# Towards a Legal Theory of Digital Ecosystems

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## Abstract

In recent years, digital business ecosystems have emerged as the primary drivers of economic value creation and distribution, surpassing traditional markets as the dominant form of economic organization in the global economy. Although legal scholarship has extensively examined the development of legal institutions that constitute, support, and shape markets, there is a conspicuous absence of work exploring the legal 'code' underlying ecosystems. This article seeks to address this lacuna by providing a legal framework that conceptualizes digital ecosystems as structures of governance. Our approach is informed by a comparative analysis of digital ecosystems across sectors and geographies. We reject the dominant narrative in regulatory debates on the digital economy of both sides of the Atlantic – a 'natural order rhetoric' that assumes the superiority of private ordering (such as contractual governance designed by keystone firms of the digital economy) over instituted processes (such as regulation). Instead, we add nuance to its nascent but still underdeveloped critique, a 'power rhetoric.' At the heart of these competing framings are contrasting visions of the role of law in instituting novel modes of economic organization. The 'natural order rhetoric' understands the private governance of ecosystems as 'given,' rather than the product of a deliberate corporate strategy of keystone firms to gain rents and hence argues for regulatory restraint. However, these intellectual traditions fail to identify the essence of ecosystems as a novel mode of organization. We juxtapose it to an alternative framing: A 'power rhetoric' which is attuned to the manifestations of private power and means of control, both formal and informal, legal and technological, and that highlights the influence of central actors within these ecosystems whose actions necessitate regulatory intervention. Only relying on the 'power rhetoric' remains however reductionist and inflexible in its perception of the role of private governance regimes that are also necessary for digital ecosystems to function and produce social value.

We advocate for a third approach to inform regulatory policies in the EU, UK, and US: an integrated governance framework designed to facilitate socially beneficial institutional change that combines the capabilities of both public and private governance. Our conceptual inspiration comes from typologies of governance in (primarily industrial) Global Value Chains (GVCs) which we adjust to the context of digital ecosystems. We demonstrate how concrete ecosystem-based legal mechanisms, contractual terms, and technological governance may create and maintain significant power imbalances in ecosystems. We also highlight that relying exclusively on such private governance tools may enable keystone firms to capture disproportionate surplus value from collective innovation efforts and generate negative externalities at the societal level. The intervention of regimes of public governance, such as

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recent regulatory and antitrust law interventions in the EU, UK, and US, becomes therefore a crucial governance complement with systemic risks connected to the rise of certain ecosystems. We conclude that progressive institutional reform - one that is informed by the political economy of technology regulation and conceptualizes ecosystems as complex adaptive social systems integrating both public and private governance - is necessary to incorporate a broader range of values into digital capitalism.

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## I. Introduction

Every form of economic organization presents legal analysis with the challenge of finding a suitable analytical framework to capture the empirical reality and attach appropriate normative implications to it. Past iterations of this challenge are tied to the rise of multinational corporations, production networks and global value chains, and, most recently, digital platforms. This paper turns to digital ecosystems, the latest institutional formation in the digital economy, to inquire how legal analysis should conceptualize such ecosystems, what role law plays in their formation and functioning, and what promising paths for their governance exist.

A proper legal analysis of ecosystems requires understanding how their institutional frameworks and distributive effects are legally constituted. Like markets[1] and other economic organizations such as firms[2], ecosystems are fundamentally structured by legal 'code' from their inception. This 'legal code' should be understood broadly to encompass governance mechanisms that operate at the intersection of law, social norms, and technology code. This legal self-reflexivity in approaching ecosystems is what we refer to as a necessary 'legal theory' of ecosystems.[3]

Current discussions on digital ecosystems often adopt a 'natural order rhetoric'[4] , premised on the superiority of private ordering such as contractual and technological

[1] See, KARL POLANYI, THE GREAT TRANSFORMATION: THE POLITICAL AND ECONOMIC ORIGINS OF OUR TIME (1944); Karl Polanyi, The Economy as Instituted Process, in TRADE AN MARKET IN THE EARLY EMPIRES: ECONOMIES IN HISTORY AND THEORY 243 (Karl Polanyi, Conrad M. Arensberg & Harry W. Pearson eds., 1957). (on the market-constitutive and market-shaping role of law, a feature also characterizing institutionalist approaches to law and economics). See, GEOFFREY M. HODGSON, CONCEPTUALIZING CAPITALISM: INSTITUTIONS, EVOLUTION, FUTURE (2015).

[2] See, *inter alia*, Jean-Philippe Robé, *The Legal Structure of the Firm*, 1 ACCT. ECON. & L. 1 (2011); Simon Deakin, The Juridical Nature of the Firm, in THE SAGE HANDBOOK OF CORPORATE GOVERNANCE 113 (Thomas Clarke & Douglas Branson eds., 2012); JEAN-PHILIPPE ROBÉ, PROPERTY, POWER AND POLITICS: WHY WE NEED TO RETHINK THE WORLD POWER SYSTEM (2020).

[3] *See* similarly for the realm of finance, Katharina Pistor, *A Legal Theory of Finance*, 41 J. COMPAR. ECON. 315 (2013) and Mark J. Roe, *The Derivatives Market Payment Priorities as Financial Crisis Accelerator*, 63 STAN. L. REV. (2011); for the realm of money, see Anna Chadwick, *Rethinking the EU's 'Monetary Constitution': Legal Theories of Money, the Euro, and Transnational Law*, 1 EUR. L. Open 468 (2022).

[4] For a general introduction to the 'natural order rhetoric,' *see* Charles M.A. Clark, *Spontaneous Order Versus Instituted Process: The Market as Cause and Effect*, 27 J. ECON. ISSUES 373 (1993); for a poignant critique, *see* BERNARD E. HARCOURT, THE ILLUSION OF FREE MARKETS: PUNISHMENT AND THE NEED OF NATURAL ORDER (Harv. Univ. Press 2012). By 'rhetoric,' we mean a certain way of framing and arguing about matters of digital policy that draws on the purported superiority of certain types of governance, operating as underlying narrative rather than as distinct academic argument.

governance designed by what has been described as 'platform firms[5]' or 'keystone firms'[6], dominating broader ecosystems.[7]This rhetoric takes inspiration from an eclectic selection of influential economic theories, particularly Transaction Costs Economics (hereinafter TCE), Resource-Based Views of the 'Firm' (hereinafter RBV), and Dynamic Capabilities Approaches.[8] In repurposing such theories, this rhetoric advocates for centralized private governance models instead of regulation (regimes of public governance)[9] to administer solutions for a wide range of policy aspects, including privacy protection, competition, innovation policy and content moderation.

The 'natural order rhetoric' is however not without its critics, many of whom argue that it ignores the genealogy and varied ontology of the structuring power of central private digital actors and the power asymmetries these may give rise to.[10] The central positioning of digital ecosystems, increasingly powered by Artificial Intelligence[11], has fundamentally altered power dynamics. These platforms now dominate not only economic value generation but also non-economic spheres such as cultural production and civic engagement, consolidating influence at the expense of democratic and public institutions, at multiple scales, from the national level to the broader global geopolitical landscape..[12] This competing 'power rhetoric' foregrounds the role of regulatory frameworks within which private governance can unfold, and advocates for a shift towards more public governance of the digital economy, which may take the form of digital ecosystems-centered interventions, such as public rules that mandate greater openness, to initiatives to build alternative informational infrastructures.[13] Analysis based on 'power' provides a productive vantage point to trace new manifestations of private power in the digital economy, including business models that draw on novel means of exerting control

[5] See, Anabelle Gawer, Bridging Differing Perspectives on Technological Platforms: Toward an Integrative Framework, 43 RES. POL'Y 1239 (2014).
[6] See, MARCO IANSITI & ROY LEVIEN, THE KEYSTONE ADVANTAGE: WHAT THE NEW DYNAMICS OF BUSINESS ECOSYSTEMS MEAN FOR STRATEGY, INNOVATION, AND SUSTAINABILITY (Harv. Bus. Sch. Press 2004).
[7] Tobias Kretschmer et al., *Platform Ecosystems as Meta-Organizations: Implications for Platform Strategies*, 43 STRATEGIC MGMT. J. 405 (2022) (conceptualizing 'platform ecosystem' as 'characterized by a larghe collection of relationships that re neither as limited and specific as spot market contracts, nor as enduring and extensive as those within a hierarchical organization').
[8] See *infra* Section III.A.
[9] *See*, for instance, Nicolai J. Foss et al., *Ecosystem Leadership as a Dynamic Capability*, 56 LONG RANGE PLANNING 102270 (2023).
[10] Various metaphors such as *gatekeeper*, *orchestrator*, *intermediary, bottleneck, lead firm, keystone organization or ecosystem captain* have been employed to describe these actors. On power asymmetries in platform ecosystems see, Donato Cutolo & Martin Kenney, *Platform-Dependent Entrepreneurs: Power Asymmetries, Risks, and Strategies in the Platform Economy*, 35 ACAD. MGMT. PERSP. 584 (2021).
[11] Wessel, M., Martin Adam, Alexander Benlian, Ann Majchrzak & Florian Thies, Generative AI and its Transformative Value for Digital Platforms, 42 J. MGMT. INFO. SYS. 346 (2025).
[12] See, *inter alia*, Byung-Chul Han, *Infocracy: digitalization and the crisis of democracy* (Polity Press, Cambridge, 2022); ANU BRADFORD, DIGITAL EMPIRES: THE GLOBAL BATTLE TO REGULATE TECHNOLOGY (Oxford University Press 2023).
[13] For a discussion of the former see, infra, Section . V.C. For the later, see, for instance, the recent 'Eurostack' initiative to develop sovereign AI platforms and federated data spaces with the aim to 'reduce dependencies on foreign providers, protect intellectual property, and position Europe as a leader in public interest AI': Francesca Bria, Paul Timmers & Fausto Gernone, EUROSTACK – A EUROPEAN ALTERNATIVE FOR DIGITAL SOVEREIGNTY 8 (Bertelsmann Stiftung 2025).

to ultimately change the architecture of entire industries.[14] Nonetheless, such a 'power rhetoric' does not fully reflect the empirical reality of private governance structures and can be reductionist in its inability to account for the specificities of the 'ecosystemic mindset' and possible efficiencies of an orchestrated co-production of value.[15]

If there is a choice to be made between the tools of public or private governance of ecosystems, one should also integrate the fact that both are expressions of a complex adaptive social system,[16] in which (legal) institutions matter.[17] Any institutional choice should therefore result from a comparative analysis that considers each polity's public values while integrating the benefits of network-based collaboration and complementarity-driven value value generation intrinsic to business ecosystems. Developing a legal theory of business ecosystems is therefore essential to account for the interactions between public and private governance regimes that form the essence of these new economic and social structures. This article aims to do just that.

In *Section II*, we explore how the notion of an ecosystem has evolved from a meso-concept in economics, distinct from that of 'market' and 'firm', into a legal concept informing the debate on private and public governance in the digital economy. *Section III* discusses the theoretical underpinnings of the 'natural order rhetoric' and the private governance bias inherent to this perspective, as well as the analytical and operational context of the more fine-tuned 'power rhetoric'. *Section* IV explores the typology of ecosystems resulting from the 'power rhetoric', and illustrates the power imbalances that allow keystone firms to capture disproportionate surplus value from collective innovation efforts and create different forms of "externalities" at the societal level.[18] In *Section V*, we examine the role of public governance (or regulation) of business ecosystems and shed light on the alleged failure of the traditional regimes of contract and competition law in dealing with the multi-dimensional reality of power in the digital economy. Furthermore, we engage in a comparative institutional analysis of new regulatory tools and advocate for an approach that recognizes ecosystems as components of complex adaptive social systems. These systems should be approached from both public and

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[14] On the concept of 'architectural power', see Ioannis Lianos & Bruno Carballa-Smichowski, *A Coat of Many Colours—New Concepts and Metrics of Economic Power in Competition Law and Economics*, 18 J. COMPETITION L. & ECON. 795 (2022).

[15] Soumaya Ben Letaifa, *The Uneasy Transition from Supply Chains to Ecosystems: The Value-Creation/Value-Capture Dilemma*, 52 MGMT. DECISION 278 (2014).

[16] On complex adaptive systems, *see*, among others, PHILIP W. ANDERSON ET AL., THE ECONOMY AS AN EVOLVING COMPLEX SYSTEM (1st ed., CRC Press 1988); W. BRIAN ARTHUR ET AL., THE ECONOMY AS AN EVOLVING COMPLEX SYSTEM II (1st ed., CRC Press 1997); Leigh Tesfatsion, *Agent-Based Computational Economics: Modelling Economies as Complex Adaptive Systems*, 149 INFO. SCI. 262 (2003). For a more detailed discussion of ecosystems as complex social adaptive systems *see* Ioannis Lianos, MINDING COMPETITION IN COMPLEX ADAPTIVE SOCIAL SYSTEMS: THE SOCIOLOGICAL APPROACH TO COMPETITION LAW (Univ. Coll. London Faculty of Laws, Research Paper No. 19/2024, 2024), https://ssrn.com/abstract=4851966

[17] *See* Simon Deakin et al., *Legal Institutionalism: Capitalism and the Constitutive Role of Law*, 45 J. COMP. ECON. 188 (2017); Pistor, *supra* note 3, at 315; KATHARINA PISTOR, THE CODE OF CAPITAL: HOW THE LAW CREATES WEALTH AND INEQUALITY 2 (Princeton University Press 2019) (noting that 'capital is made from two ingredients: an asset and the legal code […] (w)ith the right legal coding any […] assets can be turned into capital and thereby increase its propensity to create wealth for its holder(s)'.

[18] While the concept of "externalities" is primarily used to denote the social costs of the market form of organization, it is used here to denote the social costs of ecosystems. *See* for a discussion of externalities Michael Jacobides et al., *Externalities and Complementarities in Platforms and Ecosystems: From Structural Solutions to Endogenous Failures*, 53 RSCH. POL'Y 1 (2024).

private governance perspectives, with consideration for each polity's public values and an understanding of institutional change dynamics.

## II. From Metaphor to Theory: The Current State of Ecosystem Research

Ecosystem theory has emerged over the last few years as a leading analytical framework informing the study of private governance in the digital economy. It lends itself as an inroad to the debate, even though the concept has been plagued with varieties of meaning. The term 'ecosystem' was first introduced into the governance discourse by business management literature,[19] as a rather inconsistently used metaphor without a coherent empirical and normative grounding or appreciation of legal implications.[20] To the extent that there is value in taxonomic definitions[21], we attempt to use an ecosystem definition that is normatively open and capable of capturing governance in an empirically pertinent fashion. We therefore define an ecosystem as *a community of multiple independent actors, which exhibit unique or supermodular, non-generic complementarities, forming a modular architecture and requiring an alignment structure to maximize their joint value, and which are subject to governance rules to achieve system-level goals*.[22] The following section will briefly explain the central pillars of this definition.[23] This definition draws partly on the now extensive strategic management literature on the ecosystem concept.[24] However, while this literature emphasizes how ecosystems emerge as distinct organizational forms, how they are built or designed, and the competitive processes within and between ecosystems through which they capture economic value, the legal/institutionalist approach to ecosystems focuses on the governance mechanisms that ensure ecosystems generate social value. Given their prominent role in the global economy, ecosystems have the potential to produce significant effects not only at the market level, but

[19] *See* Michael G. Jacobides et al., *Towards a Theory of Ecosystems* 39 STRATEGIC MGMT. J. 2255, 2266 (2018) defining ecosystems as "a group of interacting firms that depend on each other's activities . . . reliant on the technological leadership of one or two firms that provide a platform around which other system members, providing inputs and complementary goods, align their investments and strategies.". *See also* on the concept of business ecosystem, Iansiti & Levien, *supra* note 6; David Teece, *Next-Generation Competition: New Concepts for Understanding How Innovation Shapes Competition and Policy in the Digital Economy*, 9 J.L. & POL'Y 97, 105-6 (2012)

[20] The definitional ambiguity resulted from the descriptive rather than normative approach followed by James F. Moore who provided different definitions of what constitutes an ecosystem in his work: *Predators and Prey: A New Ecology of Competition*, 71 HARV. BUS. REV. 75 (1993).

[21] Geoffrey M. Hodgson, *Taxonomic Definitions in Social Science, with Firms, Markets and Institutions as Case Studies*, 15 J. INSTITUTIONAL ECON. 207 (2019).

[22] This definition is inspired by that of Michael G. Jacobides et al., supra note 19 at 2266; See also Michael G. Jacobides & Ioannis Lianos, *Ecosystems and Competition Law in Theory and Practice*, 30 INDUS. & CORP. CHANGE 1199-229 (2021).

[23] For another discussion taking a legal perspective on 'ecosystems' (although limited to competition law and the DMA) *see* Philipp Hornung, *The Ecosystem Concept, the DMA, and Section 19a GWB*, J. ANTITRUST ENF'T (2023).

[24] Notably, Ron Adner. *Ecosystem as Structure: An Actionable Construct for Strategy*, 43 J. MGMT. 39-58 (2017); Michael G. Jacobides et al., supra note 19. For a recent literature review, see Maximilian J. Krome & Ulrich Pidun, *Conceptualization of research themes and directions in business ecosystem strategies: a systematic literature review*, 73 MANAG. REV. Q. 873 (2023).

across entire industries, the broader economy and society at large. Consequently, the legal system should account for their existence and function.

### A. The Building Blocks of Ecosystems: Complementarity and Modularization

The first feature of digital ecosystems is that they comprise multiple independent actors (the ecosystem members). This requirement refers to decisional independence rather than corporate organization: Ecosystems only emerge when several ecosystem members (*multiple*) retain control over their actions and assets (*independent actors*).Ecosystems are not fully hierarchical and are therefore distinct from the organizational model of an integrated 'firm.'[25] For example, within Alphabet's ecosystem, the Google Play Store functions as a platform that hosts a vast array of applications developed by numerous independent developers who retain a large amount of control over the design, functionality, and updates of their respective apps.

The second feature of ecosystems is a specific type of complementarity between the individual contributions of the ecosystem members. General complementarity, in the sense that the use or value of one product[26] (product A) increases the use or value of another product (product B), is not sufficient for the emergence of ecosystems. The complementarity in ecosystems must be non-generic[27] and either unique (product A is unable to function without product B[28]) or supermodular (doing more of any subset of products [product A] increases the returns to doing more of any subset of the remaining products [product B, C, etc.][29]). Focusing on the existence of complementary capabilities either in consumption or in production distinguishes ecosystems from markets which are usually defined as social arenas of competition in economic *exchange* between substitutable products.[30]

The third central characteristic of ecosystems is the modularity of the individual contributions from ecosystem members. Modularity in ecosystem theory does not mean open 'plug and play' interoperability, as this would void the requirement for a specialized governance structure.[31] It rather denotes the organizational separability 'along a production (or production and consumption) chain,' leading to a grouping of individual contributions with similar function in modules.[32] This does require interoperability between modules—a feature

[25] Jacobides, *supra* note 19, at 2264.
[26] Product here should be understood in a broad sense to include also services.
[27] Adner, *supra* note 24; Jacobides, *supra* note 19 at 2266; Oliver Williamson, *Transaction-Cost Economics: The Governance of Contractual Relations*, 22 J.L. & ECON. 233 (1979).
[28] For example, applications are not functional without an operating system they can run on.
[29] *See* Paul Milgrom & John Roberts, *Rationalizability, Learning, and Equilibrium in Games with Strategic Complementarities,* 58 ECONOMETRICA 1255-78 (1990).
[30] For a discussion see, Lianos, Minding Competition…, *supra* note 16, Section III. Note also the criticisms of JAMES K. GALBRAITH & JING CHEN, ENTROPY ECONOMICS: THE LIVING BASIS OF VALUE AND PRODUCTION (University of Chicago Press 2025), at XIII & XIV (criticizing the tendency of neoclassical economics to focus on exchange which generally takes place in markets rather than production, which happens in organizations).
[31] Carliss Y. Baldwin, *Where do Transactions Come From? Modularity, Transactions, and the Boundaries of Firms*, 17 INDUS. & CORP. CHANGE 155-95 (2008); Richard N. Langlois, *The Vanishing Hand: The Changing Dynamics of Industrial Capitalism*. 12 INDUS. & CORP. CHANGE 351-85 (2003); Michael G. Jacobides & Sidney G. Winter, *The Co-Evolution of Capabilities and Transaction Costs: Explaining the Institutional Structure of Production*, 26 STRATEGIC MGMT. J. 395-413 (2005).
[32]Jacobides, *supra* note 19, at 2260 n.7.

described as 'thin crossing points'[33]—but it will be subject to complex unilateral or multi-lateral rules and closed or controlled access.

