Willer, Predicting power in exchange networks: a brief history and introduction to the issues, (1992) 14 Social Networks 187.

[370] K.S. Cook, R.M. Emerson, M.R. Gillmore, T. Yamagishi, The distribution of power in Exchange Networks: theory and experimental results, (1983) 89(2) American Journal of Sociology 275 (hereinafter Cook et al. 1983) K.S. Cook & J.M. Whitmeyer, Two approaches to social structure: exchange theory and network analysis, (1992) 18 American Review of Sociology 109 (hereinafter Cook et al. 1992).

[371] J.M. Polodny, T.E. Stuart, M.T. Hannan, Networks, knowledge and niches: Competition in the worldwide semi-conductor industry 1984-1991, (1996) 102 American Journal of Sociology 659, 661 (noting concerning the concept of the niche that 'position is the primary determinant of opportunity and constraint').

[372] Note that this concept of social structure is narrow and confined to 'the distribution of people [or organisations] among different social positions [locations in a social network]': as P. Blau, A Macro-sociological Theory of Social Structure, (1977) 83(1) The American Journal of Sociology 26, 27 explains '(t)his is a very narrow view of social structure, which leaves out of consideration numerous broader implications and connotations of the term, such as value consensus, normative orientations, institutional systems, and functional interdependence'. But as Blau accepts '(n)ot everything in social life can be explained in structural terms so narrowly conceived [...]'.

[373] Cook et al. 1993, 110.

[374] See, P.M. Blau, *Exchange and Power in Social Life* (Wiley, 1964).

[375] Cook et al. 1993, 113 referring to the work of R.M. Emerson, Exchange theory, part II: exchange rules and networks, in J. Berger, P. Zelditch & B. Anderson (eds.), *Sociological Theories in Progress* (Vol. 2, Houghton Mifflin, 1972), 58.

[376] See, for instance, M.G. Jacobides, & I. Lianos, Ecosystems and competition law in theory and practice (January 24, 2021). Available at SSRN: https://ssrn.com/abstract=3772366 .

networks and emphasizes the role of the individual actors and their strategies, thus bringing also to the picture exchange theory[377].

C. The contribution of sociology on new metrics of power

The empirical dimension of network analysis has been developed first in sociometrics[378], and more recently in advanced social network analysis[379] and graph theory[380], which develop practical tools for social structural measures. This research is still under development and has recently attracted considerable interest given the emergence of Big Data and the superior computational abilities of modern computing, for instance with the emergence of computational competition law and economics[381].

The choice of adequate tools depends on the prevailing conception of structure. Cook et al (1993) observe that there are two general conceptions of structure in network analysis: (i) a 'common view' conceiving of structure as 'a pattern of particular ties between actors, where variation in the network in the existence or strength of ties is meaningful and consequential', and (ii) a view that regards structure 'as a general deviation from random ties for particular groups'[382]. 'Ties' can be 'strong' or 'weak', although this does not prejudge the impact these ties may have on a specific outcome, as it all depends on the way the structural mechanisms are socially constructed[383].

Social network analysis may build on both resource dependency theory as well as on different approaches focusing on the 'centrality' of the actor's position in the network.

Regarding resource dependency and exchange theory, one should note the seminal work of Cook et al. (1983) which has extended exchange theory beyond the context of a dyadic relation at the level of an 'exchange network', therefore enabling

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[377] Cook et al. 1993, 114.

[378] J.L. Moreno, *Who Shall Survive?* (Nervous and Mental Diseases Publishing, 1934).

[379] For an introduction see, S. Yang, F.B. Keller & L. Zheng, *Social Network Analysis* (SAGE, 2017)

[380] F. Harary, R.Z. Norman, D. Cartwright, *Structural Models: An Introduction to the Theory of Directed Graphs* (Wiley, 1965)

[381] See, HCC, Computational law and economics : an inception report (2021), available at https://www.epant.gr/en/enimerosi/publications/research-publications/item/1414-computational-competition-law-and-economics-inception-report.htm l . See also the Computational antitrust journal initiative in Stanford: https://law.stanford.edu/codex-the-stanford-center-for-legal-informatics/computational-antitrust/ .

[382] Cook et al. 1993, 118.

[383] For instance, M. Granovetter, The strength of weak ties, (1973) 78 American Journal of Sociology 1360 has shown that job seekers often obtain less useful information from their close contacts than from acquaintances to the extent that those with whom they have close contacts have overlapping networks with them.

