

Group-Forming Networks: Relational Value and Explosive Revenues

Antonio Scala

(CNR-ISC / Centro Ricerche Enrico Fermi) **keywords:** platform economy; network effects; group-forming networks; relational value; generativity; governance; superadditive value; relational indicators

jel: “D85; L86; L51; L14; O33; D47; D63”

Abstract

Digital platforms have turned interaction into a primary productive input, yet much economic reasoning still treats value as the aggregate outcome of individual preferences and marginal contributions. We propose a conceptual framework in which platform economies are modelled as **group-forming networks**: higher-order interaction structures in which collective contexts – groups, communities, shared norms, and identities – are economically causal, not residual. In such systems value is **relational** and often **superadditive**: organised interaction can generate outcomes that exceed the sum of what members could produce independently, through coordination, trust, norm formation, and reduced transaction costs. Superadditivity, however, is ambivalent. We distinguish two structurally distinct forms: revenue superadditivity, empirically documented in advertising-funded platforms and maximised by fine-grained user segmentation, and relational superadditivity, theoretically founded in the collective action literature and maximised by cross-group bridging and overlapping membership. These two forms respond to architectural choices in opposite directions, and their divergence explains how platforms can exhibit explosive financial growth while simultaneously depleting the relational resources that sustain collective action, trust, and democratic discourse. This calls for (i) a meso-economic layer that treats relational collectives as productive units rather than aggregates of individuals, and (ii) complementary indicators that track the building and depletion of relational resources – an agenda that requires extending existing data access frameworks beyond their current competitive rationale toward a broader welfare mandate.

1. Introduction – why networks stress-test economic theory

Digital platforms are no longer peripheral intermediaries; they are infrastructures that shape market access, information flows, and the organisation of collective action. A distinctive feature of platform economies is that **interaction architectures** (who can meet whom, under which rules, with which incentives and visibility) become a central determinant of economic outcomes. This raises a methodological difficulty: standard models can describe **choices** given an environment, but they are less precise about environments whose core economic function is to reshape the pattern of interactions itself.

Networks make this difficulty explicit. Externalities, feedback loops, and path dependence are not exceptions but typical features of networked systems (Katz and Shapiro 1985; Arthur 1989; David 1985). In platforms, these features are reinforced by algorithmic mediation and by the capacity of private actors to redesign the interaction space in real time (Zuboff 2019; Crémer et al. 2019). Consequently, analysing platform dynamics as the mere aggregation of individual utilities risks missing the principal causal layer: the **relational structure** that channels, amplifies, or suppresses behavioural responses.

This paper develops a short, theory-oriented argument: platform economies are best understood as **group-forming networks** that create value through the organisation of higher-order interaction. This perspective extends standard accounts of network effects and two-sided markets (Rochet and Tirole 2003; Armstrong 2006) by placing **groups** and **collective contexts** at the centre. It also provides a compact bridge between recent evidence on network value scaling (Scala and Delmastro 2023, 2026) and the normative agenda of Civil/Social Economy, where the quality of relations and participation are not merely ethical add-ons but constitutive of economic performance.

2. Beyond individual-centred models: the reductionist trap

2.1 Why individualism becomes fragile in platform settings

Reductionist modelling strategies start from individuals and build aggregates. This is productive in many contexts, but it becomes fragile when (i) the interaction structure co-determines preferences and feasible actions, and (ii) collective contexts generate non-linear returns. Platforms satisfy both conditions. Recommendation systems, visibility rules, and ranking algorithms alter exposure, attention allocation, and the perceived payoff of actions, often creating strategic complementarities and cascades. Under these conditions, individual microfoundations are not enough: the same preferences can yield divergent outcomes under different architectures, and small design changes can dominate behavioural details.

A minimal implication is the need for a meso-economic perspective: a level of description that captures the formation and dynamics of groups as relational entities – collectives constituted by interaction, shared norms, and mutual

recognition – and that is not reducible to either single agents or macro aggregates. In network economics this appears when outcomes depend on position, clustering, and homophily (Jackson 2008; Bramoullé et al. 2014). Platform economies push further: the economically relevant unit is often not a dyad or a node but a collective interaction context in which members recognise each other as participants in a shared practice.

2.2 Relational structure as an economic primitive

We treat the relational structure as an economic primitive: a set of constraints and affordances that shape opportunity, information, and coordination. A key property is that relational structures are designed. Unlike many offline social networks, platform networks are reconfigured by policy choices, business incentives, and technical constraints. The consequence is that market outcomes are partially the outcome of institutional design by private actors – platforms act as de facto rule-makers for interaction spaces (Crémer et al. 2019).

2.3 Two distinct notions of group: a necessary clarification

The concept of “group” carries two analytically distinct meanings in platform economies, and conflating them generates serious confusion.

The first is the group as a relational collective: an entity constituted by interaction among its members, sustained by shared norms, identity, or practice. Members know they belong; the group has internal dynamics, governance, and the capacity for collective action. This is the sense relevant to the meso-economic layer we are proposing.