### B. The Ecosystem Glue: Interdependence and Private Governance

The organizational novelty of ecosystems is based on a fourth key feature that reflects how ecosystems create value and the necessity of alignment structures to maximize such value creation, and which brings the attention to the essence of the legal theory of ecosystems: a coordination structure coupled with a governance regime.

#### 1. The Ambivalent Relationships between Ecosystems Members

The joint value creation fashions strong interdependencies between the ecosystem members. As is common for networked structures,[34] there is a high degree of reliance and abstract reciprocity when it comes to maximizing the ecosystem's value and eventually maintaining a competitive offering regarding other ecosystems.[35] However, since ecosystem members are independent actors they have incentives to maximize their respective value capture, which leads to competition between actors within the same module or in nascent modules. This resulting simultaneous co-operative and competitive relationship prompted the description of the ecosystem as a system of co-opetition.[36] For example, Android developers benefit from being part of a large, cohesive offering of applications in the AppStore, but they also compete against each other for visibility and downloads.

#### 2. Indispensability and Value of Private Governance

Although 'competitive interdependence' is not a novel phenomenon in economic relations[37], what distinguishes interdependence in ecosystems is that the value of the ecosystem (i.e. the complements and the core functions) is greater than the sum of the values of the different parts.[38] Ecosystems exhibit the emergence of a superadditive and distinct value of the whole (the 'ecosystem glue'), based on the contributions of each member of the ecosystem (who participate in the web of transactions).This "joint value proposition by several players cannot be achieved by any one of the individual players in isolation."[39]

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[33] Carliss Y. Baldwin, ECOSYSTEMS AND COMPLEMENTARITY (Harv. Bus. Sch. Working Paper No. 21-033, 2020).
[34] DAVID SINGH GREWAL, NETWORK POWER: THE SOCIAL DYNAMICS OF GLOBALIZATION 17-43 (Yale Univ. Press 2008); GUNTHER TEUBNER, NETWORKS AS CONNECTED CONTRACTS (Hugh Collins ed., Hart Publ'g 2011).
[35] *See* Walter W. Powell, *Neither Market nor Hierarchy: Network Forms of Organization*, 12 RSCH. ORG. BEHAVIOUR 295-336 (1990).
[36] Ioannis Lianos, COMPETITION LAW FOR THE DIGITAL ERA: A COMPLEX SYSTEMS' PERSPECTIVE 103, https://ssrn.com/abstract=3492730, at 103; NICHOLAS PETIT & DAVID J. TEECE, TAKING ECOSYSTEMS COMPETITION SERIOUSLY IN THE DIGITAL ECONOMY: A (PRELIMINARY) DYNAMIC COMPETITION/CAPABILITIES PERSPECTIVE, DAF/COMP/WD ¶ 17 (OECD 2020).
[37] From a TCE perspective, *see* Williamson, *supra* note 27; but also, the critiques by Mark Granovetter, *Economic Action and Social Structure: The Problem of Embeddedness*, 91 AM. J. SOCIOLOGY 481 (1985) and Powell, *supra* note 35.
[38] Baldwin, *supra* note 33, at 1.
[39] Bernhard Lingens et al., *The Ecosystem Blueprint: How Firms Shape the Design of an Ecosystem According to The Surrounding Conditions*, 54 LONG RANGE PLANNING (2021). See also Hornung, *supra* note 23.

Beyond the existence of the underlying technical system, complementarities are crucially dependent on ecosystem rules and governance of cooperation and 'membership.'[40] It may precisely be because of these common rules, that it tends to be more attractive for consumers to purchase product A1 and B1 (from different suppliers) rather than to combine either of these with a version of the other which is not subject to these rules (product A2 and B2).[41]

Prominent summaries of the state of understanding in this extensive literature[42] focus not only on the complementarity of the usage systems, but also on the structure of the (technical, organizational and other) dependencies that arise between the various members of an ecosystem.[43] Without such rules, ecosystems can experience 'value network' failures affecting the capability of the ecosystem to attain its full surplus value potential, as a result of either a lack of coordination between the independent firms or 'systemic innovation' failures.[44]

## 3. Mechanisms of Private Governance

Ecosystems therefore require an "alignment structure of the multi-lateral set of partners that need to interact in order for a focal value proposition to materialize"[45], or some orm of "coordination structure" that includes "the allocation of decision rights (or control rights) between the ecosystem participants, "and the rules that are imposed"[46]. This means that the ecosystem finds its origins in a governance regime that ultimately generates the benefits of coordination and defines how the benefits are distributed among participants.[47] In contrast to the micro-level of markets/hierarchies and the macro-level of the economy, the ecosystem concept takes a meso-level perspective of governance structures.[48] These are understood as a product of directly interdependent economic agents striving to adapt through governance regimes (institutions) to the situation of strategic uncertainty generated by the great complexity of the linkages between them (complex adaptive systems).[49] Thus, unlike in a de-centralized market, independent firms rely on the price system "in conjunction with bilateral contracts, multi-lateral negotiations and [technical] platforms"[50] to coordinate economic activity. The market system premised on dispersed knowledge and individual profit maximization is thus replaced by a coordinated knowledge system focusing on ecosystemic or community profit maximization.[51] This, however, also highlights the 'central paradox' of digital ecosystems, as Gawer and Harracá argue, which 'lies in the fact that although distributed patterns of value

[40] Jacobides et al., *supra* note 18, at 1.
[41] Pierre Regibeau, Current Challenges in Competition Policy pt. 3.5 (Oct. 2022) (unpublished manuscript) (on file with author).
[42] Carliss Y. Baldwin et al., *Focusing the Ecosystem Lens on Innovation Studies*, 53 RSCH. POL'Y 1 (2024).
[43] *Id*. at 3.
[44] Jacobides et al., *supra* note 18, at 1.
[45] Adner, *supra* note 24, at 42.
[46] Tobias Kretschmer et al., *supra* note 7, at 409.
[47] *Id*., at 410.
[48] Kurt Dopfer et al., *Micro-meso-macro*, 14 J. EVOLUTIONARY ECON. 263 (2004).
[49] Letaifa, *supra* note 15. Lianos, *supra* note 16.
[50] Baldwin, *supra* note 33, at 33. *See* Elizabeth Rowe, *Private Law in Unregulated Spaces*, 99 NYU L.J. 249 (2024).
[51] Baldwin, *supra* note 33, at 33.

creation have fueled their growth, their business models have resulted in centralized methods of value capture'[52], to which we now turn.

### 4. Predominance of 'Centralized Platform Orchestration'

'Central platform orchestration' is the predominant governance model in digital ecosystems, whereby (usually) one actor guides the multi-product and/or multi-actor effort. This actor has decisive or even unilateral influence on the governance structure of the ecosystem, including the rules and conditions of membership (who is participating), the activities (who does what) and the value architectures and distribution (who gets what).

Often, orchestrators (e.g., Amazon or Airbnb) own central platforms that may be conceived as techno-economic 'agencements' that structure different dimensions of economic exchanges.[53] In this conception, platforms are the technical (transactional or even social)[54] infrastructures that enable autonomous entities to connect and transact, thus developing between them some form of technological or transactional dependency. Ecosystem orchestration, most often performed by (digital) platform owners, resemble a governmental authority within the ecosystem, monitoring, leading, and balancing the interests of different ecosystem participants (e.g., complementors, business users, end-users) by 'creating the conditions for ordered rule and collective action,'[55], though not 'as enduring and extensive as those within a hierarchical organization'.[56]

While prevalent, 'central platform orchestration' is not however the exclusive way for private governance structures to emerge. In a (theoretical) decentralised ecosystem, orchestrators are not dominant owners of platforms[57], and orchestration may be directed instead of deliberative[58]—consider for instance non-hierarchical governance in blockchain ecosystems where technology provides the governance blueprints.[59]

## III. Narratives on Private Governance in Ecosystems

[52] Annabelle Gawer & Martín Harracá, *Inconsistent platform governance and social contagion of misconduct in digital ecosystems: A complementors perspective*, 54 RSCH. POL'Y 105300 (2025).
[53] On the concept of "market agencement", *see* Fabian Muniesa et al., *An Introduction to Market Devices*, 55 SOCIO. R. 1-12 (2007); MICHEL CALLON, MARKETS IN THE MAKING: RETHINKING COMPETITION, GOODS, AND INNOVATION 48 (Martha Poon ed., Olivia Custer trans., Zone Books 2021); Petros Terzis, *Law and the Political Economy of AI Production*, 31 INT'L J.L. & INFO. TECH. 302-30 (2023).
[54] Patrik Aspers & Asaf Darr, *The Social Infrastructure of Online Marketplaces: Trade, Work and the Interplay of Decided and Emergent Orders*, 73 BRIT. J. SOCIOLOGY 822 (2022).
[55] Annabelle Gawer & Martín Harracá, *supra* note 52, at 3.
[56] Tobias Kretschmer et al., *supra* note 7, at 410 & 407.
[57] Baldwin, *supra* note 42, at 3 (raising the possibility of non-platform ecosystems in which other means of coordination than technical platforms may be used, such as 'bilateral transactions and contracts, multi-lateral agreements arranged by orchestrators and temporary linkages arranged by system integrators.').
[58] Jacobides & Lianos, *supra* note 22, at 1199 tbl.1.
[59] PHILIPP HACKER ET AL., REGULATING BLOCKCHAIN: TECHNO-SOCIAL AND LEGAL CHALLENGES ch.18 (Oxford Univ. Press 2019); Jacobides et al., *supra* note 18, at 10 (noting that 'research is only just beginning to look at decentralised ecosystems.').

As established in the previous section, ecosystems exhibit a strong need for private governance structures to operate efficiently. The way these governance structures are established, maintained and changed remains an underexplored area. Existing conceptualizations of ecosystems do not currently offer a full-fledged organizational typology with clear parameters of the modes and loci of power (or control). In particular, such conceptualizations do not conclusively explain the prevalence of 'central platform orchestration'; can it be rationalized as the most value maximizing ecosystem order (governance as natural order) or is it merely the preference of powerful actors to enhance their value capture (governance as power)?

The literature on ecosystems is divided into two broad streams that provide different answers to these questions. In this section, we will analyze the two streams which we have labelled the 'natural order rhetoric' and the 'power rhetoric.'

## A. The 'Natural Order Rhetoric'

The dominance of the model of centralized ecosystems managed by digital platforms or orchestrators has led to the emergence of a 'natural order rhetoric.' Pervasive in regulatory and academic debates as well as public narratives,[60] this rhetoric promotes a hands-off ('forbearance') perspective to private governance toolse tools, favoring limited public or regulatory oversight. This section will expose the misguided foundations of this 'natural order rhetoric'.

We see the intellectual lineage of the 'natural order rhetoric' to stem essentially from Transaction Cost Economics and Resource-Based Views of the Firm – two theoretical traditions that are highly influential in corporate, competition and economic law at large,[61] as well as more recently from theories on Dynamic Capabilities. In short, our argument is that we witness a return of the 'classic' controversy surrounding markets' self-steering ability, in which advocates of the 'natural order' rhetoric portray law as an external and non-essential element to the functioning of markets, in this case this logic applying to ecosystems.[62]

### 1. Transaction Cost Economics

The general premise of TCE concerning regulatory intervention in markets is that the legal regime should only get involved where such intervention would lower transaction costs.[63] This results in a law that remains agnostic to internal disputes within an organizational

[60] *See*, on the intellectual foundations of free market thinking, LISA HERZOG, CITIZEN KNOWLEDGE 87-103 (Oxford Univ. Press 2024).

[61] *See e.g.*, on the legacy of Transaction Cost Economics in modern contractual debates, Jaakko Salminen, *Towards a Genealogy and Typology of Governance Through Contract Beyond Privity*, 16 EUR. R. CONT. L. 25-43 (2020).

[62] ANDREW LANG, SEARCHING FOR CONTEMPORARY LEGAL THOUGHT 312-29 (Justin Desautels-Stein & Christopher Tomlins eds., Cambridge Univ. Press 2017).

[63] This emphasis on transaction costs has been introduced by Ronald H. Coase, *The Nature of the Firm*, 4 ECONOMICA 386-405 (1937). This more nuanced case for intervention is not premised on the 'price theoretic lens of choice' and is more attentive to the strategic behavior of the entities to be regulated. See, Steven Tadelis & Oliver E. Williamson, TRANSACTION COST ECONOMICS (Mar. 12, 2012), https://ssrn.com/abstract=2020176.

hierarchy, such as a firm.[64] There are two main reasons that are invoked to justify this 'law of forbearance.'[65] The first is that parties to an internal dispute within a firm have deep knowledge about both the circumstances surrounding a dispute as well as the efficiency properties of alternative solutions, which could only be communicated to the court/legal decision-maker at great cost. The second is that permitting the internal disputes to be appealed to the court/legal decision-maker would undermine the efficacy and integrity of a hierarchy.

The TCE literature has nonetheless long acknowledged that the variety of organizational structures transcends a simple binary order of 'markets' and 'hierarchies.'[66] Instead, they are often situated on a spectrum between these two poles.[67] In such hybrid organizations,[68] each participant maintains its autonomy, distinguishing it from hierarchical structures. Simultaneously, hybrids are not purely market-based, as they incorporate either formal or informal mechanisms designed to facilitate long-term coordination and cooperation among the members of the organization. Hybrids cover a variety of organizational forms, such as alliances, collective trademarks, networks, partnerships and relational contracts.[69]

The complexity of such economic relations, which involve specifically-tailored investments ('asset specificity'), make it difficult to consider *ex ante* all of the possible 'consequential disturbances' that may emerge over the course of their execution.[70] The corresponding contracts (as forms of private governance) are therefore inevitably incomplete.[71] This incomplete nature is not however a deficit to be overcome, but rather an inherent feature of complex and long-term contractual arrangements.[72] Long-term incomplete contracts require special adaptive mechanisms to realign relationships and restore efficiency when unexpected disturbances arise.[73] These adaptive mechanisms may involve for instance formal contractual clauses that contemplate unanticipated disturbances for which adaptation is needed or forms of continuous monitoring to verify performance, and may be overcome through 'dynamic programming'.[74] However, although these adaptive mechanisms serve to perfect the contract between the parties, they also impose important restrictions on the autonomy of the parties at the same time. Given the power asymmetries that may exist and the central position of digital

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[64] See Oliver E. Williamson, *The Economics of Governance*, 95 AM. ECON. REV. 1, 9-10 (2005).
[65] *Id*. at 9.
[66] Williamson, *supra* note 27.
[67] *Id*. For a critique of the framing of organizational structures as lying on a spectrum between markets and the firm, *see* Powell, *supra* note 28.
[68] The term "hybrid" was first coined by Williamson; *see also* Oliver E. Williamson, *Comparative Economic Organization: The Analysis of Discrete Structural Alternatives*, 36 ADMIN. SCI. Q. 269 (1991); Claude Ménard, *The Economics of Hybrid Organizations*, 160 J. INST. & THEORETICAL ECON. 347-50 (2004).
[69] Simon Deakin et al., *'Trust' or Law? Towards an Integrated Theory of Contractual Relations Between Firms* 21 J.L. & SOC'Y 334, 334-335(1994); Ian R. MacNeil, *Contracts: Adjustment of Long-Term Economic Relations Under Classical, Neoclassical, and Relational Contract Law*, 72 NW. U.L. REV. 857 (1978). For an overview, *see* STEFAN GRUNDMANN & FABRIZIO CAFAGGI, THE ORGANIZATIONAL CONTRACT: FROM EXCHANGE TO LONG-TERM NETWORK COOPERATION IN EUROPEAN CONTRACT LAW (Routledge 2013).
[70] Williamson, *supra* note 68.
[71] *Id.*; Oliver Hart, *Incomplete Contracts and the Theory of the Firm*, 4 J.L., ECON., & ORG. 119-39 (1988).
[72] Williamson, *supra* note 27.
[73] OLIVER E. WILLIAMSON, THE ECONOMIC INSTITUTIONS OF CAPITALISM: FIRMS, MARKETS, RELATIONAL CONTRACTING (New York: The Free Press, 1985).
[74] Eric Maskin & Jean Tirole, *Unforeseen Contingencies and Incomplete Contracts*, 66 REV. ECON. STUD. 83 (1999) (this dynamic programming will enable the estimation of the possible payoffs (potential outcomes of the contract) and how these are distributed across different possible scenarios).

platforms ('panopticon power'[75]), particularly through greater access to data analytics and AI computation, this 'dynamic programming' may favor digital platforms over other ecosystem participants (e.g., complementors, end-users)If one is to adopt this 'natural order rhetoric,' the identification of these different forms of organization and their corresponding regimes of contract law has important implications for legal intervention in general and competition law analysis in particular. The restriction of the autonomy of some of the members of these hybrid organizations may simply be viewed as governance tools that seek to avoid organizational failures while generating transactional efficiencies. Likewise, in the absence of significant market power, competition law ought not intervene as this may compromise the internal organization of this form of governance, the accompanying transactional efficiencies and entrepreneurial innovation.[76]

### 2. Resource-Based View of the Firm and (Dynamic) Capabilities

RBV theories of the firm also stress the important explanatory potential of economic resources but focus more than TCE on the *strategic use* of internal firm resources to explain the relevant firm's expansion.[77] These theories perceive firms as having idiosyncratic, not identical, strategic resources that are not perfectly mobile. The primary objective of the firm's business-level strategies is to create sources of sustainable competitive advantage in the industry, using resources, assets (physical, human and organizational) and capabilities. The *capabilities* of a firm are usually considered to be a 'bundle' of assets or resources that perform a business process, each of which is composed of discrete individual activities. The firm's '*competences*' are generally understood as a combination of knowledge, learning and behavior enabling these capabilities.

Some proponents of the 'forbearance' perspective have referred to capabilities as one of the dimensions that *explains* the power differential of Big Tech firms compared to other firms, and *justifies* an increased space for private governance instead of public governance on the basis that the accumulation of such new capabilities promotes innovation.[78] Emphasis is put not only on the presence of dynamic learning effects which are internal to firms (e.g., personnel, trade secrets, internal organization) but also to those external to it, including the relations firms build with business partners (e.g., complementors in an ecosystem) and/or stakeholders (e.g., the government). To the extent that learning gives rise to a special kind of intertemporal externality in production (i.e. externalities that involve a time lag and produce effects in the future) it may generate dynamic scale economies in production.[79]

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[75] Lianos & Carballa-Smichowski, *supra* note 14, at 815.

[76] The distinction between networks and hierarchies should not also be overstated. Networks may evolve towards a loose form of hierarchy as they are commonly subject to cyclical developments through which the most powerful participants may bring the network itself under their own control and, from that, create a hierarchical situation. *See* Hans B. Thorelli, *Networks: Between Markets and Hierarchies*, 7 STRATEGIC MGMT. J. 37 (1986).

[77] *See* Birger Wernerfelt, *A Resource-Based View of the Firm*, 5 STRATEGIC MGMT. J. 171 (1984); C.K. Prahalad & Gary Hamel, *The Core Competence of the Corporation*, HARV. BUS. R. 79 (1990).

[78] David J. Teece, *Profiting from Technological Innovation: Implications for Integration, Collaboration, Licensing and Public Policy*, 15 RSCH. POL'Y 285 (1986); David J. Teece, *Business Models, Value Capture and the Digital Enterprise*, 6 J. ORG. DESIGN (2017).

[79] Partha Dasgupta & Joseph Stiglitz, *Learning-By-Doing, Market Structure and Industrial and Trade Policies*, 40 OXFORD ECON. PAPERS 246 (1988).

Taking an evolutionary perspective on economic change, some authors emphasize the role of innovation leaders in the dynamic process of competition and distinguish between firms that "deliberately strive to be leaders in technological innovations" and those that "attempt to keep up by imitating the successes of the leaders."[80] In their view, competition is not static but dynamic, and thus leads to a process of continuing disequilibrium fundamentally different from the static price competition depicted by neoclassical price theory. This results in the elimination of less innovative firms and tips the market in favour of the innovation leaders. The market structure evolves to one involving large firms with a considerable degree of market power, and this is the trade-off society faces for rapid technological advancements. These large firms have the 'capability advantages' in terms of risks spreading, economies of scale in R&D, financial resources for taking care of the sunk costs of the research, and the 'appropriability advantages' for better protecting their innovations.[81] The static costs of a concentrated market structure and the exercise of market power may lead to welfare losses because of output restriction (and higher prices). However, these losses may be traded off by a faster rate of productivity growth caused by investments in innovation that pushes forward the production possibility frontier of the specific economy. These approaches put forward the need to protect the incentives of large firms to innovate, on the assumption that such firms will invest their profits in R&D.