more 'macro, N-actor levels of analysis'[384]. Cook et al. define 'exchange networks' as 'consisting of (1) a set of actors (either natural persons or corporate groups), (2) a distribution of valued resources among those actors, (3) for each actor a set of exchange opportunities with other actors in the network, (4) a set of historically developed and utilized exchange opportunities called exchange relations, and (5) a set of network connections linking exchange relations into a single network structure'[385]. 'Connections' between actors forming a network, in the simple configuration two exchange relations between actors A-B and actors A-C who are connected to form the 'minimum network B-A-C to the degree that exchange in one relation is contingent on exchange (or nonexchange) in the other relation' can be 'positive' or 'negative'[386]. The connection is positive 'if exchange in one relation is contingent on exchange in the other' and negative 'if exchange in one relation is contingent on nonexchange in the other'[387]. For instance, if B and C are alternative exchange partners for A and therefore substitutable as sources, then the connection is negative. However, if A requires a resource obtained from B for interaction with C, then the connection at A is positive[388]. For instance, a connection is positive when the purchase of an input requires a complementary purchase of a second input, which is an example of a positive connection in parallel[389]. Parallel connections may also occur in the context of a vertical value chain (positive connections in series), where all connections are by definition positive, to the extent that the input from one actor[390] at an upper segment of the value chain serves to constitute the output at a lower segment of the value chain[391]. However, they occur less in an ecosystem, where actors cooperate but also compete with each other on the allocation of the surplus. Interestingly, many ecosystems present a mix of positive and negative connections. The fact that ecosystems are 'a set of actors with varying degrees of multilateral, nongeneric complementarities that are not fully hierarchically controlled'[392] shows that, like value chains, they always entail positive connections. However, firms within

[384] Cook et al. 1983, 277.
[385] Ibid.
[386] Ibid. Note however the different meaning conferred to these terms by M. Grannovetter who distinguishes between 'positive dependence', which 'emphasizes the rewards of gaining valued resources from those who control them' and 'negative dependence', which 'focuses on punishment and the search for ways to avoid it': M. Granovetter, *Society and Economy – Framework and Principles* (The Belknap Press of Harvard University Press, 2017), 94.
[387] Cook et al. 1983, 277.
[388] Ibid.
[389] M.K. Hendrickson & H.S. James, Power, Fairness and Constrained Choice in Agricultural Markets: A Synthesizing Framework, (2016) 29 Journal of Agricultural and Environmental Ethics 945, 954.
[390] Ibid., 955.
[391] Ibid.
[392] M.G. Jacobides, C. Cennamo, & A. Gawer, Towards a theory of ecosystems, (2018) 39(8) Strategic management journal, 2255-2276.

ecosystems can coopete (compete and cooperate simultaneously)[393], For example Google News and news publishers cooperate in that they are vertical complements: news publishers' content helps attracting users to Google News (positive connection: without news publishers Google News cannot exist), and the latter direct traffic to news publishers that would have not visited them directly in turn. However, they also compete (negative connection) for users and advertising revenues[394] (mixed positive and negative connections in series).

In the context of a negatively connected network, the decision of an actor to connect with a node means that for this actor connecting with the other nodes is not necessary. The more negative connections in a network an actor disposes of, the more options for exchange it has. Fewer negative connections, however, correspond to greater relative dependency. One may, for instance, observe negative connections when two suppliers compete for the largest share of the purchases made by a retailer. Positive connections may result in the context of indirect network effects when there is a positive feedback loop between the number of ties/connections on one side of the platform and those on the other side of the platform. The positive or negative nature of the connections is not however static and can be transformed: for instance, a negative connection may become positive through some form of product differentiation, which reduces the substitutability between the actors of the network. Brokerage brings forward 'mixed structures' in the network to the extent that a broker develops both positive and negative exchange connections with the members of its network.

An increase in the number of positive connections in parallel leads to additional exchanges and thus also increases relative dependency to the extent that the interaction with others in the network for the purchase of the complementary products limits the availability of options and establishes some form of path dependence to continue the exchange with the same actors. An increase in the number of positive connections in series may have either the effect to increase or to decrease relative dependency. Such positive connections may facilitate exchange opportunities that previously did not exist (thus reducing relative dependence) or may act as a barrier to entry (thus increasing the dependence of the actors on the intermediaries).

Focusing on resource dependence in the context of a dyadic exchange relation or a network has also some implications on the conceptualisation of power. This is not anymore linked to the exceptional ability of an actor to raise prices, reduce

[393] A. Brandenburger and B.J. Nalebuff, *Co-opetition* (Doubleday, 1997).

[394] D. Geradin, Complements and/or Substitutes? The Competitive Dynamics Between News Publishers and Digital Platforms and What It Means for Competition Policy (TILEC Discussion Paper No. 2019-003, 2019).

output, as is assumed in the horizontal power approach, or to exclude rivals, as in the context of bottleneck power, but focuses on the way in which the value in the exchange, dyadic or at the level of the network or organisation, is divided between the different actors. The way the value is divided results from the unevenness in dependencies between actors. In that respect, social exchange theory can subsume bottleneck power and the traditional horizontal power approach as particular cases. Power will in this case correspond to some form of imbalance in the division, with the most powerful party typically getting the majority of the value. One may refer to an 'unfair' division of the surplus as a manifestation of power linked to the higher dependence of the parties with the smaller share of the surplus on the dominant actor. Unfairness in the division of surplus may also relate to the more dominant, or central, position of an actor, who because of the network structure, may benefit from asymmetrical advantages vis-à-vis the other actors.

Note that dependence may be intrinsically relational, when nodes A and C are completely dependent on B for a specific resource or value, but B has multiple alternative sources[395]. In this context, the 'differential dependencies[396]' of A and C on B may constrain their action in a direction that would be less beneficial to their interests, and may provide B a higher share of the joint surplus produced. Dependence may also relate to the internal characteristics of the actor. For instance, a rich person will be less dependent than a poor person on some resource, to the extent that it has diminishing rewards for increased amounts of a product or value, as a result of the satiation principle. Hence, if one member of a network acquires value at a greater rate than others, it can become satiated with the result that it will be interested in maintaining this social relation only if it can receive an 'unequal share' of the surplus value[397]. Hence, that actor will have the additional option of terminating the exchange relation if he judges the share of the surplus value unsatisfactory, an option that is unlikely to be available for an actor that has not arrived at the satiation point.