In this view, the constitution and consequent orchestration of a digital ecosystem may entail the bundling of resources and capabilities that one firm would be unable to provide or get from the market.[82] The process of assembling value through the creation of datasets is an example of this. Merging different types of data (structured and unstructured) and integrating location data with customer data or public data with private data, may enable the conversion of the intangible value of data into real value, should this data advantage be be combined with computational competences.[83] Quite often this monetization occurs by selling this data to a group of users with indirect network externalities to the group of users whose data has been the input of the value chain. Data monetization requires 'high technical data capabilities' (e.g., network capacities enabling the collection, storage and retrieval of data) and 'high analytical capabilities' (the analytical skills needed to exploit the data). By acquiring a large customer base, firms are also able to develop dynamic capabilities in prediction (e.g. using consumer data to improve algorithms).

Greg Sidak and David Teece have argued for a "neo-Schumpeterian framework for antitrust analysis that favours dynamic competition over static competition [that] would put less weight on market share and concentration in the assessment of market power."[84] Assuming that digital platforms are technology-intensive, these authors argue in favor of putting dynamic Schumpeterian competition (acknowledging that a firm´s dominant position may be quickly eroded by new, innovative firms that enter the market) at the center of the competition law

[80] RICHARD R. NELSON & SIDNEY G. WINTER, AN EVOLUTIONARY THEORY OF ECONOMIC CHANGE 275 (Harv. Univ. Press 1982).
[81] *Id*. at 278.
[82] David J. Teece et al., *Dynamic Capabilities and Strategic Management*, 18 STRATEGIC MGMT. J. 509 (1997); Sidney Winter, *Understanding Dynamic Capabilities*, 24 STRATEGIC MGMT. J. 991 (2003); Foss, *supra* note 3.
[83] Linnet Taylor et al., *(Re)Making Data Markets: An Exploration of the Regulatory Challenges*, 14 L., INNOVATION & TECH. 355-94 (2022).
[84] Gregory Sidak & David J. Teece, *Dynamic Competition in Antitrust Law*, 5 J. COMP. L. & ECON. 581, 581 (2009).

analysis.[85] This led them to advance a greater reliance on self-regulation and private governance regimes, as greater intervention by the State may jeopardized dynamic efficiencies. Taking an evolutionary perspective, others argue that in an industry marked by cumulative innovation "a more sheltered competitive environment, with its associated higher mark-ups, does lead to more rapid productivity growth."[86] In the presence of innovation, welfare losses because of output restriction (and higher prices) may be traded off by a faster rate of growth of productivity.

David Teece, among others, has put emphasis on dynamic capabilities as an important element defining competitive rivalry.[87] Dynamic capabilities are defined as "the firm's ability to integrate, build, and reconfigure internal and external resources/competences to address and shape rapidly changing business environments" to generate 'abnormal returns'. The emphasis is not restricted to productive efficiency resulting from improvements in the cost structure of the firm, but includes the constitution and orchestration of a network of capabilities for the co-creation of economic value with business partners and complementors.[88] This leads some authors to distinguish between different forms of monopoly rents, some of which are beneficial solely because they result from these dynamic capabilities at the level of the ecosystem[89], thus building arguments against government intervention depending on the 'type' of rents observed in this context.[90]

However, it does not necessarily follow that embracing the natural order market analogy and forbearance to the private governance arrangements in digital ecosystems is the appropriate regulatory strategy. First, some authors have highlighted the chain of capability spillovers[91], which crucially does not necessarily provide a direction as to a more or less permissive approach to intervention. While *strategies* of raising rivals' costs or diminishing

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[85] *Id.*; *See also* David Teece*, Next-Generation Competition: New Concepts for Understanding How Innovation Shapes Competition and Policy in the Digital Economy,* 9 J.L. ECON. & POL'Y 97 (2012-2013). Schumpeterian concepts of competition assume that the degree of competitiveness in markets is not reflected in the competitive pressure on prices and output of a given product (static competition), but rather in the speed and frequency of innovation cycles for products, that disrupt the existing market (dynamic competition). Competition is therefore not necessarily enhanced by a large number of market participants, but also by the absence of barriers that firms face when introducing innovative products in the market.

[86] NELSON & WINTER, *supra* note 80, at 350.

[87] *See*, among many, DAVID J. TEECE, *The Evolution of the Dynamic Capabilities Framework*, *in* ARTIFICIALITY AND SUSTAINABILITY IN ENTREPRENEURSHIP (Richard Adams et al. eds., 2023); DAVID J. TEECE, *FGF Studies in Small Business and Entrepreneurship*, *in* ARTIFICIALITY AND SUSTAINABILITY IN ENTREPRENEURSHIP (Richard Adams et al. eds., 2023); David Teece & Gary Pisano, *The Dynamic Capabilities of Firms: An Introduction*, 3 INDUS. & CORP. CHANGE 537-56 (1994).

[88] A 'business partner' 'fulfil(s) specific end-user needs from core business' by differentiating its products, services and brand from the orchestrator and 'securing its own end-user contact point'. In contrast, 'complementors' contribute 'to the fulfillment of a specific end-user need related to core business with a component', with its product easily integrated by different orchestrators and business partners: M. Jacobides, *How to Compete When Industries Digitize and Collide: An Ecosystem Development Framework*, 64 CAL. MGMT. REV. 99, 113 (2022).

[89] Nicolas Petit & David Teece, *Innovating Big Tech Firms and Competition Policy: Favoring Dynamic Over Static Competition*, 30 INDUS. & CORP. CHANGE 1168 (2021, 1183.

[90] See, Sotirios Georgousis, Bowman Heiden & Nicolas Petit, Gatekeepers, Landlords, or Superstars? An Empirical Study of Rents in the Digital Economy (Nov. 5, 2023), https://ssrn.com/abstract=4624064 (advancing a non-interventionist approach for rents generated by efficiency (Ricardian) or innovation (Schumpeterian).

[91] Cristina Caffarra et al., *Ecosystems Theories of Harm in Digital Mergers: New Insights from Network Economics*, VOXEUCEPR (June 6, 2023), https://cepr.org/voxeu/columns/ecosystem-theories-harm-digital-mergers-new-insights-network-economics-part-2 .

rivals' revenue may increase a firm's own competitive advantage, it can also prevent competitors developing their own (dynamic) capabilities and cause the competitive process across product markets and cumulative innovation to suffer. Second, we cannot assume that ecosystem orchestrators and digital platform controllers act as benevolent, neutral custodians of their ecosystems, seeking to maximize benefits for all participants. Empirical evidence reveals strategies of 'inconsistent platform governance' and 'organizational decoupling', where platforms selectively enforce rules against complementor misconduct.[92] This creates a risk of 'social contagion of misconduct' that challenges the traditional 'efficiency view' of digital platforms. Third, this view overlooks a fundamental conflict of interest: digital platforms simultaneously serve as private regulators of their ecosystems and as competitors within those same ecosystems. They compete in innovation races, sometimes directly against their own complementors, who may themselves become sources of disruptive innovation under certain circumstances.[93] Fourth, digital platforms should be understood as private governments rather than markets or meta-markets. Like governments, they hold a monopoly on 'force' - the power to impose rules on ecosystem participants. However, unlike democratic governments constrained by separation of powers, platforms can formulate exploitative rules that systematically favor their own interests without checks and balances.[94] These considerations underscore the significance of analyzing the emergence of "power rhetoric" in digital ecosystem discourse.

### B. The 'Power Rhetoric'

The 'natural order rhetoric' is increasingly challenged by an opposing rhetoric that emphasizes the role of *strategic intention* in the behavior of ecosystem orchestrators and in particular the power positioning strategies they may be inclined to follow. In this line of argument, the *agency* (of orchestrators) dominates the *structure* of competition in the digital economy. Such structures are *made* by key actors, rather than resulting naturally from the competitive process. These actors may favor central platform orchestration over other governance modes even where it is disadvantageous to the ecosystem's value creation, if it strengthens their power position and enhances their value capture. This rhetoric has direct policy implications for the ideal reach of different regulatory mechanisms and systems of public governance.

#### 1. The Growing Power of Digital Platforms and Ecosystem Orchestrators

Contractual or other internal governance instruments developed by digital platform and ecosystem orchestrators can form part of a strategic effort to limit competition. By raising barriers and marginalizing competing platforms and ecosystems through strategic foreclosure, orchestrators can gain relative (or absolute) competitive advantage. This constrains horizontal

[92] Annabelle Gawer & Martín Harracá, *supra* note 52.
[93] Ron Adner & Marvin Lieberman, *Disruption Through Complements*, 6 STRATEGY SCI. 91, 94 (2021).
[94] Annabelle Gawer & Martín Harracá, *supra* note 52, at 22.

competition, enabling one firm to obtain and exploit market power, which generates substantial consumer welfare losses, broader societal detriments, and more centralized economic structures. Such strategies additionally impact vertical competition by creating distributional effects in surplus reallocation and "pecuniary externalities". These externalities stem from substantial asymmetries in how ecosystem orchestrators, complementors, and consumers capture value from digital innovation.[95]

The multi-dimensionality of the economic (and political/cultural) power of digital platforms[96] has prompted social movements to employ the 'power' or 'domination rhetoric' to challenge the space offered for private governance, in favor of a more extensive reliance on public governance mechanisms. The initial focus has been mostly, but not exclusively, on the largest platforms (Big Tech) in view of their effect on the tangible economy and on the democratic process more broadly.[97]

Others have argued that the 'ecosystemic mindset', based on the social relationships that develop between the various actors cooperating within the ecosystem in conjunction with a multi-dimensional definition of 'value,' recognizes the contribution to the value generation process of various stakeholders.[98] In this view, capabilities (either dynamic or ordinary) do not only result from the meritorious investments, strategies and business models of a specific keystone firm[99] but also from a social process of co-production of value among multiple contributors. These contributors include participating socio-economic agents (suppliers of inputs like business partners/complementors, users, the local community, the State, etc.)[100], termed the ecosystem *lato sensu*.

The social costs generated by ecosystems do not only relate to 'value network failures' in the narrow sense.[101] Given digital ecosystems include thousands of firms and impact activity in various industries, the broader perspective of ecosystem stakeholders extends beyond the usual focus on orchestrators, complementors, and concern users (end-consumers) to include local communities and citizens. Functional and distributional failures may affect stakeholders that are not adequately represented in the institutions of private governance of ecosystems. This may impose externalities on them, to the extent that their contribution to an ecosystem or the

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[95] The distributive impact may be ignored by competition law or other regulatory intervention (if this focuses on total welfare or consumer welfare, defined narrowly) as it does not relate to economic efficiency. *See*, Ioannis Lianos, *Competition Law as a Form of Social Regulation*, 65 ANTITRUST BULL. 3 (2020). This is the main lesson of the 'Coase Theorem,' which assumes a world of zero transaction costs and individuals being able to bargain and internalize technological externalities, and thus leaving aside pecuniary externalities. Randall Holcombe & Russell Sobel, *Public Policy Toward Pecuniary Externalities*, 29 PUB. FIN. R. 304 (2001).

[96] Bo Cowgill, Andrea Prat & Tommaso Valletti, POLITICAL POWER AND MARKET POWER (Nat'l Bureau of Econ. Research, Working Paper No. 33255, 2024), https://doi.org/10.3386/w33255.

[97] K. SABEEL RAHMAN, DEMOCRACY AGAINST DOMINATION (1st ed., Oxford Univ. Press 2017); Lina Khan, *The New Brandeis Movement: America's Antimonopoly Debate*, 9J. EUR. COMPETITION L. & PRACTICE 131 (2018); Brishen Rogers, *The Social Cost of Uber*, 82 U. CHIC. L. REV. 85 (2015).

[98] Ioannis Lianos, *Value Extraction and Institutions in Digital Capitalism: Towards A Law and Political Economy Synthesis for Competition Law*, 1 EUR. L. OPEN 852-890 (2022).

[99] IANSITI & LEVIEN, *supra* note 6.

[100] For the importance of State investment in the emergence of modern digital ecosystems, *see* MARIANA MAZZUCATO, MISSION ECONOMY: A MOONSHOT GUIDE TO CHANGING CAPITALISM (Harper Bus. 2021).

[101] See, Jacobides et al., *supra* note 18, at 2 (noting that coordination problems within ecosystems may lead to endogenous governance failures, functional, which relate to the platform or ecosystem members' inability to create and deliver joint value to the final customer, and distributional failures, which are associated with participants' failure to capture value proportional to their joint contribution).

costs incurred by membership are not considered in a situation in which such ecosystems (*stricto sensu*) will be only accountable to the shareholders of the orchestrator and complementor firms. Such externalities may result from a lack of competition, due to positions of architectural power or innovation bottlenecks, or be broader to include 'social and psychological externalities'.[102]

From this perspective, examining who wields power in the ecosystem and how this power affects not only consumers but also all those who contribute to the socio-economic value of the ecosystem and its innovation, requires new approaches focusing on power positions at the level of the ecosystem.[103] Focusing on ecosystems (and/or value chains), instead of markets, brings to the fore the importance of the social nature and structure of economic activity to the extent that actors do not only interact indirectly via the intermediation of markets but also through the establishment of close relations and (local) formal or informal institutions that impact economic exchange.[104]

The power narrative is not limited to the issue of social performance and sustainable innovation, but can integrate an institutionalist component that has remained in the background. Ecosystems are stable organizations of the meso-level that rely mostly on institutions of private ordering to structure interdependencies and cooperation, but may not be sufficiently embedded into the broader sociopolitical instrumental value system.[105] Certain ecosystems deliberately seek to immunize themselves from wider political processes, e.g., by occupying a transnational space and trying to evade national and territorial rules. What is needed is a complex policy system that will sway private agents in socioeconomic systems of the meso-level (ecosystems) to offer social value (internalizing any negative social externalities) and minimise situations of 'ceremonial dominance' (*see infra* sec. V).

It follows that the expansion of (digital) ecosystems in different socio-economic and cultural spheres does not indicate their success as institutions of the meso-level. The question of the appropriate scale ought be connected to the instrumental values pursued by specific socio-political communities. This challenge is far too complex to be covered by only a few systems and necessitates a combined approach of small and large systems.

Furthermore, following the Draghi report[106], the EU recognizes the need to expand its regulatory focus beyond just market power, drawing on the macro- and meso-levels of geopolitics, geoeconomics and trade positioning.[107] This recognition is paralleled in the discussions over industrial policy and the global political economy of Big Tech platforms and

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[102] *Id*, at 7.
[103] Lianos & Carballa-Smichowski, *supra* note 14.
[104] See, W. ELSNER, T. HEINRICH, H. SCHWARDT, THE MICROECONOMICS OF COMPLEX ECONOMIES (Elsevier, 2015).
[105] The concept of (social) embeddedness is discussed by Mark Granovetter, *supra* note 37.
[106] Mario Draghi, The future of European competitiveness – A competitiveness strategy for Europe, part A (September 2024), available at https://commission.europa.eu/topics/strengthening-european-competitiveness/eu-competitiveness-looking-ahead_en ; Mario Draghi, The future of European competitiveness – In-depth analysis and recommendations, part B (September 2024), available at https://commission.europa.eu/topics/strengthening-european-competitiveness/eu-competitiveness-looking-ahead_en .
[107] Ioannis Lianos, Draghi's Untapped Vision for EU Competition Reform Beyond Tradition (November 1st, 2024) ProMarket, available at https://www.promarket.org/2024/11/01/draghis-untapped-vision-for-eu-competition-reform-beyond-tradition/ .

technology firms.[108] This is also a key addition of the scholarship on Global Value Chains (GVCs), which centers on the power relations between the various participating economic actors and on how the surplus value is spread across jurisdiction.[109] The literature on Global Value Chains (GVCs) offers valuable insights for broadening our understanding of ecosystem private governance. Rather than focusing solely on ecosystem value creation—as strategic management literature typically does—we should consider broader social value, including benefits for those outside the ecosystem. This perspective is particularly relevant since GVC analysis was originally developed to provide a developmental framework for state action.[110] GVC literature also allows us to examine in greater detail the various governance regimes that can emerge within the broader framework of ecosystem private governance.

### 2. A Typology of Power in Digital Ecosystems: Lessons from the GVC Literature

International organizations have drawn on the GVC framework to assess cross-cutting issues of economic development, trade, and investment policies relating to broader public values like sustainability, workers' rights, waste and resource circulation, and gender equality and inclusion.[111] Individual countries rely on the GVC framework to explore the potential for 'upgrading,[112]' whereby a more significant share of a given value chain is captured by providing services that add a relatively larger part of value while ensuring 'sovereignty' is maintained.

Private governance in the GVC framework provides the legal (and other) instruments that animate the value chain, and primarily connects chain actors to accomplish an integrated economic process (or 'the focal value proposition').[113] Such governance regimes can encompass contracts, standards, and certifications, as well as business routines and practices, logistics, reporting documents and practices, reputation and trust.[114] Functionally, private governance regimes in GVCs combine elements of legislative, administrative, and adjudicative

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[108] *See*, among others, ANU BRADFORD, DIGITAL EMPIRES: THE GLOBAL BATTLE TO REGULATE TECHNOLOGY (Oxford Univ. Press 2023); Oles Andriychuk, *Between Microeconomics and Geopolitics: On the Reasonable Application of Competition Law*, 85 MOD. L. REV. 598 (2022).

[109] Raphael Kaplinsky, *Spreading the Gains from Globalization: What Can Be Learned from Chain Analysis*, 47 PROBS. ECON. TRANSITION 74 (2004).

[110] *See*, Stefano Ponte, Gary Gereffi & Gale Raj-Reichert, Introduction to the Handbook on Global Value Chains, *in* HANDBOOK ON GLOBAL VALUE CHAINS 1 (Stefano Ponte, Gary Gereffi & Gale Raj-Reichert eds., Edward Elgar 2019).

[111] *See* ORG. FOR ECON. COOP. & DEV. (OECD), INTERCONNECTED ECONOMIES: BENEFITING FROM GLOBAL VALUE CHAINS (OECD Publ'g 2013); INT'L. LAB. ORG. (ILO), PROVISIONAL REP. 14-1 DECENT WORK IN GLOBAL SUPPLY CHAINS: RESOLUTION AND CONCLUSIONS SUBMITTED FOR ADOPTION (2016); OECD & WORLD BANK GRP., REPORT FOR SUBMISSION TO G20 TRADE MINISTERS MEETING ISTANBUL, INCLUSIVE GLOBAL VALUE CHAINS (2015).

[112] That is, move towards being the more value-adding segments of a chain (i.e. 'economic upgrading') and improving the social quality of employment, such as wages, workplace safety, and inclusion (i.e. 'social upgrading'): *See* Stephanie Barrientos et al., *Economic and Social Upgrading in Global Production Networks: A New Paradigm for a Changing World*, 150 INT'L LAB. REV. 319 (2012); Thomas Bernhardt & Ruth Pollak, *Economic and Social Upgrading Dynamics in Global Manufacturing Value Chains*, 48 ENV'T & PLAN. 1220 (2016)

[113] Ron Adner, *Ecosystem as a Structure: An Actionable Construct for Strategy*, 43 J. MANAGEMENT 39, 40 (2017).

[114] Michael Vandenbergh, *The New Wal-Mart Effect: The Role of Private Contracting in Global Governance*, 54 UCLA L. REV. 913 (2007).

power.[115] Substantively, private governance regimes set standards of cooperation, stipulate information rights, make allowance for on-site visits and reporting duties, permit the transfer of intangible and other assets, and, generally, allocate risks related along the value chain.

Beyond institutionalizing the economic rationality of production, private governance in the GVC is increasingly used to make up for deficits in public regulation, particularly in the fields of product safety, environmental protection, labor rights, and data protection. The integration of such concerns into pre-existing and novel instruments of private governance has not been without conflict, and the desire for the private implementation of public goals has so far proven controversial.[116] Despite this scepticism, private governance today pertains to the animating *and* the regulating dimension of private GVCs' instruments.

GVC framework's broader conception of the role of private governance resonates with the business studies and economics emphasis on the regulating role of orchestrators or multi-sided platforms in digital ecosystems.[117] What is missing from the literature is serious engagement with the multidimensional modes of power in ecosystems. Although the concept of 'industry architecture' considers how (lead) firms shape rules and roles in their ecosystem and engages with the structural features of centralized private governance and orchestration,[118] there has not been any effort to develop a more elaborate typology or theory of private governance in (digital) ecosystems, to the same level of sophistication as in the GVC literature.

Gereffi et al.'s influential typology of Global Value Chain (GVC) governance challenges Coase's traditional market-firm dichotomy by identifying network-based governance forms.[119] The model describes five governance types (market, modular, relational, captive, and hierarchy), each associated with varying degrees of explicit coordination and power asymmetry between GVC participants.[120]

***Table 1: GVC Governance Types[121]***

| **Governance Type** | **Complexity of Transactions** | **Ability to Codify Transactions** | **Supply-Base Capabilities** | **Degree of Explicit Co-ordination and Power Asymmetry** |
|---|---|---|---|---|
| **Market** | Low | High | High | Low |
| **Modular** | High | High | High |  |
| **Relational** | High | Low | High | |

[115] Lisa Bernstein, *Opting Out of the Legal System: Extra-Legal Contractual Relations in the Diamond Industry*, 21 J. LEGAL STUD. 115, 115-157 (1992).
[116] RICHARD M. LOCKE, THE PROMISE AND LIMITS OF PRIVATE POWER: PROMOTING LABOUR STANDARDS IN A GLOBAL ECONOMY (Cambridge Univ. Press 2013).
[117] Kevin J. Boudreau & Andrei Hagiu, Platform Rules: Multi-Sided Platforms as Regulators, *in* PLATFORMS, MARKETS AND INNOVATION (Annabelle Gawer ed., Edward Elgar Publ'g 2009).
[118] *See*, *e.g.*, Michael G. Jacobides et al., *Benefiting from Innovation: Value Creation, Value Appropriation and the Role of Industry Architectures*, 35 RSCH, POL'Y 1200 (2006); Gary P. Pisano & David J. Teece, *How to Capture Value from Innovation: Shaping Intellectual Property and Industry Architecture*, 50 CAL. MGMT. REV. 278-96 (2007).
[119] See, for a discussion, Gary Gereffi et al., *The Governance of Global Value Chains*, 12 R. INT'L POL. ECON. 78 (2005).
[120] *Id*.
[121] *Id.*

| | | | | |
|---|---|---|---|---|
| **Captive** | High | High | Low | |
| **Hierarchy** | High | Low | Low | High |

Based on this matrix, it becomes possible to identify the way in which common dynamics, with respect to one or several of these parameters, can impact upon the governance structure of the value chain.[122] The matrix illuminates how private governance and the locus of power may evolve according to the characteristics of the transactions, the potential of a regulating role being exercised, and the economic capabilities of the GVC members. Although the type of governance is not a constitutive element of an 'ecosystem,'[123] the GVC analytical governance matrix may provide some inspiration to the study of the typology of (digital) ecosystems.

From a descriptive perspective, the GVC framework provides a useful methodology to map the various actors co-operating in a value chain and to evaluate the power dynamics between them. Unlike in market-type relations that are governed by price information, standards can be used to codify non-price information for organizing coordination within the value chain. Equally, the firm-level approach and its 'de-territorialization' of production is contested by the GVC analysis – scholars argue that there is a stronger combination of micro- and macro-level factors and broader entry points of political economy that need to be considered.[124] Uniquely, the GVC approach enables, from a prescriptive perspective, integration of a broader set of instrumental values to gauge institutional evolution.

When transposing the GVC framework, one needs to be aware of its limitations. The typology corresponds to a firm-level analysis that largely brackets both meso- and macro-level impacts as well as inter-personal preconditions, such as inculturation practices of supply chain managers. Even more crucially, there is a significant gap in explaining the role of data and data analytics (like AI capabilities) in both digital value chains and data-driven manufacturing. Some adjustments are therefore necessary to fruitfully mobilize the GVC framework for digital ecosystems, as will be outlined in the following paragraphs.

First, the business model and operating logic of platforms is embodied in private governance structures. Hence, the role of private governance is different and more crucial than in the world of (non-digital) value chains. In physical production, the value chain is an instrument for optimizing profitability in the production of a given good and private governance is used to orchestrate production resources and realize the potential benefits from outsourcing. Under the 'lean production' paradigm, value chains can be sub-divided easily into linked sequences and/or delivery steps. In digital ecosystems, private governance does not only enable platform operability, but it also brings ecosystem operability into being. Put simply, it *constitutes* the product, rather than *optimizing* its production. In a GVC context, products are separated from the agents engaged in the exchange, as their quality is stabilized by conventions

[122] *Id*. at 90.
[123] Baldwin, *supra* note 37.
[124] *See*, Jennifer Bair, *Global Capitalism and Commodity Chains: Looking Back, Going Forward*, 9 COMPETITION & CHANGE153-80 (2005); Peter Dicken et al., *Chains and Networks, Territories and Scales: Towards a Relational Framework for Analysing the Global Economy*, 1 GLOB. NETWORKS 89 (2001).

and standards defined at the level of the value chain. The ecosystem glue (the product in this case) is shaped by the links between the agents who enter relationships.[125]

Secondly, the fragmentation of product value chains into different 'tiers' is not reflected in digital ecosystems. Instead of sequences of production, known as 'tracing a commodity,' the data value chain can be modelled around steps concerning the treatment of the data, specifically data acquisition, analysis, curation, storage and usage.[126] Once a platform is in place, these steps coincide and, therefore, it is necessary to model the business context and relationships between key stakeholders, both of which are not premised on the tracing of a single information package as it would be in the physical production field.

Thirdly, in the field of (digital) ecosystems, divisions between classical business sectors are more fluid. This is due to the use of easing data, which can crisscross these sectoral boundaries. Platform business models are not oriented towards a stable final product but are dynamic and easily move sectors to which new ones can be added (e.g. an e-commerce platform that also engages in financial services). Significantly, any perspective cannot be centered around a final product or 'core competence,' rather it must account for the openness or elusiveness of the 'final product' by focusing on processes and capabilities. In industrial value chains the underlying dynamic to increase rent capture ('upgrading') involves the attempt by a value chain actor to 'move up the chain' towards more lucrative segments of the production process. 'Upgrading' in (digital) ecosystems implies searching for activities where the use of one's data set or data analytics capabilities (AI) could prove most lucrative.[127] Rather than 'moving up a given chain,' upgrading in the context of (digital) ecosystems means *expanding* it. In fact, once a platform has obtained a significant share of the market in one sector to the extent that it effectively forms a 'bottleneck,' platforms may seek to become more integrated into other business sectors. As a result of Big Data being the logic of platform businesses, an expansion in user numbers, rather than a focus on 'premium' users, seems to be the preferred trajectory of most digital platforms. Size allows not only for similar things to be done on a larger scale but also for platforms to engage in activities that would otherwise be inaccessible to them because of a smaller data set. Therefore, a 'lifecycle approach' to platforms, which includes phases of growth and the processes of financialization and consolidation, appears a suitable heuristic approach to adopt.

## IV. Overcoming Theoretical Biases: A Balanced Analytical Framework for Private Governance in Ecosystems

The necessary strategies and legal/non-legal governance tools deployed by firms to maintain their central position in ecosystems, reflects the centrality of strategic choices in the design of governance. This dynamic makes the Global Value Chain (GVC) approach, with its

[125] LUC BOLTANSKI & EVE CHIAPELLO, THE NEW SPIRIT OF CAPITALISM 129-30 (Gregory Elliott trans., Verso 2007).
[126] Edward Curry, The Big Data Value Chain: Definitions, Concepts, and Theoretical Approaches, *in* NEW HORIZONS FOR A DATA-DRIVEN ECONOMY 32 (Jose M. Cavanillas et al. eds., Springer 2016).
[127] Peter C. Evans & Annabelle Gawer, REPORT OF THE CENTRE FOR GLOBAL ENTERPRISE: THE RISE OF THE PLATFORM ENTERPRISE 17 (Ctr. for Glob. Enter. 2016), https://www.thecge.net/wp-content/uploads/2016/01/PDF-WEB-Platform-Survey_01_12.pdf.

emphasis on power asymmetries, particularly relevant for analysis. Scholarship in this field growingly reflects the need to design both private and public governance regimes that effectively address policymakers' concerns regarding the broader social externalities of ecosystems.[128]

### A. The Complex Governance Structure of Digital Ecosystems

Digital ecosystems encompass complex relationships among diverse members, connecting business actors across multiple markets while engaging various categories of users. Some of these interactions have been theorized by industrial organization economic theory to take place in multi-sided markets in which the presence of feedback loops between different users and business actors (through the operation of non-linear complementarities) generates value.[129] Subsequent scholarship in strategic management has demonstrated that multi-sided markets essentially emerge from the development of specific digital platform firms that control ecosystems[130], representing an endogenous process of ecosystem development.[131] Digital platforms *manage* competition within ecosystems by developing platform rules that regulate both their interactions with complementors and interactions among complementors themselves. This managed competition operates not only through contracts but also through non-contractual and technological governance mechanisms, including standards, code, peer review, reputation and feedback systems.[132]

As Mulligan explains, the function of a platform 'is to hide system complexity from those third parties that wish to use the functionality but do not need to implement it themselves.'[133] This is achieved by creating applications on top of an operating system via a set of publicly available interfaces, which are also known as APIs. Such APIs are a set of standalone instructions, routines, protocols and/or tools that have been developed for the purpose of building software applications and allow developers to reuse sections of code across many different programs. This modular approach facilitates the quicker creation of applications by third-party developers and allows them to link together different parts of the system, like hardware, peripherals, and software.[134] As the architecture of networks becomes more software than hardware-based, the interface makes a paralleled shift and vertical connection between nodes enabled by APIs permits the automatic flow of information between the different actors in the value chain.

To the extent that the system relies on 'open' interfaces, the boundaries of these value chains are not delineated by the limits of the organization or contractual arrangements with suppliers and/or customers, rather they remain flexible, and the length of the value chain is determined by the degree of the openness of the relevant APIs. Mulligan coins the term

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[128] *See*, Jacobides et al., *supra* note 18, at 1.
[129] Andrei Hagiu & Julian Wright, *Multi-sided Platforms*, 43 INT'L J. INDUS. ORG. 162 (2015).
[130] MICHAEL A. CUSUMANO ET AL., THE BUSINESS OF PLATFORMS 69 (Harper Collins 2019).
[131] Marc Rysman, *The Economics of Two-Sided Markets*, 23 J. ECON. PERSP. 125 (2009).
[132] Steven Tadelis, *Reputation and Feedback Systems in Online Platform Markets*, 8 ANN. REV. ECONS. 321 (2016).
[133] *Id.*
[134] CATHERINE E.A. MULLIGAN, THE COMMUNICATIONS INDUSTRIES IN THE ERA OF CONVERGENCE 23 (Routledge 2012).

'participatory value chain' to show the way in which open interfaces and APIs reinforce the role of the end-user consumer.[135]

These interfaces allow the different parts of the platform to operate and produce both demand-side and supply-side economies of scale.[136] The interfaces that connect different parts of a platform can be horizontal or vertical,[137] allowing both the platforms of several different companies to be present in various segments of the industrial structure and enabling connectivity between the service layer and the core networks respectively.

Open interfaces can substitute for formal contracting by providing the figurative 'glue' that holds digital ecosystems together.[138] These interfaces also enable new market formation, as digital platforms and developers share data to establish connectivity between ecosystem components, ecosystem participants, and the platform-complementor relationship itself.[139] The informal nature of these arrangements may, nevertheless, become a source of power for digital platforms operating as 'system integrators'. APIs can indeed coordinate a vast amount of economic activity 'outside of the boundaries of a legal entity' (here the digital platform) in terms of ownership and control[140] and outside formal contractual ties. Consequently, strategies for controlling APIs and interfaces form the foundation of the private governance systems that organize value extraction processes in digital ecosystems.[141]

### B. A Typology of Governance Modes in Digital Ecosystems

The typology framework established by Gereffi et al. for GVC governance modes essentially addresses the relationships between lead firms and their principal suppliers (first and/or second-tier).[142] In this context, 'governance' denotes the bundle of instruments, legal and otherwise, that enable a lead firm to coordinate its value chain. Such tools have partially overcome the boundaries of privity of contract and have been described as 'contract boundary-spanning' mechanisms.[143] While the emergence of such tools seems intuitive from an institutional economics perspective, governance types can be challenged on various normative grounds.

Consequently, the abovementioned typology cannot be directly transposed to digital value chains, and even less so to ecosystems, since it presupposes a segmented linearity of physical production. An ecosystem characterized by strong power centralization will not, however, exhibit the degree of hierarchical control envisioned in the 'hierarchy mode.' Unlike

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[135] *Id*. at 26.
[136] *Id*. at 53.
[137] *Id*. at 54.
[138] *Id*. at 26.
[139] *Id*. at 58.
[140] *Id*. at 58.
[141] On the importance of controlling the technical architecture for competitive strategy, see *inter alia*, Timothy Bresnahan & Shane Greenstein, *Technological Competition and the Structure of the Computer Industry*, 47 J. INDUS. ECON. 1 (1999); GEOFFREY PARKER, MARSHALL VAN ALSTYNE & SANGEET PAUL CHOUDARY, PLATFORM REVOLUTION: HOW NETWORKED MARKETS ARE TRANSFORMING THE ECONOMY AND HOW TO MAKE THEM WORK FOR YOU (Norton 2016).
[142] Gereffi, *supra* note 119, at 92.
[143] Jaakko Salminen, *Contract-Boundary-Spanning Governance Mechanisms: Conceptualizing Fragmented and Globalized Production as Collectively Governed Entities*, 23 IND. J. GLOB. LEGAL STUD. 709-42 (2016).

hierarchical structures, ecosystems rely more on incentives and motivation-framing initiatives rather than sanctions.[144] Additionally, both the tools and the substantive rules of governance will differ for digital value chains because of their novel incentive and revenue structure, in which customers often pay through their data and, thereby, become part of the value-generating process. Furthermore, the centrality of technology and code offers an additional venue for the implementation of governance by design, such as through the steering power of search algorithms, customer reviews and/or transparency rules regarding transactional data. Ultimately, the stakes of governance become subject to recalibration when digital platforms become gatekeepers for entire industries and/or social practices. This necessitates a shift of the relevant mechanisms of control, from individual clauses of contract law to governance models through competition law more broadly.[145]

This makes it even more crucial for governance not to be identified by formal legal rules alone; rather, it needs to be thought of as the interplay between positive rules (of varying degrees of formality) and spaces of 'ungovernance'[146], which appeal to and incentivize actors in an ecosystem who might otherwise be insensitive to strict governance rules. Generally, three levels of governance can be distinguished. First is 'contractual' governance that manifests itself in specific clauses, such as those concerning exclusivity, royalties or termination. Second is 'soft and informal' governance, which includes aspects of community-building, standards of behaviors, perks and reputational governance. Third is 'technological' governance, which is imposed through the technical interface of the platform and is implemented through the control of APIs, algorithms, patents, etc.

Overall, we propose a typology for ecosystem governance, inspired by Gereffi et al., which is premised on a continuum ranging from 'participatory/ collaborative' on one end, with 'relational governance' in the middle, to 'captive/ intrusive' governance by the orchestrator on the other end. The types of governance present on the continuum will differ with respect to the following crucial features. Firstly, the entry and exit barriers of the ecosystem, such as performance standards, community-oriented regulation/lock-in effect, and switching costs. Secondly, the degree of transparency of the relevant governance instruments and conditions. Thirdly, the degrees of formality and co-operation inherent in the relevant governance instruments and conditions, coupled with the extent of their appeal to extra-legal norms such as trust and reputation. Fourthly, the ease of customizing the governance model and the platform use, fifthly the price model, and sixthly the functionality of dispute mechanisms.

***Table 2: Ecosystem Governance Types***

| | **Feature** |
|---|---|

[144] Tobias Kretschmer et al., *supra* note 7, at 408-409.
[145] *See* Thomas Höppner et al., Taking a Bite at the Apple: Ensuring a Level-Playing-Field for Competition on App Stores, (May 13, 2019) (unpublished manuscript) (available online https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3394773.
[146] *See* Deval Desai & Andrew Lang, *Introduction: Global Un-Governance*, 11 TRANSNAT'L LEGAL THEORY 219 (2020).

| | ***Entry/ Exit Barriers*** | ***Transparency*** | ***Formality, Co-operation and Appeal*** | ***Customization*** | ***Price Model*** | ***Dispute Mechanism Functionality*** |
|---|---|---|---|---|---|---|
| **Participatory/ Collaborative Governance** | Low<br>↓ | Transparent<br>↓ | Informal<br>↓ | Low<br>↓ | Finance<br>↓ | Learning<br>↓ |
| **Relational Governance** | High | Opaque | Formal | High | Data | Deterrence |
| **Captive/ Intrusive governance** | | | | | | |

This typology should be tested against a series of private governance tools utilized by different platforms from different business sectors. The guiding question is how private governance regimes within ecosystems - whether contractual, informal, or technological - emerge, internalize externalities, and coordinate value chains. Importantly, 'private' governance does not operate in isolation from public regulation; rather, it often develops to react to, complement, pre-empt, or circumvent public rules.

## V. The turn towards a Public Governance of Digital Ecosystems

One major concern driving the emergence of public governance mechanisms in recent years is the rise of centralized private governance systems dominated by powerful Big Tech companies with distinctive economic and technological structures. Although the effort to regulate the digital space has been scattered in various regimes of public governance and undertaken at different moments, they have all attempted to address the multi-dimensional power capabilities enjoyed by the large 'Big Tech' actors in the digital economy. These recent efforts attempt to de-bias the law from the 'natural order rhetoric' and bring a more balanced approach, addressing the broader social externalities produced by (digital) ecosystems. Regimes of public governance thus act as a complement to private governance tools when they do not adequately integrate broader public values unrelated to a profit motive, or when they do not sufficiently consider the interests of underrepresented categories of stakeholders.

### A. Beyond the 'Natural Order Rhetoric': An Institutional Perspective

Governance regimes raise important questions about how legal systems and public institutions shape digital ecosystems. However, traditional legal institutionalism provides only part of the picture, as ecosystem coordination results from both law and technical arrangements (code). Acknowledging this broader dimension is essential for understanding the limitations of traditional legal institutions - such as contract, civil liability, and property law - in integrating broader public values.

## 1. The Power and Limits of Contractual Governance – Legal Institutionalism

Legal institutionalists have explained how certain institutions constitute critical and central characteristics of the development of capitalism, highlighting the role of law in the establishment and maintenance of markets, firms and other forms of economic organization.[147] Resisting technological determinism, legal institutionalists link the emergence of technological innovations to the emergence of legal institutions or "code," such as property rights, contracts, finance and other legal parameters.[148] They claim to have a more holistic understanding of the legal system, by reflecting on the power structure involved in private ordering [149] and evaluating legal rules not solely by their level of influence on rational individuals but on their institutional effects. A central tenet of this approach is to conceive of the legal status quo as one out of many possibilities of legal design, its realization being to some extent path dependent. When confronted with novel social or economic phenomena, the current emanation of these approaches needs to be thought of as a legal construct that is potentially amendable by legal means.

An institutionalist lens contributes to ecosystem research by demonstrating that digital platforms, market dynamics, and market characteristics can no longer be viewed as stable, pre-existing features of a natural economic order based on autonomy and bilateral exchange. The contractual relations within a given ecosystem depend on its functionality. Take the example of a matchmaking platform, such as Amazon to retail, Airbnb to short-term rentals, or Tinder to dating. Both the 'supplier' and the 'client' in the former two platforms, or both users in the case of Tinder, are bound to the platform by its standard contract terms (boilerplate clauses). Those terms stipulate the rights and duties of the platform and the respective participant, formulate standards of behavior for the entire community, and set out ways of exiting from the platform and deleting one's account. The platform, itself being a party to these contracts, establishes the technological and social infrastructure required to enact the business plan on a 'take-it-or-leave-it' basis. What appears as community standards is *de facto* established through the central regulatory capacity of the platform.[150]

The concluded contract is generally largely regulated or co-regulated by the platform.[151] Both the supplier and the client are provided with a fully-fledged regulatory framework upon which their transaction is based. This framework will consist of primary rules, rules of interpretation and, often, rules regarding dispute resolution. Typically, these rules serve as default rules and, to some extent, can be customized. This possibility of customization arguably entails a risk that the platform in its dominant position may seek to abuse, because it can steer, through binding rules or the effects of defaults, the contracting member's behavior.