A social actor's power does not always relate to individual characteristics and exceptional attributes. It may also be a function of the network structure, to the extent that an actor holds a pivotal position in the underlying social structure of an exchange network. In view of 'the tendency of complex systems to create asymmetric network structures, in which some nodes are 'hubs,' and are far more connected than others',

[395] D. Easley & J. Kleinberg, *Networks, Crowds, and Markets: Reasoning about a Highly Connected World* (CUP, 2010),301.
[396] K.S. Cook, Emerson's contributions to social exchange theory, in K.S. Cook (ed.) *Social exchange theory* (SAGE, 1987) 209, 216.
[397] D. Easley & J. Kleinberg, *Networks, Crowds, and Markets: Reasoning about a Highly Connected World* (CUP, 2010),301.

it is essential to examine the topography of such complex systems[398]. Centralised networks provide actors with the necessary levers to extend their influence and thus reach sooner the tipping point towards sustainable dominance, eventually using the networks for their purposes rather than those that led to the formation of the network in the first place. Centrality measures, such as degree centrality (where the node strength – the sum of weights of links connected to the node- gives a measure of local influence), betweenness centrality (the amount that a node lies on the shortest path between other nodes), and closeness centrality (inverse sum of shortest distances), which measure centrality at the level of a specific node, are indeed the most commonly used indicators to assess the importance of an actor in a network[399].

The greater the centralisation of a complex system, such as a network or an ecosystem, the larger the disparity between the nodes' individual centrality measures. Degree centrality counts the number of connections a node has (in terms of potential communication activity): those with a high degree of centrality are more active players. The distribution of degree centrality among the nodes of a network may indicate how equal network actors are.

Betweenness centrality measures are based on the 'frequency with which a point falls between pairs of other points on the shortest paths (or geodesics) connecting them'[400]. Strategic location on paths linking pairs of pairs provides potential influence in the network through 'the withholding or distorting of information in transition'[401]. An example of betweenness centrality is provided by Ronald Burt in his work on 'structural holes' when he suggests that nodes connecting otherwise disconnected nodes or parts of the network may gain from their position through 'brokerage'[402]. One may think for instance of actors such as platforms bringing together various users in multi-sided markets may have a high betweenness centrality without necessarily having a high degree centrality. A node that connects two separate networks may have a low degree centrality but may be highly influential if it sits on the only path through which the nodes of the two networks may reach each other[403]. However, if there are multiple geodesic paths that may connect the two networks, the node will not have a high betweenness centrality. Having a high central point often exhibits potential for control of the network.

Finally, 'closeness-based measures' provide an index to the extent that a particular point is closer to another, by measuring how fast a given node in a network

[398] See also, A.-L. Barabási & R. Albert, Emergence of Scaling in Random Networks, (1999) 286 Science No. 5439, 509; M. E. J. Newman & J. Park, Why Social Networks are Different from Other Types of Networks, (2003) 68 *Physical Review E*, No. 036122 (2003), 1.
[399] L.C. Freeman, Centrality in Social Networks: Conceptual Clarification (1979) 1 Social Networks 215.
[400] Ibid., 221.
[401] Ibid.
[402] R.S. Burt, *Structural Holes: The Social Structure of Competition* (Harvard Univ. Press, 1992)
[403] S. Yang, F.B. Keller & L. Zheng, *Social Network Analysis* (SAGE, 2017) 62.

can reach other nodes. This is often calculated by taking the inverse of a given node's geodesic (shortest path or lines length) with all other nodes in a given network[404]. Centrality in this case is indexed by the shortest distance score of one point to all others, thus indicating the extent to which a point can 'avoid the control potential of others[405]'. A node closer to others is less dependent on intermediaries in relaying information.

The notion of a 'clique' is also of particular interest, as it can wield significant influence over the behaviour of its members. A clique is defined by the interconnectedness of its members, who, in a strict sense, are directly linked to each other without any outside connections within the network. Members of the clique engage in frequent interactions with each other, rather than with individuals outside the group. These concepts allow researchers to visualize the unfolding of a network and determine the centrality of a node, using tools such as multidimensional scaling (MDS) for visualisation. However, as is noted by Cook et al. 'the devices we use to represent networks –such as points, lines, edges, and geodesics – and the concepts we use to describe network properties –such as density, centrality, and degree of connectedness- are devoid of specific substantive meaning', which raises the problem of the 'interpretability of findings' and their linkage to the concept of power[406], in particular in competition law. We have previously explained how power may be linked to dependence in an exchange relation, and the way exchange theory may be implemented beyond the situation of a dyadic relation. According to the power-dependence perspective, the dependence of one actor on another is a function of the interest in the resource that actor has and the availability of that resource from alternative sources[407]. These alternative resources may be other nodes in a network or a structure of connected social actors.