One reason that the role of contractual governance is crucial is because classical points of intervention under national legislation are not effective due to attempted circumvention by

[147] Deakin et al., *supra* note 17, at 188.
[148] PISTOR, *supra* note 17.
[149] Deakin, *supra* note 17, at 189.
[150] Mateusz Grochowski, *Spontaneous Order in the Sharing Economy? A Research Agenda*|, 49 ZESZYT 75 (2018).
[151] *Id*. at 75.

online platforms. The significance of private governance in relation to online platforms has been endorsed by the European Commission, that stated in its Communication on Online Platforms that "principle-based, self- or co-regulatory measures, including industry tools for ensuring the application of legal requirements and appropriate monitoring mechanisms can play a role" in the future regulatory framework.[152]

The mechanisms of legal control of private governance depend upon the nature of the rules. In business-to-consumer (hereinafter B2C) contracts, the EU and other jurisdictions review clauses under a criterion of fairness and many jurisdictions have sectoral rules concerning privacy protection. For business-to-business (hereinafter B2B) contracts, only limited reasons for unconscionability exist. There is an ever-increasing amount of overlap between the types of clauses used by platforms that have been perceived to be unfair by other actors in the ecosystem. A survey conducted by the European Commission found that in B2B relationships, contract clauses from standard Ts&Cs were deemed problematic by businesses on several bases[153] including; an inability to be negotiated, platforms reserving the right to make unilateral changes, clauses requiring a 'bundling' of subscriptions to various services of the platform, prescription of proprietary payment systems, data clouds, and/or communication channels, the use of 'parity clauses,' and the restricted access and use of data to hinder one's ability to switch platforms. Cross-cutting issues were unclear termination, suspension conditions and procedures and the general complexity and vague nature of Ts&Cs.

Given the recurrence of typical clauses across platforms, recent initiatives to formulate model clauses for digital platforms may have promising potential. These include the European Law Institute's 'Discussion Draft of a Directive on Online Intermediary Platforms,'[154] as well as the EU Regulation that promotes fairness and transparency for businesses using online intermediation services (hereinafter P2B Regulation).[155] Importantly, model clauses will typically, although not necessarily, be limited to a formal, contractual level of governance and will leave the more informal, social and technological levels unaffected. This provides a strong argument in favor of mobilizing other more hands-on tools of public governance, such as competition law, alongside the more conventional and long-standing instances of contract law and consumer protection.

### 2. Institutional Automation under Big Data: The 'Uncontract'

The value of flexible public governance tools becomes clearer when considering the broader governance toolkit for regulating digital ecosystems. Contract governance theories and

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[152] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS ON ONLINE PLATFORMS AND THE DIGITAL SINGLE MARKET OPPORTUNITIES AND CHALLENGES FOR EUROPE, COM (2016) 288 final (May 25, 2016), https://ec.europa.eu/digital-single-market/en/news/communication-online-platforms-and-digital-single-market-opportunities-and-challenges-europe.

[153] COMMISSION REPORT ON BUSINESS-TO-BUSINESS RELATIONSHIPS IN THE ONLINE PLATFORMS ENVIRONMENT: LEGAL ASPECTS AND CLARITY OF TERMS AND CONDITIONS OF ONLINE PLATFORMS, (Nov. 14, 2016), report_on_tc_workshop_2017_11_14_F7E200E8-02BF-6B1E-1A013FB1B3922279_43829.pdf.

[154] Christoph Busch et al., *Rsch. Grp. L. Digit. Serv., Eur. Legal Stud. Inst., Discussion Draft of a Directive on Online Intermediary Platforms*, 5 J. EUR. CONSUMER & MKT. L. 164 (2016).

[155] Commission Regulation 2019/1150 of June 20, 2019, Promoting Fairness and Transparency for Business Users of Online Intermediation Services, 2019 O.J. (L 186) 57 (EU).

practices rely on controlling individuals and entities through incentives, sanctions, and rewards. Contracts, and the contractual regime that binds contracts together, serve to reduce uncertainty about the future behavior of others, by formulating expected obligatory (from a legal perspective) standards of behavior coupled with various enforcement mechanisms. Novel information technology-based interactions, such as blockchain, challenge this view of contracting. In these systems, technology supplants personal interaction, enabling behavioral prediction through data rather than contractual rules, with automatic technological enforcement. Zuboff has termed these phenomena that subvert the essence of contracting to be an 'uncontract,' rather than some new form of contracting,[156] premised on 'the substitution of automated procedures for promises, dialogue, shared meaning, problem solving, dispute resolution, and trust'.[157]

Consequently, the bilateral nature of contracts—despite being fundamental to contract theory—loses all practical relevance. Rather than the fictitious 'meeting of the minds,' neither the 'minds' nor their 'meeting' appears necessary in the case of 'uncontracts.' These uncontracts are 'unprecedented in their ability to impose unilateral power' because of technological or economic dependence.[158] In other words, contractual governance needs to be compatible not only with the digitalization of the whole lifecycle of contracts,[159] but with a reality where basic elements of contracts have been absorbed into technological mechanisms of compliance, algorithmic governance and/or governance by design. Further examples can be drawn from the broad emerging field of smart contracts, for example 'lex cryptographia.'[160]

Such practices for the most part fly under the radar of control of contract and consumer protection law. 'Uncontracts' are not parts of Ts&Cs that can be easily isolated and struck down as in a blue-pencil-test, rather they (i) become integral parts of the platform service itself, and (ii) they no longer present themselves as identifiable contractual devices. Instead of subjecting every 'uncontract' to scrutiny, regulatory responses need to address them on a more abstract and overarching level. Considering this, public governance, most notably through competition law, needs to determine permissible practices, while standards of rule of law can establish procedural guarantees vis-à-vis technological processes.

Such meta-level approaches can ultimately also be embedded in the private governance of platforms themselves and, thereby, add a self-reflexive element to their operations. One can think of combinations between substantive rules and instruments (ethics codes in venture capital), procedural rules and instruments (platform-related dispute mechanisms) and/or institutional rules and instruments (the relevant Ombudsman). An example of such would be the content screening that has been partially undertaken by Facebook individually and partially under the influence of national legislation, such as the pioneering German

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[156] SHOSHANA ZUBOFF, THE AGE OF SURVEILLANCE CAPITALISM: THE FIGHT FOR A HUMAN FUTURE AT THE FRONTIER OF NEW POWER 208 (Profile Books 2019).
[157] *Id*. at 333-334.
[158] *Id*. at 314.
[159] Stefan Grundmann & Philipp Hacker, *Digital Technology as a Challenge to European Contract Law: From the Existing to the Future Architecture* 13 EURO. REV. CONTRACT. L. 255 (2017).
[160] Aaron Wright & Primavera De Filippi, *Decentralized Blockchain Technology and the Rise of Lex Cryptographia* 34 SOC. SCIENCE NETWORK 41 (2015).

Netzwerkdurchsetzungsgesetz[161] and most recently the Digital Services Act.[162] This law requires commercial social networks to establish transparent procedures for dealing with complaints about illegal content, such as hate speech. Furthermore, social networks are required to (i) check complaints immediately, (ii) delete 'obviously illegal' content within 24 hours, and (iii) delete any illegal content within 7 days after checking it and block public access to it. Documentation regarding each complaint and its content must be stored for at least 10 weeks.

On this point, the regulatory debate surrounding digital platforms converges strongly with the debate concerning a fairer and/or more sustainable system of private governance regarding production GVCs. After more than a decade of relatively ineffective experimentalism with various instruments of corporate social responsibility (hereinafter CSR), a reinvigorated interest in and engagement with possible legislative interventions can be observed.[163] These depart from mere market-based forms of regulation and have introduced and developed markets centered on ethical standards and reputational sanctions. Simultaneously, they have acknowledged the challenges and complexity inherent in such regulation, and understand that what is required is a certain degree of participation by, and willful compliance of, keystone firms. The regulatory debate around GVCs certainly shows that regardless of the legal origin of regulatory initiatives, whether it be legislation or transnational standards (like the ILO or corporate codes of conduct), only regulation that can be effective will make a difference in the private governance regime of a chain. Likewise, for digital platforms and ecosystems, different pathways of regulation do exist. However, a worthwhile objective would be to implement these public values, such as fairness, *within* the private governance system of the respective digital ecosystems, through some form of in-built compliance.

### B. The Failure of Traditional Legal Tools (Contract Law and Competition Law) in Engaging with Multiple Dimensions of Power: A Trigger for Regulatory Experimentation?

Contract and competition law take different perspectives towards private governance, with contract law being concerned with fairness from the individualistic vantage point of personal autonomy, and competition law adopting a broader remit on fairness focused on market imperfections that harm consumers. The established, traditional toolkit of both legal fields fails, however, to come fully into terms with the governance techniques employed by platforms and ecosystems.

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[161] *See* Act to Improve Enforcement of the Law in Social Networks [Network Enforcement Act], Sept 12, 2017 (Ger.), https://www.bmjv.de/SharedDocs/Gesetzgebungsverfahren/Dokumente/NetzDG_engl.pdf?__blob=publicationFile&v=2; for a comprehensive overview of legal issues, see MARTIN EIFERT & TOBIAS GOSTOMZYK, NETZWERKRECHT: DIE ZUKUNFT DES NETZDG UND SEINE FOLGEN FÜR DIE NETZWERKKOMMUNIKATION (Nomos 2018).

[162] Commission Regulation 2022/2065 of Oct. 19, 2022, A Single Market for Digital Services and Amending Directive 2000/31/EC (Digital Services Act), 2022 O.J. (L 277) 1 (EU).

[163] Galit A. Sarfaty, *Shining Light on Global Supply Chains*, 56 HARV. INT'L L.J. 419 (2015).

### 1. Contract law

As regards contract law, the limitations of the traditional approach are familiar from debates around GVCs.[164] Primarily, contract law remains centered around individual contracts, not their interconnection as manifested in networks, ecosystems and other forms of complex economic organization. The doctrines of contract law also fail to grasp informal or soft elements of contractual governance arrangements, including reputational and other mechanisms used in long-term relationships.[165] In addition, the benchmark of tests for doctrines of unconscionability under contract law is largely procedural, pertaining to individual consent; in other words, contract law pursues no independent (re-)distributive goal.[166] Taken together, these conceptual orientations limit the traditional contractual toolkit to scrutinize platform power.

For the most part, private law scholarship has focused on the contractual relations between platforms and end-users, not yet adopting an ecosystem perspective[167] and leaving room for expansion in two ways. First, one needs to adopt an ecosystem perspective that encompasses the diverse set of economically dependent actors. Second, one needs to undertake inquiries not only into formal legal relations, but also into the extra-legal incentives and rules of cooperation, as is exemplified by prior work on contractual governance.[168] This heuristic approach concerning private governance can then, in turn, be used to inform a range of legal policies.

### 2. Competition Law

In competition law, the capacity of neoclassical price theory-inspired frameworks to capture multi-dimensional concepts of economic power has faced significant challenges.[169] Following the shift toward a 'more economic approach,' competition law evaluates power within the confines of specific relevant markets, concentrating primarily on limited competitive parameters—particularly price. Competition law interventions traditionally rely on analyzing specific business conduct related to the exercise of market power within a relevant market context. These relevant markets are typically delineated by grouping firms that produce

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[164] *See*, *e.g.*, Klaas Hendrik Eller, *Is 'Global Value Chain' a Legal Concept? Situating Contract Law in Discourses Around Global Production*, 16 EURO. REV. CONT. L. 3-24 (2020).

[165] *See*, *e.g.*, Stefan Grundmann, *Towards' a Private Law Embedded in Social Theory: Eine Skizze*, 24 EURO. REV. PRIV. L. 409 (2016); David Campbell & Hugh Collins, Discovering the Implicit Dimensions of Contracts, *in* IMPLICIT DIMENSIONS OF CONTRACT 25 (David Campbell et al. eds., 2003); K.H. Eller, *Comparative Genealogies of "Contract and Society"*, 21 GERMAN L.J. 1393

[166] *See* the discussion in Ioannis Lianos et al., Power in Food Value Chain: Theory and Metrics, *in* GLOBAL FOOD VALUE CHAINS AND COMPETITION LAW 256-314 (Ioannis Lianos et al. eds., Cambridge Univ. Press 2022). For an analysis of inroads of political economy perspectives to contract law, *see* Klaas Hendrik Eller, *The Political Economy of Tenancy Contract Law: Towards Holistic Housing Law*, 1 EURO. L. OPEN 987 (2022).

[167] Clement Petersen et al., *Platforms as Private Governance Systems: The Example of Airbnb*, 1 NORDIC J. COM. L. 39-61 (2018).

[168] For a comprehensive state-of-the-art overview, *see* STEFAN GRUNDMANN ET AL., CONTRACT GOVERNANCE: DIMENSIONS IN LAW AND INTERDISCIPLINARY RESEARCH (Oxford Univ. Press 2015).

[169] *See*, CENTRE ON REGULATION IN EUROPE (CERRE), DIGITAL MARKETS ACT: MAKING ECONOMIC REGULATION OF PLATFORMS FIT FOR THE DIGITAL AGE 29-48 (2020), CERRE_DMA_Making-economic-regulation-of-platforms-fit-for-the-digital-age_Full-report_December2020.pdf.

substitutable products, to the extent that their competitive constraints are interdependent. However, in ecosystems, digital platforms are 'multi-sided': the decision of a member to join the platform on side A will benefit members on side B and vice versa (positive feedback loop). While analyzing each side of the platform separately will ignore the drivers of the overall dynamics of power in ecosystems,[170] examining these markets collectively (by considering multi-sidedness, tying, or network externalities) focuses on the dominance in one particular marker and thus fails to replace a heads-on analysis of the ecosystem dependencies.[171] Furthermore, this approach does not account for the possibility that power may be exercised at an ecosystemic level. Through use of "ecosystem glue", a firm may leverage its "connexionist" power from positions where it controls a bottleneck or chokepoint to other more competitive spaces, without necessarily this result being directly linked to the adoption of specific types of business conduct.[172]

Different concepts than 'market power' have been put forward as a trigger for regulatory/competition law intervention. These recognize that power may not only emanate from the fact that a firm behaves independently from its customers and trade partners in a market, but from its positioning and influence at the level of the ecosystem. "Strategic market status,"[173] "conglomerate market power," "intermediation power,"[174] "structuring digital platforms,"[175] or "gatekeepers"[176] are meant to complete, or even substitute, in some cases, the archetypical concept of market or monopoly power in competition law.[177]

Although the concept of ecosystem was not elaborated in most of the reports commissioned by public authorities to explore the possibilities of legal change, the European Commission dedicated a Section to (digital) ecosystems in its recently adopted market definition notice.[178] However, such a definition takes a narrow perspective on the use of this concept and does not integrate the complexity of other systems than aftermarkets.[179] [180] These insights, while welcomed, are sufficient and it remains important to watch how the Commission will implement these broad directions in its decisional practice.

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[170] Jacobides & Lianos, *supra* note 22, at 1206-1207.
[171] *Id*. at 1209.
[172] BOLTANSKI & CHIAPELLO, *supra* note 125, at 111; Jacobides & Lianos, *supra* note 22, at 1204-6.
[173] DIGIT. COMPETITION EXPERT PANEL, UNLOCKING DIGITAL COMPETITION 55 § 2.10 (Crown Publ'g 2019), https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/785547/unlocking_digital_competition_furman_review_web.pdf [hereinafter FURMAN REPORT].
[174] HEIKE SCHWEITZER ET AL., MODERNISING THE LAW ON ABUSE OF MARKET POWER: REPORT FOR THE FEDERAL MINISTRY FOR ECONOMIC AFFAIRS AND ENERGY (GERMANY), modernisierung-der-missbrauchsaufsicht-fuer-marktmaechtige-unternehmen-zusammenfassung-englisch.pdf (bmwk.de).
[175] ARCEP, PLATEFORMES NUMÉRIQUES STRUCTURANTES (2019), https://en.arcep.fr/fileadmin/cru-1599207494/reprise/communiques/discours/2020/plateformes-numeriques-structurantes-elements-reflexion-dec2019.pdf.
[176] Art. 3 DMA Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (in the following: *Digital Markets Act or DMA*), http://data.europa.eu/eli/reg/2022/1925/oj.
[177] For a discussion, *see* Lianos & Carballa-Smichowski, *supra* note 14, at 795-831.
[178] COMMISSION NOTICE ON THE DEFINITION OF THE RELEVANT MARKET FOR THE PURPOSES OF UNION COMPETITION LAW 2024/1645 § 4.5, COM (2024) (Feb. 22, 2024).
[179] Michael G. Jacobides & Ioannis Lianos*, Regulating Platforms and Ecosystems: An Introductio*n, 30 INDUS. CORP. CHANGE 1131, 1208 tbl.2 (2021).
[180] Commission, *supra* note 178, ¶ 104.

More recently, competition law discourse has more seriously incorporated the competitive threats posed by ecosystem operations through the development and examination of ecosystem-specific theories of harm. These theories address leveraging and dominance entrenchment strategies developed by ecosystems that benefit from networks of capabilities that other economic actors cannot easily replicate.[181] The U.S. DOJ and FTC Merger Guidelines do not address ecosystem theories of harm and mention 'ecosystem' only twice - when describing issues raised by mergers that eliminate nascent competitive threats. This limits the concept's application to scenarios where incumbents retain and reinforce dominance by eliminating emerging competitors, which represents only one possible form of ecosystemic harm to competition.[182] In contrast, some recent European Commission merger control decisions[183], and a Brazilian CADE decision regarding *ex post* antitrust enforcement[184] engage more actively with ecosystemic theories of harm.[185] The General Court of the EU has also explored ecosystem mechanisms of harm in the *Google Android* case when it examined the intensity of inter-ecosystem competition between Apple and Google.[186] The General Court acknowledged that a digital ecosystem brings together several categories of supplier, customer and consumer who interact within a platform, and contains markets of products or services with horizontal or vertical complementarity and potential global dimensions.[187] This may open the door to a more holistic approach about ecosystem theories of harm and ecosystem power,[188] although it may also provide undertakings the possibility to put forward ecosystem-related efficiencies or justifications.[189]

In the *Superleague* case, the Court of Justice of the European Union (CJEU) addressed the fundamental question of constitutional-like constraints that must be imposed on the governance power of ecosystem orchestratorss[190] While this case did not involve digital ecosystems, it addressed the legality of FIFA and UEFA's prior approval scheme for creating the breakaway European Super League competition. The CJEU notably referred to FIFA and UEFA as regulatory/governance 'ecosystems[191]'. The Court held that such prior approval rules

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[181] See, Manu Batra, Paul de Bijl & Timo Klein, *Ecosystem Theories of Harm in EU Merger Control: Analysing Competitive Constraints and Entrenchment*, 15 J. EUR. COMPETITION L. & PRAC. 357 (2024).

[182] MERGER GUIDELINES 20 (U.S. Dep't of Just. & F.T.C.2023) (noting that 'the nascent threat supports what may be referred to as 'ecosystem' competition" and explaining that "ecosystem competition refers to a situation where an incumbent firm that offers a wide array of products and services may be partially constrained by other combinations of products and services from one or more providers, even if the business model of those competing services is different.').

[183] See, particularly, European Commission Decision, Case M.10615 - Booking Holdings/eTraveli Group (Sept. 25, 2023), https://ec.europa.eu/competition/mergers/cases1/202451/M_10615_10430872_121034_7.pdf..

[184] Brazilian Administrative Council for Economic Defense (CADE), Apple Inc. and Apple Services LATAM LLC, Appeal No. 08700.009932/2024-18 (2024), https://www.gov.br/cade/en/matters/news/cade-upholds-interim-measure-against-apple/copy_of_AppleAppealCADEsDecisionEnligshversion.pdf .

[185] For a discussion, see the event organized by the Centre for Law, UCL, *The Rise of Ecosystem Theories*, YOUTUBE (Oct. 31, 2023), https://www.ucl.ac.uk/laws/events/2023/oct/rise-ecosystem-theories.

[186] Case T-604/18, *Google & Alphabet v. Comm'n*, 2022 ECLI:EU:T:2022:541.

[187] *Id*. ¶ 116.

[188] *Id*. ¶ 880.

[189] This did not escape Google which effectively 'dressed' its justification of the anti-fragmentation agreement as an effort to protect the security and integrity of its ecosystem: *Id*. ¶ 857. The Commission, confirmed by the General Court, did not find this objective justification convincing: *Id*. ¶ 878, 880 & ¶ 884.

[190] Case C-333/21, European Superleague Co., 2023 E.C.R. I-__, ECLI:EU:C:2023:1011.

[191] *Id,* ¶ 149.

for sporting competitions must meet several requirements: they should be based on transparent, objective, and precise substantive criteria; follow transparent and non-discriminatory procedural rules; and not deny 'effective access to the market', this being meant as the market on which FIFA and UEFA's ecosystem competed with the Super League ecosystem (inter-ecosystem competition); Additionally, these criteria and rules must be published in accessible form before implementation, applied consistently to all participants, and any sanctions must comply with the principle of proportionality.[192]

This principles-based approach to regulatory 'ecosystems' has also recently influenced adjustments to the substantive standards that apply when digital infrastructure ecosystems refuse to provide interoperability. In *Android Auto*, the CJEU applied more lenient standards (favorable to claimants) for establishing liability against a dominant platform controlling digital infrastructure. The Court held that these standards apply when the infrastructure was initially designed as open - not solely for the platform's own business needs - and is not owned by the dominant digital platform, and has in the past enabled third-party use.[193] This approach opens the possibility for competition law actions to ensure interoperability, even when access to the digital infrastructure is not indispensable for the requesting undertaking's commercial operations.[194] This jurisprudence may be interpreted as reflecting both an emphasis on the collaborative and cumulative nature of innovation in digital ecosystems and a recognition of the need to safeguard ecosystem participants from abuses of governing power by digital ecosystem orchestrators.

### 3. Locating the 'Black Spot' of Traditional Public Governance Tools: Ecosystem Power Asymmetries

One may conclude from the discussion that a 'black spot' for the more traditional public governance tools of contract and competition law is the power asymmetry/differential existing between the platform orchestrator and the complementors, even where the power of the former does not extend to the whole market and is merely of relational nature (non-structural power). The concept of superior (or unequal) bargaining power is a well-known concept in the fields of contract law and competition law,[195] where it has given rise to a considerable literature attempting to unveil its theoretical underpinnings.[196] Authors usually contrast the use of this

[192] *Id,* ¶ 151.
[193] Case C-233/23, Alphabet and Others (Android Auto), 2025 E.C.R. I-__, ECLI:EU:C:2025:110, ¶ 47-48.
[194] *Id.,* ¶ 50-51.
[195] At the EU level *see* article 4:109 of the PRINCIPLES OF EUROPEAN CONTRACT LAW (TRANS LEX 2002) ON EXCESSIVE BENEFIT OR UNFAIR ADVANTAGE; Principle 10 of the DRAFT COMMON FRAME OF REFERENCE (Study Grp. Eur. Civ. Code & Acquis Grp. 2009); COMMISSION COMMUNICATION ON GREEN PAPER ON UNFAIR TRADING PRACTICES IN THE BUSINESS-TO-BUSINESS FOOD AND NON-FOOD SUPPLY CHAIN IN EUROPE, COM (2013) 37 final (Jan. 31, 2013); COMMISSION COMMUNICATION ON TACKLING UNFAIR TRADING PRACTICES IN THE BUSINESS-TO-BUSINESS FOOD SUPPLY CHAIN, COM (2014) 472 final. *See also*, the doctrines of 'unconscionable conduct,' economic duress and undue influence in contract law in England & Wales.
[196] *See* the seminal cases, *Lloyds Bank Ltd. v. Bundy* [1974] EWCA (Civ) 8, *Macaulay v. Schroeder Publ'g Co. Ltd.* [1974] 1 WLR and the explanatory appraisal by Spencer Nathan Thal, *Inequality of Bargaining Power Doctrine: The Problem of Defining Contractual Unfairness*, 8 OXFORD J. LEGAL STUD. 17 (1988); See also Michael J. Trebilcock, *The Doctrine of Inequality of Bargaining Power: Post-Benthamite Economics in the House*

concept where the focus is on the unfairness of the process of exchange, with the efforts to integrate this rule in the field of competition law where the emphasis is usually put on outcomes or some parameter of consumer welfare.[197] The underlying objective of contract law or unfair competition statutes consists in regulating the contest between contracting parties and ensuring a relatively equalized landscape of bargaining capacity (bargaining power being interpreted as the interplay of the parties' actual power relationship in an exchange transaction).

On the contrary, competition law defines bargaining power more generally, in terms of the ability of an undertaking to introduce a deviation from the price or quantity obtained from the competitive situation in the transaction market. This approach emphasizes the outcomes resulting from the presence of bargaining power relative to a situation in which it is absent (not necessarily that of perfect competition),[198] focusing on market structure and concentration.[199] European competition authorities are careful to distinguish between the respective fields of contract law and competition law.[200]

Inequality of bargaining power was historically used by the European Commission in several cases, especially to deal with situations of economic dependence[201], but has recently fallen into disuse at the European Union level, though not necessarily at the national level[202], apparently due to perceptions that it enables excessively broad regulatory intervention with attendant risks of political influence.[203] Further, the current tools of competition law seem to focus solely on horizontal competition rather than on vertical competition and the distribution of surplus value along the value chain.[204]

The lack of enforcement of competition law with regard to certain segments of these digital ecosystems (e.g. collective bargaining of gig workers)[205] and calls for the withdrawal of

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*of Lords,* UNIV. TORONTO L.J. 359 (1976); Larry A. DiMatteo, *Equity's Modification of Contract: An Analysis of the Twentieth Century's Equitable Reformation of Contract Law*, 33 NEW ENG. L. REV. 265 (1998); Albert H. Choi & George G. Triantis, *The Effect of Bargaining Power on Contract Design*, VA. L. REV. 1665 (2012).

[197] *See* PINAR AKMAN, THE CONCEPT OF ABUSE IN EU COMPETITION LAW: LAW AND ECONOMIC APPROACHES 170-84 (Hart Publ'g 2012).

[198] *See* ROGER CLARKE ET AL., BUYER POWER AND COMPETITION IN EUROPEAN FOOD RETAILING (Edward Elgar Publ'g 2002).

[199] John T. Dunlop & Benjamin Higgins, *Bargaining Power and Market Structures*, 50J. POL. ECON. 1, 4-5 (1942); R. G. Noll, *"Buyer Power" and Economic Policy*, 72 ANTITRUST L.J. 589 (2005).

[200] EUROPEAN COMPETITION NETWORK, ECN ACTIVITIES IN THE FOOD SECTOR: REPORT ON COMPETITION LAW ENFORCEMENT AND MARKET MONITORING ACTIVITIES BY EUROPEAN COMPETITION AUTHORITIES IN THE FOOD SECTOR ¶ 26 (2012).

[201] *See* Commission Decision 75/75 of 19 December 1974, General Motors Continental, 1974 O.J. (L 029) 14-9; Commission Decision 77/327 of 19 April 1977ABG/Oil companies operating in the Netherlands, 1977 O.J. (L 177) 1-17; Commission Decision 78/68 of 8 December 1977Hugin/Liptons, 1978 (L 22) 23-35; Commission Decision 89/205 of 21 December 1988, Magill TV Guide/ITP, BBC and RTE, 1989 O.J. (L 78) 41-3.

[202] See, for instance the recent Google decision of the French Competition Authority making use of the abuse of economic dependence concept in French competition law: Autorité de la Concurrence, Decision 22-D-13 (June 21, 2022) (regarding practices implemented by Google in the press sector), https://www.autoritedelaconcurrence.fr/en/decision/regarding-practices-implemented-press-sector.

[203] Frederic Jenny, The "Coming Out" of Abuse of Superior Bargaining Power in the Antitrust World, *in* INTERNATIONAL ANTITRUST LAW AND POLICY: FORDHAM COMPETITION LAW (Barry Hawk ed., Juris Publ'g 2009)

[204] Lianos, *supra* note 98 at 879 (defining 'vertical competition' as competition between the members of an ecosystem for a higher percentage of the surplus value generated by the ecosystem).

[205] For a discussion, see Ioannis Lianos, Reconciling Antitrust Standards and Collective Bargaining Rights: Towards a New Analytical Framework in EU Competition Law, *in* COLLECTIVE BARGAINING FOR SELF-EMPLOYED WORKERS IN EUROPE APPROACHES TO RECONCILE COMPETITION LAW AND LABOUR RIGHTS (Bernd Waas & Christina Hieíl eds., Wolters Kluwer 2021).

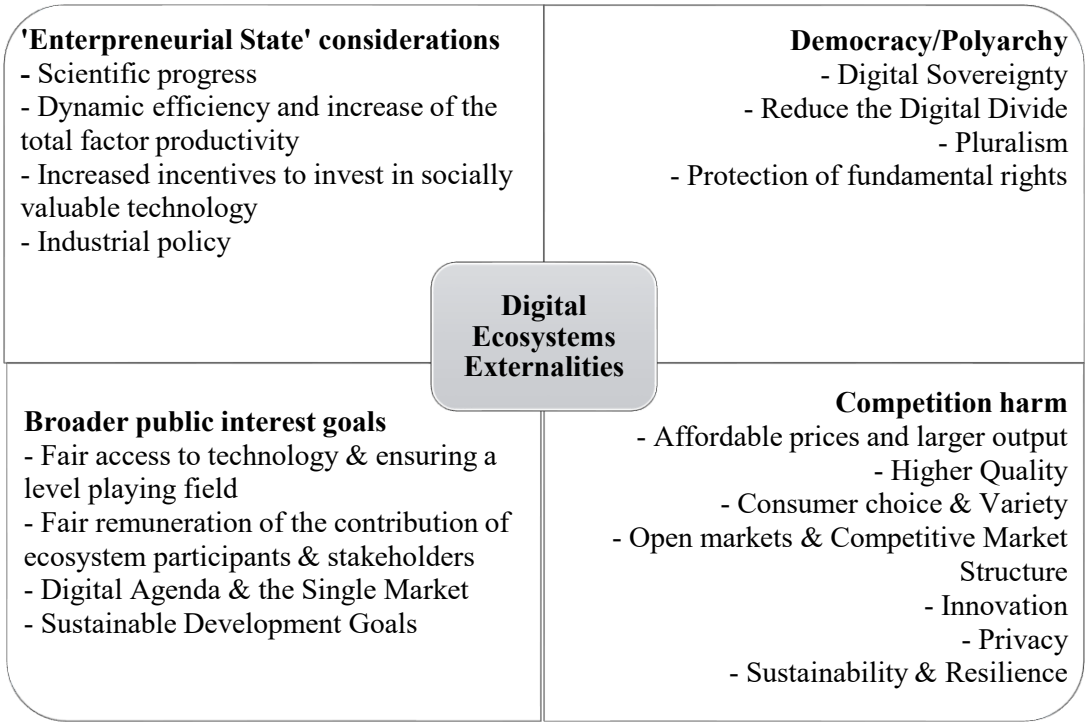
net neutrality regulations,[206] seem more compatible with a *laissez-faire* approach in avoiding heavier public governance intervention. They aim to engineer a more balanced private governance system, through the emergence of countervailing powers along the digital value chain. Similar arguments have been made for the development of countervailing powers that would thwart the power of digital platforms through code, such as the ability of consumers to outsource purchasing tasks to algorithms and, thereby, minimize the direct role they play in purchasing decisions and overcoming biases "to enable more rational and sophisticated choices."[207] These failures explain the recent discussions over the need to expand the traditional public governance toolkit.

### C. 'New' Tools of Public Governance: Enablers or Corrective Devices to Self-Regulation?

The resurgence of 'power rhetoric' has prompted numerous jurisdictions to abandon laissez-faire reliance on private governance mechanisms for delivering the anticipated social benefits of digital innovation. These jurisdictions now acknowledge the significant social externalities arising from Big Tech platform emergence, escalating economic concentration, and the inadequacy of traditional 'light-touch' public governance approaches. The associated regulatory innovation has expanded the public governance landscape to encompass new instruments that function both as complements and enablers to private governance tools, as well as substitutes and corrective mechanisms. These instruments not only aim to protect various public values threatened by Big Tech phenomena, but also address the challenge that the multi-dimensional nature of such externalities sits uneasily with the compartmentalized structure of legal systems across different fields of law[208] Limiting contestability and fairness by, for instance, rendering access to data more difficult are not the only externalities that may be caused by the emergence of digital ecosystems. Others relate to broader concerns than business or end user harm, such as harm to the democratic process and/or fundamental rights (see Table 3).[209]

***Table 3: Digital Ecosystems' Externalities & Different Public Values/Goals***

[206] Oles Andriychuk, *(Why) Did EU Net Neutrality Rules Overshoot the Mark? Internet, Disruptive Innovation and EU Competition Law & Policy*, 18 Y.B. ANTITRUST REGUL. STUD. 227 (2018).
[207] Michal S. Gal & Niva Elkin-Koren, *Algorithmic Consumers*, 30 HARV. J.L TECH. 309 (2017).
[208] See Molly K. Land, The Problem of Platform Law: Pluralistic Legal Ordering on Social Media, *in* THE OXFORD HANDBOOK OF GLOBAL LEGAL PLURALISM 974 (P. Schiff Berman ed., Oxford Univ. Press 2020); Lianos, *supra* note 95, at 852-90.
[209] These may be thought of as the externalities of the centralized private governance of digital ecosystems. See ANDREAS A. PAPANDREOU, EXTERNALITY AND INSTITUTIONS (Oxford Univ. Press 1998); M. Fleurbaey et al., *Social Externalities and Economic Analysis*, 18 SOC. RSCH. 171 (2021).

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Such broad categories of harms or threats of harm require the development of a toolkit approach of public governance regimes. While some approaches require strong steering of private actors through sanctions and mandatory rules, others rely more heavily on incentives or nudging to encourage private actors operating within ecosystems to adopt business strategies and practices that mitigate or limit potential harm to the values and goals of the specific polity.

### 1. Strong Public Governance Regimes: Digital Regulation in the Era of the DMA, Data Act, DSA and EHDS

The contestable markets hypothesis and the emphasis on the dynamic capabilities of the central unit of the digital platform in ecosystems finds its limits in the paradox of an increasing trend towards economic concentration matched with innovation emerging in more decentralized, open, and even non-profit, business environments.[210] Enhancing inter-ecosystem competition may not suffice because of the strength of network effects/economies of scale or scope and the existence of tipping points, which make digital ecosystems move easily to situations of dominance. Such observations advance arguments in favor of more pervasive regulation.

There exist different options for pervasive public regulation, depending on the respective understanding of the source of externalities present in digital ecosystems. While some approaches suggest that digital platforms may present characteristics of a natural monopoly,[211] others reject this exclusive reliance on the neoclassical economics concept and instead adopt a political economy perspective that emphasizes the multi-facetted effects that

[210] For instance, in the field of AI, OpenAI, first developed as a non-profit, provides a telling example.
[211] For a thorough discussion of this possibility, *see* FRANCESCO DUCCI, NATURAL MONOPOLIES IN DIGITAL PLATFORM MARKETS (Cambridge Univ. Press 2020); Lianos, *supra* note 98, at 852.

the dependence on dominant 'keystone firms' has on firms[212], society and the democratic system.[213]

Moving beyond the procedural and broad substantive principles developed in competition law jurisprudence (see *supra* Section V.B.2.), the European Union's Digital Markets Act (DMA) establishes a specific *ex ante* regulatory regime that imposes particular substantive duties on certain large digital platforms designated as 'gatekeepers'.[214] This regulatory regime does not aim to regulate entry or rates/output, as is common for traditional utility regulation. Instead, the DMA sets some bright-line rules for business conduct that would be considered problematic in order to safeguard fairness and contestability of core platform services provided by gatekeepers. To accomplish these public values the regulation identifies core platform services,[215] to which specific regulatory obligations are imposed.[216] This conduct-focus remains distinct from competition law enforcement in terms of legislative drafting and methodology, as the implementation of the DMA does not require an individualized assessment of market positions and does not permit undertakings to provide objective justifications for the conduct in question.[217] Instead, the gatekeeper must ensure and demonstrate compliance with the obligations laid down in the DMA.[218] The legislation also recognizes that this 'common carrier' type regulation,[219] requires far-reaching duties and an elaborate institutional setting both at the EU and national levels.[220]

The implementation of the DMA fully recognizes the limits of private governance to achieve contestability and fairness, and aims to achieve an optimal level of inter-ecosystem and intra-ecosystem competition through public governance intervention.[221] While traditional

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[212] Antonio Andreoni & Simon Roberts, *Governing Digital Platform Power for Industrial Development: Towards an Entrepreneurial-Regulatory State*, 46 CAMBRIDGE J. ECON. 1431-54 (2022).

[213] *See* AGUSTIN REYNA, WHY COMPETITION LAW MUST PROTECT DEMOCRACY: A EUROPEAN PERSPECTIVE, DAF/COMP/GF/WD 36 (Org. for Econ. Coop. & Dev. (OECD) 2017); Spencer W. Waller, *Antitrust and Democracy*, 46 FLA. STATE UNIV. L. REV. 807 (2019); DIGITAL PLATFORM GOVERNANCE: PROPOSALS INDEX, BELFER CTR. SCI. INT'L AFFS. (Jan. 2023), https://www.belfercenter.org/digital-platform-governance-proposals-index.

[214] According to the Digital Markets Act (DMA), gatekeepers are entities that (i) have a significant impact on the EU internal market, (ii) operate one or more important gateways to customers, and (iii) enjoy or are expected to enjoy an entrenched and durable position in their operations (Art. 3 DMA). The Commission has already designated 6 gatekeepers. *See* European Commission Press Release, Digital Markets Act: Commission Designates Six Gatekeepers (Sept. 6, 2023).

[215] These include: (i) online intermediation services; (ii) online search engines; (iii) social networking; (iv) video sharing platform services; (v) number-independent interpersonal electronic communication services; (vi) operating systems; (viii) Cloud computing services; (viii) advertising services offered by a provider of any of the core platforms services mentioned above including ad networks, ad exchanges and any ad intermediation services; and (ix) virtual assistants.

[216] *Art*. 5, 6 & 7 DMA.

[217] *Id*. at recital 10.

[218] *Id*. at art. 8.

[219] For a discussion of this concept, see Christopher S. Yoo, *Common Carriage's Domain*, 35 YALE J. REGUL. 991 (2018).

[220] The DMA proposals were put forward by DG Competition and DG Connect, Directorate F: Digital Single Market — Unit F2: E-Commerce & Platforms. Its enforcement involves apart from the Commission, also designated National Competition or Regulatory Authorities and national courts (for private enforcement).

[221] *DMA* Recital 7: 'the purpose of this Regulation is to contribute to the proper functioning of the internal market by laying down rules to ensure contestability and fairness for the markets in the digital sector in general, and for business users and end users of core platform services provided by gatekeepers in particular.' *See* Hornung, *supra* note 23.

utilities-like regulation is perceived as focusing on static effects at the expense of innovation, the dynamic relationships between regulation, business risk, and innovation are a key feature of modern utilities' regulation.[222] The 'future-proofing' of the DMA is guaranteed with the procedure of market investigations,[223] in particular for the purpose of examining whether one or more services within the digital sector should be added to the list of core platform services, detecting practices that are unfair or limit the contestability of core platform services, and identifying practices which are not effectively addressed by the DMA.[224]

With regard to the regulatory obligations imposed, the gatekeeper does not enjoy any discretion to make access to the ecosystem conditional on the specific contractual or technical requirements prohibited by the DMA, with the exception of relatively narrow circumstances[225]. Contestability and fairness may be 'sacrificed' when the integrity of the core platform service or the security/privacy of its users is at risk.[226] Nonetheless, the discretion left to the private governance of ecosystems is limited[227] and these exceptions protect values with a strong public dimension and do not result purely from private decision-making.[228] In conclusion, the DMA subjects a small number of large undertakings providing core platform services to an enhanced regime of public governance akin to modern utilities' like regulation.[229]

A public governance regime to ensure access to data may be necessary for undertakings that are not designated as gatekeepers or large online platforms and search engines, within the scope of the DMA. The EU Data Act complements the DMA, by focusing on barriers to data sharing, and adapts rules of contract law with the aim "to prevent the exploitation of contractual imbalances that hinder fair data access and use for micro or medium-sized enterprises."[230] The Data Act, also provides some public law type regulatory obligations to promote contestability by enabling switching between data processing services, and enhancing the interoperability of data and data-sharing mechanisms and services.[231] By containing general access rules, whenever a data holder is obliged by law to make data available to a data recipient, the Data Act, also stipulates that such access rules should be based on fair, reasonable, non-discriminatory and transparent conditions.[232] The Regulation recognizes the principle that all persons can have access to the data they generate,[233] although it indirectly recognizes a quasi-

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[222] HM GOVERNMENT, DEP'T BUS. & TRADE, ENCOURAGING INNOVATION IN REGULATED UTILITIES: CONSULTATION, 2018-9 (UK).

[223] *Questions and Answers: DMA*, EUR. COMM'N (Sep. 6, 2023), https://ec.europa.eu/commission/presscorner/detail/en/QANDA_20_2349 ("[e]nsuring that the Digital Markets Act is and remains future proof has been a key objective of the Commission from the start, and it was strongly retained in the final agreement").

[224] *Art*. 19 DMA

[225] *DMA*, at art. 6(4), 6(7) & 7(9) for integrity, art. 6(4) & 7(9) for security, art. 7(9) for privacy. For a discussion, *see* Hornung, *supra* note 23, at 26-7.

[226] *DMA,* Recital 67; *See also id*. at art. 10.

[227] *See*, concerning security, *id.* at recital 50.

[228] *See*, id. at recitals 64 & 65.

[229] *DMA* Recital 4.

[230] Commission Regulation 2023/2854 of December 13, 2023, Harmonising Rules on Fair Access to and Use of Data and Amending Regulation (EU) 2017/2394 and Directive (EU) 2020/1828 (Data Act), 2023 O.J. (L 2023) 2854 recital 5 (EU).