These approaches may nevertheless constrain strategic action to bargaining within existing network configurations and ignore the possibility that the actor may negotiate changes in the network itself. Leik explains how an actor can gain power through manipulating the linkages of the network, thus altering the power potential of one's position[408]. These strategies include adding links, deleting links, 'negotiating which position one occupies or what rules the network operates under'[409]. For instance, an actor may gain more power in the network by manipulating the

[404] G. Sabidussi, The centrality index of a graph, (1966) 31 Psychometrika 581.
[405] L.C. Freeman, Centrality in Social Networks: Conceptual Clarification (1979) 1 Social Networks 215, 224
[406] Cook et al 1983, 276.
[407] J. Skvoretz & T.J. Fararo, Power and network exchange: an essay toward theoretical unification, (1992) 14 Social Networks 325, 329.
[408] R.K. Leik, New directions for network exchange theory: strategic manipulation of network linkages, (1992) 14 Social Networks 309.
[409] Ibid., 310-311.

alternatives available to him or the other nodes, generating the possibility of basic shifts in power. For instance, 'a position of lower power can gain power by establishing one or more links to other nodes' or inversely 'a position of higher power may lose power if lower power nodes are able to establish mutual links'[410]. The opportunity of lower power nodes to challenge that of higher power nodes depends on the size of the network. Leik explains that as network size increases, 'while mean network density remains constant, a single change should have less impact on overall power differentiation', hence, 'more successive linkage changes will be needed for any node to experience a given degree of change in relative power'[411]. This finding is of particular interest in the context of the digital networked economy, where established networks already benefit from increasing network effects and increasing returns to scale. Hence, strategic agency will be particularly crucial for low power nodes.

Centrality indexes have already been used in order to explore the positional power of certain keystone firms, such as banks and financial institutions through interlocking directorates in the economy[412]. The topology of networks may also become a particularly rich resource to understand the quite complex interactions between the participants in ecosystems in which the interrelations between the various participants often lead to non-linear increases in utility and value[413]. Complex systems, such as the multi-actors ecosystems of the digital economy, 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), and the interactions of whom give rise to global systemic properties that equate to more than the sum of individual behaviour. As the interactions within the multi-actors ecosystem are not independent, various feedback loops, some of which may be situated outside the sub-system of the relevant market, can enter into the system and affect the individual decisions of the specific relevant market agents. As the focus moves from specific outcomes (prices, output) to social relations (concerning access to resources, capabilities etc), it becomes important to acknowledge that complex social systems such as multi-actor ecosystems are populated by a collection of heterogeneous agents, all influencing each other. Their interactions give rise to *global*

[410] Ibid., 311.
[411] Ibid., 321.
[412] See, for instance, P. Mariolis, Interlocking directorates and control of corporations: The theory of bank control, (1975) 56 *Social Science Quarterly* 425; B. Mintz and M. Schwartz, *The Power Structure of American Business* (University of Chicago press, 1985); M.S. Mizruchi, What do interlocks do? An analysis, critique, and assessment of research on interlocking directorates, (1996) 22 Annual Review of Sociology 271.
[413] See, the theoretical and practical discussion in I. Lianos & B. Carballa-Schmichowski, A Coat of Many Colours—New Concepts and Metrics of Economic Power in Competition Law and Economics, (2022) 18(4) Journal of Competition Law & Economics, 795.

systemic properties that equate to more than the sum of individual behaviour of each actor (e.g. ecosystems). Individual action aggregation is not linear, and we may observe some mismatch between individual behaviour and social outcomes, hence the need to explore the institutional context or the structural features of social interactions that may influence agents' behaviour[414]. In this more complex economy (and society) than what is envisioned by neoclassical economics, power may also encompass various dimensions beyond a simple reduction of output and/or an increase of prices, or even narrow definitions of the quality parameter of competition[415].

VI. Multi-Performance Justifications

A. 'Orders of worth' and the common good

Scholars studying social coordination have highlighted the pre-exchange qualification process that precedes the market transactions. These qualifications give rise to rules or conventions, forming the basis for various justifications or orders of worth for economic actions. In their pragmatic sociology, Boltanski and Thevenot have delved into the intricate nature of justifications, examining how economic actors and interpreters may contend with different available forms of justification to provide sound reasons for action in complex situations.[416]. As the authors explain, concepts of worth may be observed in many everyday situations, and it is possible in the search for a common good that actors may shift from one form of justification to another as they adjust to the challenges of social critique and coordination, while however 'remaining true to a consistent set of requirements', common to all orders of worth integrated in the model of a polity[417]. After conducting empirical analysis and consulting various action guides, they have identified several legitimate forms of the common good (or "worth"). These forms of worth can be based on factors such as wealth, esteem, the general will, or competence, all stemming from the common good model. They further explore the relationship among these different orders of worth.[418]. These dimensions of the common good are different from polity to polity, for instance, while the market polity focuses on capital accumulation industrial polity focuses on efficacy and equality.

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[414] F. Squazzoni, *Agent-Based Computational Sociology* (Wiley, 2012), 166-167.
[415] See, I. Lianos, Competition Law for a Complex Economy., (2019) 50 International Review of Intellectual Property and Competition Law (IIC), 643–648.
[416] L. Boltanski & L. Thévenot, *On Justification – Economics of Worth* (Princeton Univ. press, 1991, 2006 ed.),
[417] Ibid., 15, 140-144.
[418] Ibid., 65.

The distinct orders of worth listed in their initial work are six, each of them having different principles of evaluation and other attributes[419]: the 'market polity' (in which 'market exchanges remove any tinge of personal dependence from interpersonal relations'[420] and with as principles of evaluation prices and costs), the 'industrial polity' (with as principles of evaluation technical efficiency and accuracy), the 'inspired polity' (with as principles of evaluation inspiration, spirituality, creativity), the 'domestic polity'' (with as principles of evaluation esteem, hierarchical order , trust, proximity) the 'polity of fame' (where 'worth depends solely on the number of persons who award their esteem'[421] with as principles of evaluation popularity and recognition), the 'civic polity' (where the principles of evaluation are collectivity and equality), to which in their more recent work they added the 'green' or 'ecological'[422]' (which relies on principle that gives intrinsic value to nature and the natural environment) and the 'project' polities or worlds[423].

These worlds or orders of worth are understood as historical constructs that have emerged in various situations and which are not set in stone, the authors recognize that 'the development of a higher common principle based on a new social bond always goes hand in hand with a critique of bonds constructed in conformity with other principles'[424]. Each system ('order or worth') provides a framework for organizing and evaluating things and their value, offering various perspectives on the common good.. These orders of worth are employed to construct equivalencies between actors and objects and assess them according to how well they promote a plurality of principles of the common good, such as efficiency, sustainability, tradition, and equality. Given the plurality of potential regimes of justification, different forms of criticisms may be put forward when taking into account the relations of different orders of worth in a controversy/argument, among others, criticisms denouncing the reality test as relevant to a particular world, criticisms arguing that the alternative world should also be considered as relevant, thus entering in a competition between the two orders of worth, the outcome of which can

[419] Ibid., chapters 2 and 4.
[420] Ibid., 47.
[421] Ibid., 100.
[422] See, L. Thévenot, M. Moody, & C. Lafaye, Forms of valuing nature: arguments and models ofjustification in French and American environmental disputes, in M. Lamont, and L. Thévenot (eds.), Rethinking comparative cultural sociology: repertoires of evaluation in France and the United States (Cambridge University Press, 2000), 231. For a discussion see, T. Lehtimäki & M.J. Virtanen, Differentiating natures, connecting environments pragmatic sociology and the emergence of green justifications, (2023) Distinktion – Journal of Social Theory, 1-20, https://doi.org/10.1080/1600910X.2023.2187736 .
[423] L. Boltanski & E. Chiapello, *The new spirit of capitalism*, (Verso Books, 2018).
[424] L. Boltanski & L. Thévenot, *On Justification – Economics of Worth,* 47.

be either a compromise between the two worlds or the acceptance of only one test, following the exercise of power[425].

The discussion over justifications and the distinct orders of worth may be particularly useful to theorize about the common good in polycentric competition law disputes, when the activities in question sit at the intersection of multiple institutional spheres or orders of worth[426]. We have commented elsewhere on the strategies of 'framing struggles', 'cross-institutional isomorphism', and 'multiple performances', to repeat them here[427]. This may also be reminiscent of the discussion on the different 'spheres of justice', to ensure 'complex equality', for no single criterion 'can match the diversity of social goods', including the requirement of non-domination of a criterion driving distribution of assets/resources that may challenge the autonomous distribution criteria applying in the various social spheres[428].

Such multi-performance disputes need to be modelled in the context of CASS and examined empirically. The finding of equivalences may also enable the development of specific performance indicators that may be useful to assess the contribution of specific policy measures not only to a specific order of worth but also more generally explore their interactions. Recent work developing a computational framework for policy priority inference in the context of SDGs would be particularly useful in this context[429].

B. Illustrations: Industrial policy and competition law

The tensions between the different orders of worth are inevitable in a competition law system that is either cognitively or normatively open. The emergence of the neoliberal phenomenon and its impact on the way we conceive the role of competition law has nevertheless led to a domination of a narrow economic efficiency logic, referring to the evaluative criteria of prices and costs, over concerns of technical efficacy and equality of opportunity, which have often opposed the logic of competition to that of industrial policy. The mainstream view of orthodox neoclassical economics has neglected issues of competitiveness and industrial policy, the emphasis being put instead on competitive markets as 'the ideal (and

[425] S. Jagd, Economics of Convention and New Economic Sociology, (2007) 55(1) Current Sociology 75.
[426] I. Lianos, Polycentric Competition Law, (2018) 71(1) Current Legal Problems 161.
[427] Ibid., 197-212.
[428] M. Walzer, *Spheres of Justice: A Defense of Pluralism and Equality* (Basic Books, 1983), 3 and the discussion in I. Lianos, Competition Law as a Form of Social Regulation, (2020) 65(1) The Antitrust Bulletin 3, 78-81.
[429] O. Guerrero & G. Castañeda, *Complexity Economics and Sustainable Development – A Computational Framework for Policy Priority Inference* (CUP, 2024).

idealized) mechanism of (economic) governance'[430]. Drawing mainly on industrial organization analyses of perfect competition, the 'Competition State' in Europe was perceived as a tool to promote micro-economic competition and thus ignored the need to ensure the digital and green transition of the economy, or the need to rebuild domestic capacity to ensure resilience, following decades of deindustrialization.