[231] *DMA* Recital 5.

[232] *Id*. at recital 38.

[233] *Id*. at preamble ¶ 20.

property right for those harvesting this data.[234] Parts of the Data Act present a similar focus to specific initiatives in the food supply chains that balance the asymmetrical or relational power between market participants.[235] This is often a topic of concern for contract law, but also for some national competition authorities, which employ the concept of abuse of economic dependence to deal with such situations.[236]

The Digital Services Act (DSA) constitutes another example of a strong public governance regime combining a regulation of common carrier/digital utilities' with a systemic risk regulation approach.[237] The aim is to establish a regime of public governance to deal with several 'systemic risks' that may arise from the online distribution of content.[238] While the DSA applies to a broad range of 'intermediary services,'[239] it puts particular emphasis on the regulation of "very large online platforms and of very large online search engines"[240] to the extent they "may cause societal risks, different in scope and impact from those caused by smaller platforms".[241] These are subject to specific additional obligations in the DSA, art. 33-47, which include, among others, transparency reporting, due account of fundamental rights in the terms of service, and notice and action mechanisms for illegal content.

### 2. Hybrid Private/Public Governance Regimes

Another option is to rely on tools of private governance managed by 'light touch' forms of public governance, and/or to adopt bespoke regulatory regimes that integrate the business and operational models of digital platforms. This leaves more space for differentiation to the various regimes of private governance of (digital) ecosystems.

The first option was put forward by the European Commission in the *Platform to business regulation*, where duties of non-discrimination and transparency were imposed on most digital platforms irrespective of their market power.[242] Article 45 of the DSA also encourages platforms to draw up voluntary codes of conduct in cooperation with the

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[234] *See* Martina Eckardt & Wolfgang Kerber, *Property Rights Theory, Bundles of Rights on IoT Data, and the EU Data Act*, 57 EURO. J. L. ECON. 113 (2024).
[235] See Ioannis Lianos et al., Power in Food Value Chain: Theory and Metrics, *in* GLOBAL FOOD VALUE CHAINS AND COMPETITION LAW (Ioannis Lianos et al. eds., Cambridge Univ. Press 2022) 256-314
[236] For a discussion, see IOANNIS LIANOS ET AL., COMPETITION LAW: ANALYSIS, CASES AND MATERIALS 837-44 (Oxford Univ. Press 2019).
[237] Regulation (EU) 2022/2065 of the European Parliament and of the Council of 19 October 2022 on a Single Market For Digital Services and amending Directive 2000/31/EC (Digital Services Act, hereinafter *DSA*), OJ L 277/1, 27.10.2022.
[238] These can be of four sorts: risks associated with the dissemination of illegal content; risks associated with the actual or foreseeable impact of the service on the exercise of fundamental rights; risks concerning the actual or foreseeable negative effects on democratic processes, civic discourse and electoral processes, as well as public security; risks stemming from similar concerns relating to the design, functioning or use, including through manipulation, of very large online platforms and of very large online search engines with an actual or foreseeable negative effect on the protection of public health, minors and serious negative consequences to a person's physical and mental well-being, or on gender-based violence. *Id*. at recitals 80-83.
[239] These are according to Art. 2 DSA: (i) a 'mere conduit' service; (ii) a 'caching' service; and (iii) a 'hosting' service.
[240] *Id*. at recital 75.
[241] *Id*. at recital 76.
[242] Commission Regulation 2019/1150, *supra* at 195.

Commission, to complement platform regulation with a clearer and more easily applied set of standards defining the boundaries of undesirable conduct in digital markets.

The UK Digital Markets, Competition and Consumer Act (henceforth DMCCA) has also attempted to accommodate a more hybrid interaction in its legal regime.[243] While following the regulatory technique of the DMA in adopting a two-step process, the DMCCA resorts to a different mix of both public and private governance solutions. Firstly, in identifying problematic actors with strategic market status, the designation procedure does not define quantitative thresholds and rather relies on purely qualitative criteria. This flexibility in the designation decision extends to the requirement of a digital activity (*see* ch. 2, § 3), which is defined in much broader terms than the minutely detailed list of core platform services defined in art. 2, § 2 of the DMA. Secondly, when obliging designated undertakings to adhere to a prescribed set of rules and standards, the DMCCA seems to allow for more flexibility in designing and adapting the code of conduct for the individual undertaking, thus enabling it through bespoke/personalized regulation to adjust its private governance tools to the concerns expressed by the regulator while retaining the necessary flexibility.

Furthermore, with an eye on the need for flexibility, the DMCCA establishes an exemption from the codes of conduct, where the benefits of a conduct breach to users or potential users outweigh the actual or likely detrimental impact on competition resulting (*see* ch. 3, § 29 of the DMCCA). The exemption is only applicable where "the conduct does not eliminate or prevent effective competition," but its effect is to provide more leeway for considering the specificities of each ecosystem and the positive effects of its underlying private governance arrangements.[244]

### 3. The Regulatory Analogy of the 'Uncontract': Supervisory Technology and 'Regulation by Design'

It is a well-recognised fact that code is used by private actors in order to embed their values in ecosystem governance (code is law), however code can also be used by public actors as a regulatory mechanism to enhance the compliance of private technoeconomic systems to public values (law is code).[245] Public governance tools in the digital age cannot just rely on traditional rulemaking and law enforcement, but should utilise 'code' to prescribe and automatize compliance to specific forms of conduct.

Different sets of supervisory technologies ('Suptech') and the ambition of 'regulation by design' have emerged. Code can be used as a tool to enhance continuous monitoring of the market or ecosystem in question, and can facilitate early detection and eventual punishment of conduct that is, or risks, to produce social costs. Through the use of APIs and robotic-process automation (RPA), as well as more elaborate technologies involving neural networks, public authorities may develop a series of diagnostic, analytic, predictive and even prescriptive tools that may not only deter firms from breaking the law, but, if these are implemented

[243] Digital Markets, Competition and Consumers Act 2024 (DMCC), c. 13 (UK), https://www.legislation.gov.uk/ukpga/2024/13/contents.
[244] *Id.* at sec. 29(2).
[245] Samer Hassan & Primavera De Filippi, *The Expansion of Algorithmic Governance: From Code is Law to Law is Code*, (Special Issue) 17 FIELD ACTIONS SCI. REP. 88-90 (2017).

systematically, may lead to 'compliance by design.'[246] So far, Suptech has mainly been used in the context of financial regulation, anticorruption regulation, and competition law enforcement.[247] However, its expansion to broader areas of 'regulation by design,' and stages of enforcement (e.g., automated monitoring of remedies) to ensure compliance is only a matter of time.[248]

### D. The Public Values of Digital Capitalism: Towards a Comparative Institutional Analysis of Tools of Private and Public Governance

Ecosystems constitute complex adaptive social systems where different actors (non-state and state) develop interaction patterns and strategies to adapt to their evolving technological, economic, and political environment. These interactions lead to punctuated equilibria that influence institutional change through path dependencies and feedback loops, affecting these ecosystem evolution and governance. Our analysis therefore naturally emphasizes institutional evolution and institutional choice - and consequently 'institutional imagination'[249] - as central to the legal analysis of ecosystem governance. We contend that these systems should reflect broader societal values established through democratic processes and social contracts rather than the internal preferences of dominant ecosystem actors - still less the individual ambitions, empire aspirations and ideological motivations of the so called 'tech barons'.[250] This approach explicitly recognizes that institutional change analysis is inherently normative. Moreover, legal frameworks governing digital ecosystems must embed dynamic mechanisms to prevent regulatory rigidity and institutional obsolescence.[251] A theory of institutional change is hence consubstantial to a dynamic legal theory of ecosystems. Based on the above, we emphasize the need for a comparative institutional analysis, modified to account for the complexity of the institutional choice present in ecosystems and the important social impact such institutional choice may produce.

#### 1. Value-Laden Institutional Change: Regressive Versus Progressive

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[246] HELLENIC COMPETITION COMM'N, COMPUTATIONAL COMPETITION LAW &ECONOMICS: INCEPTION REPORT (2021), https://www.epant.gr/en/enimerosi/publications/research-publications/item/1414-computational-competition-law-and-economics-inception-report.html.

[247] *See* ORG. FOR ECON. COOP. & DEV. (OECD), *The Use of Suptech to Enhance Market Supervision and Integrity*, in OECD BUSINESS AND FINANCE OUTLOOK 2021: AI IN BUSINESS AND FINANCE, (OECD Publ'g 2021), https://doi.org/10.1787/d478df4c-en. ORG. FOR ECON. COOP. & DEV. (OECD), INTERCONNECTED ECONOMIES: BENEFITING FROM GLOBAL VALUE CHAINS (OECD Publ'g 2013); INT'L. LAB. ORG. (ILO), PROVISIONAL REP. 14-1 DECENT WORK IN GLOBAL SUPPLY CHAINS: RESOLUTION AND CONCLUSIONS SUBMITTED FOR ADOPTION (2016)

[248] WBG, THE NEXT WAVE OF SUPTECH INNOVATION: SUPTECH SOLUTIONS FOR MARKET CONDUCT SUPERVISION (2021).

[249] Roberto Unger, *Legal Analysis as Institutional Imagination*, 59 MOD. L. REV. 1 (1996).

[250] Concerning the role of the Big Tech founders in the innovation pathways of digital ecosystems, see, *inter alia,* ARIEL EZRACHI & MAURICE E. STUCKE, HOW BIG-TECH BARONS SMASH INNOVATION—AND HOW TO STRIKE BACK (Harper Business 2022). For a discussion of the role of these individual motivations of CEOs and Big tech founders in guiding the innovation direction in the context of AI, see KAREN HAO, EMPIRE OF AI (Penguin 2025).

[251] See Thomas O. Garity, *Some Thoughts on 'Deossifying' the Rulemaking Process*, 41 DUKE L.J. 1385 (1992); Elizabeth E. Bailey, *Innovation and Regulation*, 3 J. PUB. ECON. 285 (1974).

In explaining the distinction between ceremonial and instrumental values in organizations, Paul Bush notes that ceremonial values 'correlate behavior within the institution by providing the standards of judgment'.[252] These values are grounded in tradition, accepted as authoritative, and regarded as absolute, thereby placing them beyond critical or scientific scrutiny[253]. In comparison, instrumental values 'correlate behavior by providing the standards of judgment by which tools and skills are employed in the application of evidentially warranted knowledge to the problem-solving processes of the specific community', and 'are validated in the continuity of the problem-solving processes'.[254]. Unlike ceremonial values, instrumental values are not 'fixed or immutable.' Finally, a behavior may be 'dialectic' (possess both instrumental and ceremonial characteristics), which adds to the complexity of forms that behavior patterns may take.[255]

Institutional behavior patterns can thus be categorized into two types: those driven by ceremonial factors (like tradition, status, or ritual) and those driven by instrumental factors (based on practical problem-solving). However, there is a significant risk that ceremonial values co-opt and dominate originally instrumental behaviors.[256] When such 'ceremonial enclosure' occurs, practical or instrumental behaviors become encapsulated by ceremonial patterns, forcing them to serve ceremonially-determined outcomes rather than their original practical instrumental values-driven purposes.[257] This leads to institutional lock-in, where outdated practices persist long after they have lost their practical utility, blocking more efficient or problem-solving-oriented approaches from being adopted.[258] Ultimately, ceremonial dominance poses an obstacle to the absorption and diffusion of new technologies, new ways of thinking about the common good, and evolving societal values.[259]

This discussion leads Bush to conclude that there are two forms of institutional change: a regressive and a progressive one. *Regressive institutional change* sees the 'the displacement of instrumentally warranted patterns of behavior by ceremonially warranted patterns of behavior,'[260] leading to 'the absolute triumph of imbecile institutions over life and culture' (or technological and social progress). *Progressive institutional change* results in increased reliance on instrumental values in shaping community behaviour, and enables the continuous incorporation of new knowledge in the problem-solving processes[261] and the diffusion of innovation.[262] For Bush, democratic and decentralized processes promote positive institutional change by encouraging practical problem-solving through experimentation, participation, discussion, and community engagement.[263] Conversely, societies built on individualism or

[252] Paul D. Bush, *The Theory of Institutional Change*, 21 J. ECON. ISSUES 1075, 1079 (1987)
[253] *Id.*, at 1080.
[254] *Id*.
[255] *Id*. at 1081.
[256] *Id*. at 1083.
[257] *Id*. at 1084.
[258] *Id*. at 1085-6.
[259] *Id*. at 1093.
[260] *Id*. at 1100.
[261] *Id*. at 1101.
[262] *Id*. at 1105.
[263] *Id*. at 1108.

rigid hierarchies may easily lead to ‘endogenous institutional degeneration’ towards situations of ceremonial domination.[264]

Transposing this analysis to digital ecosystems, public governance systems should avoid the trap of ceremonial dominance, wherein technological and social progress becomes ossified through the encapsulation of instrumental values by ceremonial ones. Given the power asymmetries, central positioning of Big Tech firms, and resource dependence of complementors, ecosystems characterized by ceremonial encapsulation may persist and develop in the absence of viable alternative ecosystems (lack of inter-ecosystem competition).The interaction system will support continuous exploitation, as the dominant player (e.g., the ecosystem orchestrator) will still manage to keep its subordinates (complementors) cooperating, even if receiving less of the joint surplus value produced by the joint innovation effort.[265] Hence, even if initially efficient and value-generating, an ecosystem may cease to provide an effective solution for organizing collaborative value creation and optimally allocating the surplus generated through joint production and innovation. Ensuring that external agents - whether disruptors and competitors or public governance institutions - can intervene to steer this private ordering away from ceremonial values toward greater responsiveness to stakeholders' instrumental values will prevent degeneration into ceremonial domination and promote progressive institutional change.

However, one must also consider Meyer and Rowan's influential study on formal organizational structures as a cautionary tale regarding the impact of public governance on the actual behavior of regulated organizations.[266] In their study, they argue that many organizational structures persist not due to their superior efficiency but because they function as 'myths', ritualistic displays of conformity to institutionalized environmental expectations. The primary purpose of these structures is to legitimize organizations in the eyes of external stakeholders and thereby secure resources from their institutional environment that guarantee their survival. Faced with such quests for legitimacy, and the everyday constraints of doing business, organizations may ‘decouple’, separating their formal organizational structure from their actual work activities in which they follow different and, from the perspective of their formal structures, irrational or inefficient practices. Illustrative of what may go wrong in terms of 'symbolic communication' - whereby organizations demonstrate conformity to public governance values without undertaking substantive commitments - are 'greenwashing' practices that decouple environmental sustainability integration from commensurate action at the operational level.[267] Similar caution must be exercised regarding the risk of 'decoupling' in response to regulatory requirements resulting from public governance regimes for digital ecosystems.[268] This calls for public governance that embraces a graduated regulatory approach

[264] See the comments by WOLFRAM ELSNER ET AL., THE MICROECONOMICS OF COMPLEX ECONOMIES 410, 412 (Elsevier 2015).
[265] *Id*. at 407.
[266] John W. Meyer & Brian Rowan, *Institutionalized Organizations: Formal Structure as Myth and Ceremony*, 83 AM. J. SOC. 340 (1977).
[267] Patricia Bromley & Walter W. Powell, *Decoupling in the Contemporary World*, 6 ACAD. MGMT. ANNALS 483 (2012); Joel Bothello et al., *CSR Decoupling Within Business Groups and the Risk of Perceived Greenwashing*, 44 STRATEGIC MGMT. J. 3217 (2023).
[268] See, Annabelle Gawer & Martín Harracá, *supra* note 52., at 17 (noting how digital platforms may decouple their practices from external scrutiny and build ‘organizational façades’, that ‘enable managers to gain discretion,

emphasizing dialogue between digital regulators and affected stakeholders, continuous monitoring and learning to enable ongoing adjustments to specific conditions, and bespoke tools (such as regulatory sandboxes) that provide greater flexibility while ensuring effective compliance with public governance principles. It also demonstrates the importance of developing bespoke private governance structures for ecosystems that provide more effective 'voice' to ecosystem participants and other affected stakeholders, particularly given the prevailing economic concentration in key sectors of the digital economy, where sufficient alternatives may not exist and thus withdrawal from the specific digital ecosystem ('exit') seems unrealistic.[269]

### 2. Institutional Choice and Modified Comparative Institutional Analysis

When examining institutional choice, it becomes clear that economic efficiency frameworks - focusing on allocative, productive, dynamic, and transactional efficiency - may not fully engage with the broader public values pursued by public governance regimes governing digital ecosystems. Our goal here is to assess the *optimality* of ecosystem governance arrangements *in the specific polity (social contract) context*. This framework accepts the GVC focus on the different economic and social actors in the value chain(s), and the emphasis put on the degree of their participation in the process of value generation and capture. This approach also recognizes that each of the private or public governance regimes may have their advantages and disadvantages.[270]

In his theory of comparative institutional analysis, Neil Komesar emphasizes the primary role of institutional choice; that is the selection of the social decision-making process that would dispose the residual right of decision-making in a specific context to deal with various externalities/policy problems.[271] Komesar distinguishes between legislatures (the political realm), courts (adjudicators), and markets. Beyond this initial scope, it is possible to apply his analysis to various other intermediary social (public or private) decision-making processes. [272] This broad perspective on the availability of institutional choice should be

justify their actions, and acquire resources by appearing to conform to the principles and ideologies preferred by their environments').

[269] See, ALBERT O. HIRSCHMAN, EXIT, VOICE, AND LOYALTY: RESPONSES TO DECLINE IN FIRMS, ORGANIZATIONS, AND STATES (Harvard Univ. Press 1972) (on the role of 'voice' as a viable option when members are dissatisfied with an organization due to declining quality or benefits, particularly when withdrawal—or 'exit'—from the organization is not feasible).

[270] See, for instance, the recent empirical research by Sruthi Thatchenkery & Riitta Katila, *Innovation and Profitability Following Antitrust Intervention Against a Dominant Platform: The Wild, Wild West?*, 44 STRATEGIC MGMT. J. 943 (2023). *See also*, Yuchen Zhang et al., *Platform Governance Matters: How Platform Gatekeeping Affects Knowledge Sharing Among Complementors*, 43 STRATEGIC MGMT. J. 599 (2022).

[271] NEIL K. KOMESAR, IMPERFECT ALTERNATIVES: CHOOSING INSTITUTIONS IN LAW, ECONOMICS AND PUBLIC POLICY (Univ. of Chi. Press 1997); NEIL K. KOMESAR, LAW'S LIMITS (Cambridge Univ. Press 2001).

[272] This can include *inter alia* the following scenarios: State owned companies regulated by ownership/control, State bureaucracy or independent regulatory authorities regulating *ex ante* through command and control prohibitions enabling different degrees of flexibility, independent regulators/competition authorities enforcing competition law liability rules *ex post*, specific corporate governance regimes mandated or provided as an option by the State, State courts as institutions of enforcement of private governance tools, private self-regulation bodies, community/ecosystemic rules and standards imposed through different regimes of private governance (including corporate social responsibility regimes), market agencements, as well as an hierarchy within a digital platform

accompanied with an understanding of the public values that need to be embedded in the governance institutional choice of ecosystems. Different public values (e.g., contestability, fairness, innovation, sustainability, security, public health, democratic accountability, media pluralism, digital sovereignty) may be achieved by the intermediary of these institutional processes.

The combined focus on progressive institutional evolution and appropriate institutional choice means that governance decisions cannot be made abstractly or statically. Instead, the selection of institutional processes must be dynamic and experimental, taking into account both the quantity and complexity of issues that need to be addressed.[273] The relationship between institutions and legal analysis is crucial: institutional choices shape how legal analysis is conducted, rather than legal analysis determining institutional choices. This perspective rejects oversimplified matching of goals to institutions and instead puts institutional choice at the center of analysis.

These institutional choices can of course be viewed in 'welfare terms' (e.g., the efficiency, fairness, sustainability-oriented operation of a particular institution) *and* in "participatory" and "inclusivity" terms (regarding the quality and extent of participation of all affected stakeholders in the decision-making processes at issue).[274] Institutional processes can be characterized as procedural requirements that place some constraints as to how governance/institutional choices should be made. Here, participation would mean that the participatory interests of *all* those contributing to the generation of ecosystemic value should be considered. As this approach focuses on institutional choice, it accords particularly well with recent scholarship on legal institutionalism as well as the Law & Political Economy synthesis. These approaches seek to foreground macro-level perspectives, including the constitutive role of law for the political economy of digital capitalism and for politico-legal 'background rules' that shape the specific institutional choices made regarding the regulation of digital markets and ecosystems.[275]

The second implication is that the choice of the institution that will balance the costs and benefits (if this is the chosen decision rule) should be the result of a comparative analysis, rather than a single-handed assessment focusing only on the costs and benefits of a specific institution. Institutions are alternative mechanisms by which societies carry out their goals, and each of them presents specific limits and imperfections. In the presence of market failures, a single institutional analysis would immediately conclude that, for instance, the courts or the legislative process should intervene, and in the presence of a government failure, it would opt for the market as being the adequate institutional choice. In contrast, comparative institutional

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firm imposing corporate values to its various institutional components. As Callon notes, the market is not asocial and one should situate market transactions "within the entire set of material and textual devices" (including the legal regimes) that structure and prompt commercial activities: Callon, *supra* note 53, at 49.