This increasingly led to conflicts with the techno-nationalism[431] of the national 'industrial states', which rely on industrial planning, and not the price system, to procure the stability that the significant commitment of capital and time for the development of the more sophisticated technologies of the second and the third industrial revolution required. Coined by Galbraith, the concept of 'Industrial State' does not only refer to government intervention through planning to promote national champions or to intensify efforts of industrialization, but also englobes the organization of economic activity by large multinational M-form corporations (conglomerates and vertically integrated firms), whose tight managerial structure has been a key mechanism for managing savings, developing investment strategies in new markets, and unlocking productivity in the post-Second World War decades[432]. Industrial policies are broadly understood as 'a political economy process of coordination and alignment across the public-private spectrum, towards feasible and desirable techno-economic trajectories and associated policy interventions[433]' or more narrowly defined as 'government policies that explicitly target the transformation of the structure of economic activity in pursuit of some public goal'[434]. They aim to address different forms of market failure, such as externalities, coordination or agglomeration failures, lack of provision of public goods/inputs, imperfect capital markets, and imperfect information (including lack of reputation in export markets). These policies have been usually criticized as governments face information shortcomings to pick winners and there is a risk the policies may be captured by vested interests. In contrast, competition policies are more directly related to the functioning of the market and promote more competitive outcomes through the expansion of markets and the enhancement of the competitive process.

The multiple goals pursued by the EU in a complex economy and society, in particular in the digital economy[435], may involve tensions and trade-offs that require

[430] B. Jessop, The course, contradictions, and consequences of extending competition as a mode of (meta)governance: towards a sociology of competition and its limits, (2015) 16(2) Distinktion: Scandinavian Journal of Social Theory 167.
[431] S. Ostry & R.R. Nelson, *Techno-nationalism and techno-globalism*, (Brookings 1995).
[432] J.K. Galbraith, *The New Industrial State* (Princeton University press, 1967).
[433] A. Andreoni & H.J. Chang, The Political Economy of Industrial Policy: Structural Interdependencies, policy alignment and conflict management, (2019) 48 Structural Change and Economic Dynamics 136.
[434] R. Juhász, N. Lane, D. Rodrik, *The New Economics of Industrial Policy* (August 2023).
[435] I. Lianos, Competition Law for the Digital Era: A Complex Systems' Perspective (August 30, 2019). Available at SSRN: https://ssrn.com/abstract=3492730 .

the operation of multiple instruments and the development of synergies between the various tools employed and some conciliation between the criteria of the market polity and the industrial policies, breaking with the neoliberal perception that they form two distinct but also opposing orders of worth. The 'orders of worth' theoretical framework may also be employed to re-conceptualize the relations between the market order and other orders of worth, such as the civic order, when institutional logics and criteria collide, as is, for instance, the case with the interaction between competition law and sports, or competition and media or culture.

VII. Concluding thoughts: A Competition Law for Complex Adaptive Social Systems

This research seeks to provide a comprehensive overview of how sociological studies, particularly within the realm of economic sociology, can enhance our comprehension of the concept of competition. Additionally, it aims to offer valuable concepts, methodologies, and metrics that can be utilised by competition authorities and the wider community of competition law and policy. We believe that this approach, in conjunction with the input of other disciplines such as political economy, complexity science, and human ecology, will contribute to the establishment of a new regulatory science tailored for a competition law that is suitable for Complex Adaptive Social Systems (CASS).

As demonstrated in the previous sections, sociological studies on markets, competition, organisations, and the economic process encompass a diverse body of knowledge. These studies originated from attempts to address various research questions and have not yet culminated in a unified theoretical framework that applies across different scenarios. This rich array of theories, concepts, and tools is primarily concerned with the meso-level, delving into direct and local interactions within networks, ecosystems, and value chains. This provides an additional level and perspective of analysis that is not typically offered by neoclassical economics or a political economy viewpoint, which mainly focus on the micro- and macro-levels, respectively[436]. In contrast to some complex economic approaches that occasionally uncritically employ concepts from natural ecology in social systems, the CASS

[436] See, M.S. Mizruchi, Political Economy and Network Analysis, (2007) (2) Sociologica 1, observing that work in political economy has focused on the macro-level, the interaction of political institutions, collective beliefs and actions, globalization, and varieties of capitalism with the market economy but not as much with the meso-level ('Political economy is highly macro, with the nation-state as its most frequent unit of analysis', Ibid., 3). See however the political economy literature on Global Value Chains (cited above) and, among others, I. Lianos, Value extraction and institutions in digital capitalism: Towards a law and political economy synthesis for competition law, (2022) 1(4) European Law Open 852, which offer a law and political economy approach to competition law that also integrates the meso-level.

approach acknowledges the significant role of the institutional environment and culture. These factors influence and are also shaped by, the various actors within the social system, the emergence of new technologies and institutional innovation. Understanding the path of social system evolution hinges on whether institutions are extractive or inclusive[437].

Further efforts are necessary to operationalise these concepts and give them empirical significance. Their role would be crucial in shaping the development of the polycentric competition law paradigm[438]. The argument is based on two key normative standpoints. Firstly, it asserts that polycentricity (in the sense of polyarchy) should be an inherent goal of competition law. Protecting competition as a form of polyarchy is considered fundamental to the essence of competition law. Secondly, it emphasises the need to avoid isolating the economic sphere from other realms of social activity. Instead, it advocates considering an individual's preferences in various aspects of their life (as a citizen, a worker, an entrepreneur) and also taking into account potential collective preferences at a group or societal level.

The sociological approach differs from neoclassical economics in its perspective on the role of policy. Instead of viewing policy as a means to simply set up incentives for rational individuals, it is seen as a way to leverage well-established social interaction mechanisms. This perspective, known as causal pluralism, seeks to establish connections between various aspects of social interaction to comprehend the structural features and patterns of individual and collective behaviour. The goal is to engineer favourable social outcomes. Unlike neoclassical competition economics, this approach does not isolate a single variable under the assumption that all other factors remain constant (ceteris paribus). Instead, it aims to identify causal links within a complex system of interactions and intervene through institutional mechanisms, assuming that individual incentives will lead to optimal or satisfying social outcomes.[439]

Our analysis aims to capture the core ideas from various research areas, instead of delving deeply into the wider sociological theories that underpin them. We outlined

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[437] See also G.M. Hodgson & T. Knudsen, *Darwin's Conjecture: The Search for General Principles of Social and Economic Evolution* (University of Chicago Press, 2010); G. Castañeda, *The paradigm of Social Complexity* (Vol. I, CEEY, 2003), 486 (noting that '(w)ith its tapestry of social norms, collective beliefs and shared ideologies, a community's existing social governance affects the individual decisions and macroscopic behaviours for many years. The social context (or environment) does not change substantially until the gradual incorporation of new cultural elements coming from other societies, or from alternative forms of thinking, gives rise to a renewed sociocultural (Complex Adaptive System)'). See also, from a political economy perspective, *inter alia,* D. Acemoglu, S. Johnson, J.A. Robinson, Reversal of fortune: Geography and institutions in the making of the modern world income distribution, (2002) 117 Quarterly Journal of Economics 1231 (noting the influence of 'weak' institutions on growth and income distribution).

[438] I. Lianos, Polycentric Competition Law, (2018) 71(1) Current Legal Problems 161.

[439] M. Blaug, *The Methodology of Economics* (CUP, 1992).

the broader framework for a new synthesis of a multi-level approach to competition law (the polycentric competition law model) that draws from diverse disciplinary sources, evaluates interactions and feedback loops between actors at different analytical levels, acknowledges the non-linear nature of the processes involved, and integrates a multidimensional perspective on performance standards and justifying principles[440]. The broad contours of this approach, inspired by New Institutional Economic Sociology, are presented in Figure 1[441]. The diagram illustrates the three primary levels of analysis (macro, meso, micro) and emphasises the importance of situating actors within their external environment (e.g., bio-sphere, techno-sphere, values system, institutions), which shapes their actions and strategies. This is complemented by an understanding of the actors' internal properties at the micro-level (e.g., at the bottom of the diagram). Interactions within various domains (e.g., markets, ecosystems, value chains, business networks, industries) involve competition, cooperation, and/or co-opetition, serving as interfaces between the external and internal environments and leading to societal outcomes. The bidirectional arrows denote feedback interactions, while the unidirectional arrows represent one-way influence. Each box in the diagram can be further elaborated, and the interactions between different concepts will be explored in greater detail in subsequent work.

[440] For a more detailed development of this framework, see I. Lianos, *Polycentric Competition Law: a Competition Law for Complex Adaptive Social Systems* (forth. 2025).
[441] V. Nee, The New Institutionalisms in Economics and Sociology, in N.J. Smelser & R. Swedberg (eds.), *The Handbook of Economic Sociology* (2nd, ed., 2005), 49, 56.