[273] Komesar's analysis suggests a shift in the choice of the adequate institutional process as numbers and complexity increase. Komesar *supra* note 271.

[274] Gregory Schaffer & Joel P. Trachtman, *Interpretation and Institutional Choice at the WTO*, 52 VA. J. INT'L L. 103, 106 (2011).

[275] *See, for example* Jedediah Britton-Purdy et al., *Building a Law-and-Political-Economy Framework: Beyond the Twentieth-Century Synthesis*, 129 YALE L.J. 1784 (2020); for European perspectives, see Anna Beckers et al., *The Transformative Law of Political Economy in Europe: An Introduction*, 1 EURO. L. OPEN 749 (2022) (and the contributions in the respective Special Issue).

analysis will assess all alternative institutional options, proceeding to a relational assessment of their costs and benefits, before any decision is made. None of these institutional choices is perfect from the perspectives of social welfare maximization, distributive fairness or the direct and indirect participation in decision-making of the affected stakeholders. Under each alternative, stakeholder positions will be reflected and affected in different ways, the relative merits of institutions varying across different settings.[276]

The third implication is that different interpretive choices can be analyzed using a comparative institutional analytic method that focuses on the relative implications of choices on, for example, welfare and participation. Here, we modify Komesar's analysis and add other prescriptive norms or procedure requirements beyond efficiency and participation, such as transparency, integrity, accountability, representativeness, openness, innovativeness, efficiency/effectiveness, adaptivity, responsiveness, and legitimacy.[277] The allocation of institutional responsibilities always turns upon a judgment about which of the candidate institutions is, when compared to the other candidates, best suited to the job. Consequently, the governance challenges posed by digital ecosystems require a comparative analysis of various institutional options, in addition to the problematic, in our view, option of no-intervention (laissez-faire) which draws on the erroneous application of the 'natural order' of the market analogy to ecosystems. Table 2 (adapting GVC learning) may also serve as a source of inspiration for reflecting on governance types, but we believe it lacks the granular detail needed to describe all interactions that may occur *within* a digital ecosystem, as it encompasses broader market-based price transactions beyond ecosystem-specific interactions. The institutional options examined thus include but are certainly not limited to the following options (see also Table 4):

(1) centrally orchestrated ecosystem that preserves ecosystem participant (complementors but also business and end-users) 'voice'' either through voluntary compliance or under the 'shadow of the law' application of principles of non-discrimination and transparency;

(2) A decentralized ecosystem governance model featuring layered collaborative structures, including a stakeholder council with representation for all parties affected by ecosystem operations and an independent adjudicatory body providing alternative dispute resolution. This architecture implements separation of powers principles within the ecosystem's organizational framework and seeks to integrate input from affected stakeholder communities (e.g. consumers, ('gig') workers, citizens, local communities);

(3) A hybrid governance regime that combines public and private oversight through a code of conduct - either collaboratively developed by the digital orchestrator and ecosystem community or government-imposed - and administered by an ombudsman appointed by either ecosystem governance structures or government entities;

(4) the competition authority and courts involved in *ex post* abuse competition-focused control and eventually resorting to balancing regarding some broader parameters of well-being or sustainability;

[276] Komesar *supra* note 271, at 189.
[277] Tom Pieter Matthijs Bastiaans, THE GOVERNANCE OF COLLABORATIVE ECOSYSTEMS, 52 (2022) (M.A. thesis, TU Delft University of Technology) (on file with TU Delft University of Technology).

(5) A self-regulatory governance framework anchored by constitutional principles, with enforcement mechanisms subject to default public authority supervision;

(6) A hybrid governance framework where government authorities both establish and systematically enforce detailed transparency regulatory requirements;

(7) A tailored regulatory framework employing codes of conduct to regulate comprehensive aspects of ecosystem governance and performance across multiple domains;

(8) a regulator interfering *ex ante*, with specific behavioral or performance criteria or based on broader or narrower prescriptive values, norms, and principles striving to mitigate various power dynamics and

(9) A publicly-owned or controlled digital ecosystem infrastructure that provides access to data, computational capabilities, and an installed user base to support either innovative application development (innovation platform) or transaction facilitation (transaction platform).[278]

[278] On the disctinction between innovation and transaction platforms, see Annabelle Gawer & Michael A. Cusumano, *Industry Platforms and Ecosystem Innovation*, 31 J. PROD. INNOV. MGMT 417 (2014).

*Table 4: Digital Ecosystem Governance Options: A Comparative Table*

| **Option** | **Governance Structure** | **Control Mechanism** | **Enforcement** | **Stakeholder Participation** | **Regulatory Approach** | **Key features** |
|---|---|---|---|---|---|---|
| **1**. Centrally orchestrated with participant voice | Centralized with orchestrator leadership | Voluntary compliance or shadow of law | Ecosystem orchestrator | Complementors (& users) voice | Centralized private governance | Preserves central control while ensuring participant input |
| **2**. Decentralized multi-layered | Decentralized with separation of powers | Collaborative governance structure and independent adjudication | Ecosystem orchestrator & Independent alternative dispute resolution body | Stakeholder council with broad representation | Collaborative private governance | Implements separation of powers; integrates diverse stakeholder communities |
| **3**. Hybrid | Hybrid private/public governance | Code of conduct (collaborative or imposed) | Ecosystem orchestrator Ombudsman oversight | Complementors, Users, eventually stakeholders through code development process | Mixed private/public governance | Flexible & Agile legal 'code' development mechanisms |
| **4**. Ad hoc (competition/contract) regulation (competition authorities/courts) | Market based with judicial/competition authority oversight | Ex post abuse control | Courts and competition authorities | Economic actors internal (complementors, users) and external economic actors (potential & actual competitors, potential users) to ecosystem + other stakeholders (if individually & directly affected) | Adjudicatory public governance | Reactive public governance intervention |

| | | | | | | |
|---|---|---|---|---|---|---|
| **5**. Self-regulation with public oversight | Self-regulatory | Ecosystem constitutional principles conceded by the orchestrator | Ecosystem orchestrator & Default public authority supervision | Public authority & eventually indirectly through a complaint mechanism complementors & ecosystem users | Self-regulatory (private) governance with public governance backstop | Constitutional foundations with government overight |
| **6**. Government Transparency Regulation | Hybrid with government control | Detailed transparency requirements | Ecosystem orchestrator & Regulator | Public authorities and, indirectly through a complaints mechanism, internal and external economic actors | Prescriptive regulatory (public governance) approach | Government transparency standards (limited scope regulation) |
| **7**. Tailored multi-domain regulation | Cooperative (public/private) regulatory framework | Codes of conduct across domains | Ecosystem orchestrator & Regulator | Public authorities and, indirectly through a complaints mechanism, internal and external economic actors | Comprehensive regulatory (public/private) governance | Light-touch regulation of multiple governance and performance domains |
| **8**. Ex-ante systematic regulatory behavior and performance regulation | Systematic regulatory monitoring and control | Behavioral/performance criteria | Independent Regulator | Public authorities and, indirectly through a complaints mechanism, internal and external economic actors | Prescriptive values-based public regulatory governance | Proactive mitigation of power asymmetries |

| | | | | | | |
|---|---|---|---|---|---|---|
| **9**. Public digital infrastructure | Public ownership/control | Direct Government Control | Government | Public authority & indirectly citizens (voters) | Public utility owned/controlled governance | Government-owned infrastructure supporting innovation/transactions |

This institutional analysis should comparatively examine all institutional options against selected procedural requirements, including social welfare maximization, distributive fairness, and direct or indirect stakeholder participation in decision-making. Importantly, cost-benefit analysis is not the sole decision criterion available; alternative decision rules such as the precautionary principle or variants of the maximin rule may also be employed to achieve the desired public values.[279] The last option may seem, at the time of writing, as particularly interventionist, but it cannot be excluded as the recent debate on digital sovereignty has brought to the fore proposals to develop a European sovereign digital infrastructure (the 'Eurostack')[280], while there are also precedents for such forms of public digital infrastructure, such as the Indian platforms Aadhaar (for digital identity), UPI (for digital payments), DigiLocker (for document storage) or the Modular Open Source Identity Platform (MOSIP) which has reached international appeal, or Brazil's open health platform, to provide some examples of successful initiatives.[281] Note that the term 'public' does not necessarily mean this digital infrastructure will be government-owned. It also encompasses situations where the infrastructure was developed through private sector collaboration with government support, or where the government retains certain residual rights of control or access. In such cases, the governance regime may incorporate significant private governance components and may not align closely with governance option 9.

As evident from the above discussion, it is profoundly misleading to analyze digital ecosystems using market analogies that assume a 'natural order,' while ignoring that they constitute private governance systems with government-like power that requires constitutional-type constraints. It is also unsatisfactory to analyze ecosystems by focusing only on the dynamic capabilities of Big Tech orchestrators. A proper analysis must compare both the capabilities of all ecosystem participants, including complementors who collaborate in creating ecosystem value, and the relative strengths and weaknesses of both private and public governance approaches, including their resources, learning ability, accountability, and effectiveness in achieving higher levels of 'responsible innovation'.[282] Just as focusing solely on private governance is flawed, examining only one type of public governance (like antitrust rules) is equally limiting. A proper comparative approach must evaluate multiple regulatory

[279] The precautionary principle will accept short-term losses to avoid long term significant losses for which there is not a known probability distribution in terms of frequency. The maximin rule will choose whatever alternative institutional arrangement will maximize the minimum (words) outcome of a particular choice. On the precautionary principle and its distinction from other decision rules, such as cost-benefit analysis, see DANIEL STEEL, PHILOSOPHY AND THE PRECAUTIONARY PRINCIPLE: SCIENCE, EVIDENCE, AND ENVIRONMENTAL POLICY (Cambridge Univ. Press 2015).

[280] Francesca Bria, Paul Timmers & Fausto Gernone, EUROSTACK – A EUROPEAN ALTERNATIVE FOR DIGITAL SOVEREIGNTY (Bertelsmann Stiftung 2025), https://www.bertelsmann-stiftung.de/en/publications/publication/did/eurostack-a-european-alternative-for-digital-sovereignty .

[281] For a discussion, *see* Penzo Kuchev & Ian Brown, EU Regulation, Brazil's Open Health, and the India Stack: A Common Platform Approach to Integrated Digital Public Infrastructure, T20 Policy Brief, G20 (May 2023); Luca Belli & Larissa Galdino de Magalhães Santos, *Editorial: Toward a BRICS Stack? Leveraging Digital Transformation to Construct Digital Sovereignty in the BRICS Countries*, 55 COMPUTER L. & SECURITY REV. 106064 (2024).

[282] Jack Stilgoe et al., *Developing a Framework for Responsible Innovation*, 42 RES. POL'Y 1568, 1571-72 (2013) (describing 'responsible innovation' as an effort to develop collective stewardship of science and innovation by limiting the asymmetric power of certain actors and providing space for public deliberation regarding the desirability of specific innovation pathways and more generally the direction of the innovative process).

options while considering both efficiency factors (including state actors' capabilities) and the interests of all stakeholders, including regulated tech companies. Further research is needed to apply this modified comparative institutional analysis to specific problems.

Our analysis has shown the difficulty faced by private governance regimes (including self-regulation) and to a certain extent by light-touch public governance tools. We find that while private governance tools like contract law and competition law remain important for addressing the variety of social costs engendered by digital platforms, no single approach suffices. Instead, authorities are adopting a combined toolkit approach that integrate both public and private governance mechanisms. The selection and calibration of different tools depends on the complexity of the problem, the public values enshrined in each polity's social contract, and the efficiency/effectiveness of institutional capabilities and resources available for each institutional choice. These institutional choices may vary across jurisdictions and evolve according to changes in public values or available institutional capabilities, among other factors. This multi-jurisdictional institutional experimentation can serve as a source of significant policy learning that may alter comparative institutional analysis or influence each polity's selection of appropriate procedural rules, decision rules, and public values to be embedded in digital ecosystem governance regimes.

## VI. Conclusions

This essay argues that private governance of digital ecosystems is 'made' - that is, it is constructed through private or public governance legal frameworks - rather than 'given' as an implementation of some 'natural order'. This analysis, which draws on the legal institutionalist approach, parallels that of other organizational forms, including markets and hierarchical structures (firms). Digital ecosystems may put forward private governance regimes, either collaboratively through some form of self-regulation, or by a platform lead/ecosystem orchestrator/keystone firm imposing certain *de facto* standards of interaction. These measures not only aim to improve efficiency but also to *regulate* various 'value network' failures that emerge from ecosystem expansion, with the goal of avoiding stricter government oversight through public governance regimes that would address ecosystem-related social costs generally overlooked by digital orchestrators.[283] Relying only on private governance regimes does not however effectively responds to the concerns that ecosystems may be sources of an important number of broader externalities that are not adequately addressed by institutions of private governance. The sheer size of digital ecosystems in the global economy raises systemic risks as they exercise an important power that remains largely unchecked from competition, due to the economic concentration in the digital economy[284], and enables keystone actors to capture 'unfairly' the most important part of the surplus value brought about by the collective

[283] Michael A. Cusumano et al., *Can Self-Regulation Save Digital Platforms?*, 30 INDUS. & CORP. CHANGE 1259 (2021).
[284] George J. Stigler Ctr. for the Study of the Econ. & the State, Comm. for the Study of Dig. Platforms, Market Structure and Antitrust Subcomm., Report 11 (2019), https://research.chicagobooth.edu/-/media/research/stigler/pdfs/market-structure-report.pdf.; THOMAS PHILIPPON, THE GREAT REVERSAL: HOW AMERICA GAVE UP ON FREE MARKETS 265 (Belknap Press, 2019).

innovative effort of all participants to the ecosystem and other stakeholders (e.g. State innovation and R&D promotion policies).

To address these concerns, one may adopt different strategies of public intervention (public governance mechanisms). Non-discrimination, neutrality-enhancing policies, or policies against abusive termination by a platform may limit the risks of self-preferencing and foreclosure. Similarly, access duties to the parts of the platform considered to be like 'essential facilities' (or a bottleneck) could protect the ability of the platform's partners to develop competing offers (to those of the platform's subsidiaries) in other segments of the digital value chain. One may also select a hybrid strategy and put in place institutions of private governance with countervailing powers, such as unions of intermediary or end-users, trade unions that represent the self-employed in the gig economy (like Netflix artists and Uber drivers), whistleblowers and leakers, or enhance the cooperation of media companies to collectively bargain with, and thereby tame the power of Big Tech platforms.[285]

Our study provided an analysis of the (un)suitability of the traditional tools of competition law and contract law to deal with *all* challenges that emerge from complex governance structures in the digital economy. An overview of new regulatory tools and initiatives revealed that most often they also fail to consider the relative novelty of public governance structures in the digital economy and the need to perform a comparative institutional analysis of the alternative institutional choices on offer with the aim to ensure progressive institutional change. Exposing that private governance mechanisms are not 'natural' but are purposefully designed, and that the risk of degeneration towards ceremonial domination and regressive institutional change looms, this study showcased the limits of private governance of ecosystems and the importance of embedding these institutions of public governance that would sway ecosystem stakeholders towards interactions that offer greater social value as defined by the social contract of the specific polity. However, one must also remain cautious about the possibility of degeneration into 'ceremonial dominance' and 'decoupling' if public governance frameworks fail to adequately account for evolving societal values and the technological opportunities presented by continuous innovation.

By defining the contours of a legal theory of ecosystems, our study differs from the reductionist scope of strategic management/business studies and industrial organization/economics approaches to ecosystems. The strategic management/business studies literature explores how to harness private value for participants in business ecosystems, particularly for the ecosystem orchestrator. These studies address surplus value allocation only insofar as it affects the specific business ecosystem's economic (market) value potential. Broader social value issues, particularly the impact on external business ecosystem actors, did not form part of the discussion until recently. Some promising recent literature has attempted to provide a broader theory of 'ecosystem externalities' or 'ecosystem failures' that may eventually justify the intervention of competition/regulatory authorities, to ensure the broader social (and not just ecosystemic) value generated by business ecosystems.[286] However, this effort has not yet reached intellectual maturity and and it remains unclear what this literature

[285] For a more detailed analysis of these broader set of interventions, see Ioannis Lianos, *Value Extraction…, supra* note 98.
[286] See, for instance, Jacobides et al., *supra* note 18.

offers in terms of operational concepts and methodologies for studying the broader social risks stemming from the development of digital ecosystems.

The integration of the concept of the 'ecosystem' in the competition law toolkit has also in turn led Industrial Organisation (IO) and other economic experts to explore the contours of the concept and possible ecosystemic theories of harm that may be taken on by competition authorities to initiate *ex ante* or *ex post* competition law interventions.[287] This literature is however still embryonic and largely relies on the economic theory of competition, without, for the time being, any effort to develop a corresponding theory of co-opetition that would be adequate to assess the social costs and benefits of business conduct within ecosystemic structures.[288] This literature still tries to fit the ecosystem concept in the existing narrow conceptual framework of IO economics. This missing engagement with the study of ecosystems as a distinct institution of economic ordering leads to profound gaps in the understanding of the process of value generation and capture in modern capitalism, as well as in the conceptualization and measurement of power positions (economic, but also any other dimension to which economic power may be converted). Furthermore, the IO approach to ecosystems makes little effort to link the study of ecosystems to the broader conception of the public good that integrates social and environmental sustainability concerns, polyarchy, and democracy, and which forms the essence of the emerging new mainstream of 'polycentric' competition law paradigm.[289]

To embrace the full potential of business ecosystems as an institution producing social value, one needs to abandon the narrow lenses of strategic management/business studies and IO literatures and adopt a broader perspective such as that of Complex Adaptive Social Systems[290] or Law and Political Economy[291]. Further, to the extent that such perspective has been transplanted now into law, the concept needs to adjust to its new host.[292] This calls for the development of an overarching legal theory of ecosystems. The approach resonates with recent legal institutionalism approaches by taking the entanglement between legal and economic institutions and formations (and the shallow understanding that both have of one another) as a starting point. Responding to the evolutionary economics focus on innovation, such theory should not attempt to eternalize an institutional *status quo*. Instead, the institutional response (whether through different regimes of public and private governance or combinations thereof) must be responsive to the social needs of the specific polity and open to institutional change, avoiding ceremonial encapsulation within norms and values of the past, or the risk of

[287] See, for instance, Paul Heidhues et al., A THEORY OF DIGITAL ECOSYSTEMS (CESifo Working Paper No. 11332, 2024), https://ssrn.com/abstract=4991830.

[288] See, for instance, the criticisms of Giovanni Dagnino & Giovanna Padula, Coopetition Strategy: A New Kind of Interfirm Dynamics for Value Creation, *in* COOPETITION STRATEGY: THEORY EXPERIMENTS AND CASES 25-43 (Giovanni Dagnino ed., Routledge 2009).

[289] Ioannis Lianos, *Polycentric Competition Law*, 71 CURRENT LEGAL PROBS. 161 (2018).

[290] Ioannis Lianos, *Minding Competition…, supra* note 16.

[291] Ioannis Lianos, *Value Extraction…, supra* note 98; Ioannis Lianos, A LAW AND POLITICAL ECONOMY APPROACH TO ECOSYSTEMS AND COMPETITION LAW (Apr. 10, 2024), https://ssrn.com/abstract=5015913 ; Stavros Makris, *A Smithian Political Economy Approach for the Competition Law of the 21st Century*, 88 MOD. L. REV. ___ (2025).

[292] A theory of (legal) translation is essential to understand the integration of economic transplants in law. *See* Ioannis Lianos, *Lost in Translation? Towards a Theory of Economic Transplants*, 62 CURRENT LEGAL PROBS. 346 (2009).

‘decoupling’. It can also not abstract from the public values enshrined in the social contract in the specific polity, the institutional capabilities of the respective institutions of public and private governance, following a comparative institutional analysis, and accounting for different decision procedures than cost-benefit analysis, such as the principle of precaution and/or the maximin rule. A well-calibrated governance approach that considers the complex interplay between public oversight and private governance will be key to fostering innovation while supporting sustainable development of digital ecosystems, the broader economy, and society as a whole.