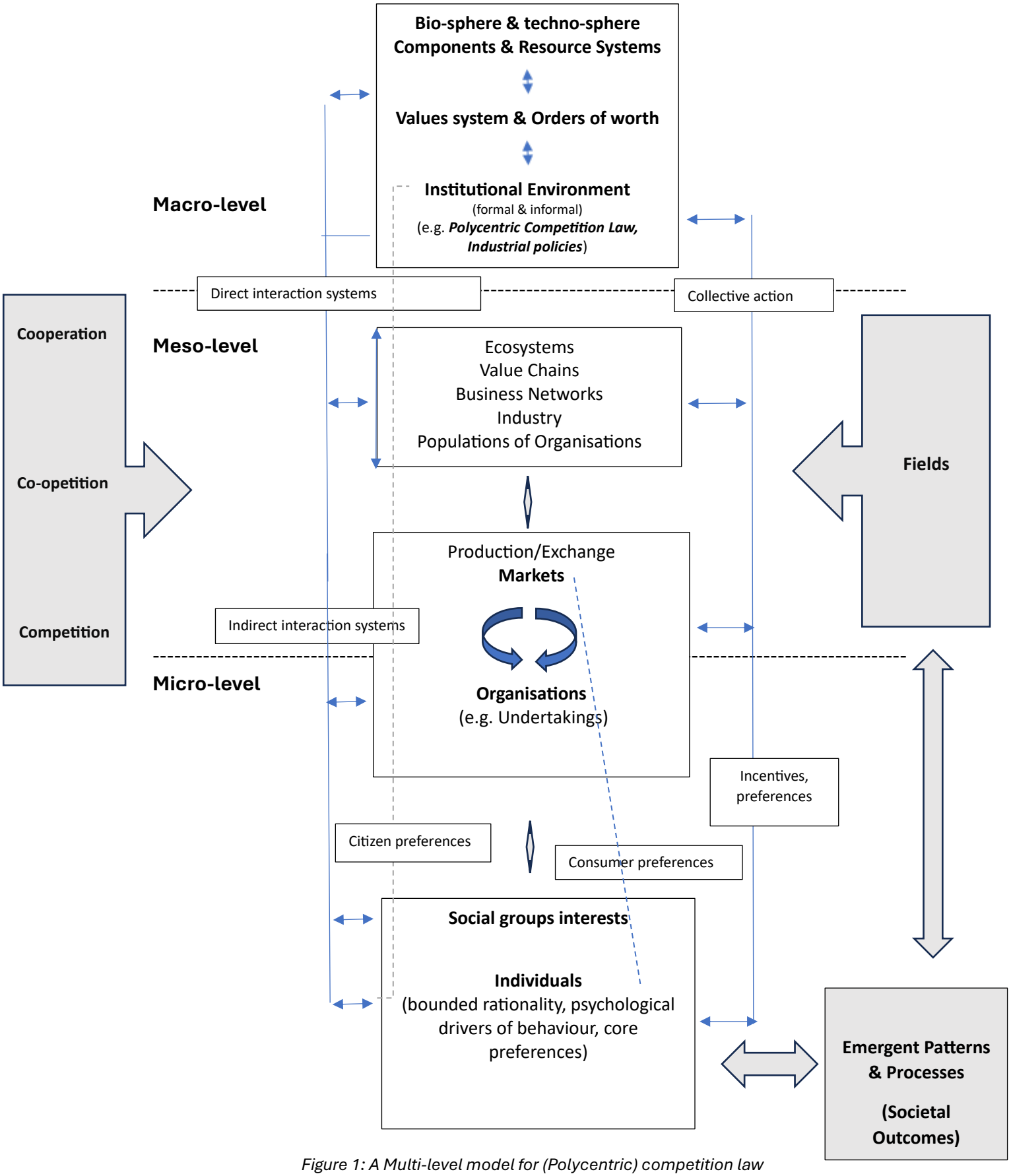

Figure 1: A Multi-level model for (Polycentric) competition law

The multi-level approach presents a contrasting alternative to the prevailing "more economic approach" in competition law which is heavily influenced by neoclassical economics. We delved into the sociological perspective of competition, highlighting its differences from its traditional economic interpretation. Additionally, we examined the environment in which competitive interactions unfold and yield their impact: the market. This is conceptualised as a social arena, rather than the abstract meeting point of supply and demand. A socially embedded conception of markets as networks of actors or fields fully integrates their reflexivity and performativity, but also calls for exploring the social structure of competition. Our analysis delved into the different approaches put forward in economic sociology to understand the competition phenomenon, those emphasising social structure, others taking a more evolutionary perspective, exploring the organisational ecology of competition, and others that observe the emergence of a different understanding of competition in a connexionist world.

The topic of power is essential in a sociological examination of competition law. Sociology has long examined various forms and aspects of power. In this context, we investigated power through the lens of resource dependence, which is highly pertinent to the typical emphasis of competition authorities on regulating bottlenecks or chokepoints for inputs. Sociology offers established quantitative metrics and methodologies to assess such power, and these have already been employed in the context of competition law[442]. We also noted the contribution of other quantitative sociology techniques, such as advanced social networks analysis and agent-based modelling to a more accurate measurement of power, particularly if we expand the lens of the inquiry from the economic sphere to other spheres of social life in which economic power may be converted to or result from. This is crucial if one is to understand how power or institutional change (regressive or progressive[443]) may impact the trajectory of the evolution of a CASS. This could involve the search for 'structural accelerators' and/or 'systemic bottlenecks'[444].

In the final section, we examined the rationale behind justification in a multi-performance institutional setting. We acknowledged the importance of not only competing in traditional markets, but also considering the prevailing conceptions of the common good in other societal realms. Additionally, we analysed the direct interdependencies, which may lead to non-linear relationships, between these different realms in the specific CASS context. At an empirical level exploring the interdependency network between different SDGs for instance may provide crucial

[442] See I. Lianos & B. Carballa-Schmichowski, A Coat of Many Colours—New Concepts and Metrics of Economic Power in Competition Law and Economics, (2022) 18(4) Journal of Competition Law & Economics, 795.

[443] P.D. Bush, The Theory of Institutional Change, (1987) 21(3) Journal of Economic Issues 1075.

[444] O. Guerrero & G. Castañeda, *Complexity Economics and Sustainable Development – A Computational Framework for Policy Priority Inference* (CUP, 2024), 291-293.

insights as to the impact of the competition law tool, among other alternative instruments in the policy toolkit, for strategic planning. A more socially conscious and dynamic (adaptive) approach to competition law should consider all relevant dimensions of the common good, rather than dismiss them as neoclassical competition economics does by citing methodological complications and the lack of commensurability in balancing. From this perspective, sociology should be recognised as an important source of wisdom in competition law and policy, contributing, along with other disciplines, to the development of the polycentric model for competition law required for Complex Adaptive Social Systems (CASS).