The second is the group as a statistical construct: a subset of users identified by the platform on the basis of shared demographic or behavioural characteristics, without any requirement that members interact or recognise each other as a collective. This is the sense underlying targeted advertising – the “useful groups” of Scala and Delmastro (2023, 2024) whose proliferation drives superlinear revenue growth.

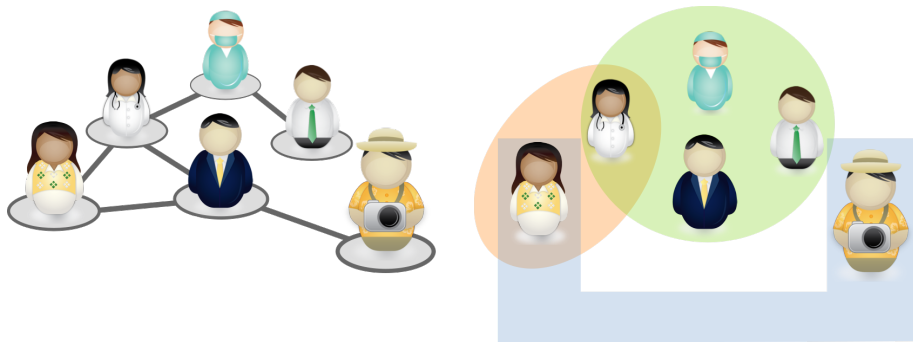


Figura 1: The same users constitute two analytically distinct group structures. Left: a relational collective, defined by interaction ties and overlapping membership. Right: statistical segments, defined by the platform from behavioural data with no interaction required among members.

These two notions are not only distinct but structurally in tension. Relational value, in the first sense, grows with the density and quality of intra-group interaction and with the capacity of members to bridge across groups. Extractive value, in the second sense, is maximised by the platform’s ability to identify homogeneous, well-separated segments – the more distinct the segments, the more targetable they are. The same architectural choices that fragment relational collectives into clean demographic clusters can therefore increase advertising value while depleting the relational resources that sustain generative collective action.

2.4 Non-overlapping individuals versus overlapping groups

A further property distinguishes groups from individuals as units of analysis: individuals are non-overlapping by definition, while group membership is inherently overlapping. A single user belongs simultaneously to multiple groups – a professional community, a local community, a political or cultural affinity group, a friendship network. This overlapping membership is not a complication to be managed; it is a source of economic value.

Granovetter’s (1973) argument on the strength of weak ties and Burt’s (1992, 2005) work on structural holes both point in this direction: the users who bridge distinct groups occupy positions of informational and coordinative advantage, and their bridging activity generates value that neither group would produce in isolation. In platform terms, overlapping membership expands the set of feasible collective contexts and the range of coordination problems that can be solved, producing a form of network value that is closer to what Reed (2001) envisioned from the user side – value arising from the combinatorial explosion of possible group formations – than to Metcalfe’s pairwise link count.

This has a direct implication for platform design and measurement. Architectures that encourage bridging across groups – through cross-community visibility, interoperability, or federated governance – expand relational value. Architectures that reinforce homophily and fragment the user base into sealed clusters increase advertising targetability at the cost of relational value. The empirical literature on echo chambers (Del Vicario et al. 2016; Sunstein 2017) documents the costs of the latter dynamic but focuses on the dichotomous presence or absence of cross-group exposure rather than quantifying the economic value of overlapping membership directly. This remains an open empirical question and a gap in the literature that the group-forming network framework we propose could help address.

3. From network effects to group-forming economies

3.1 Three generations of networks: value, revenue, and who pays

To motivate the group-forming network framework, a preliminary clarification on the concept of “network value” is necessary. The literature uses the term in two distinct senses: value in the welfare sense – the utility users derive from

participation, which increases with network size through direct externalities (Katz and Shapiro 1985; Rohlfs 1974) – and value in the revenue sense – what the operator extracts, either from users directly or from advertisers in two-sided markets (Rochet and Tirole 2003; Armstrong 2006). These two measures can diverge sharply, and the direction of divergence is not random: as we argue in section 4, the same architectural choices that maximise advertising revenue can systematically deplete relational value for users.

With this in place, three stylised regimes can be distinguished. Broadcast networks exhibit linear value scaling with audience size (Sarnoff’s law): value is one-directional and aggregate, revenue is extracted from advertisers paying for undifferentiated contacts. Connection networks should exhibit superlinear scaling with pairwise links (Metcalfe’s law), though Scala and Delmastro (2026) document, using 60 years of Italian data, that second-generation telecoms grew approximately linearly – a pattern consistent with either bilateral (pairwise) connectivity constraints (Odlyzko and Tilly 2005) or the effect of mandatory interoperability regulation. Group-forming networks exhibit explosive scaling – power-law or exponential – because the platform can identify and monetise a rapidly growing number of targetable user segments (Scala and Delmastro 2023, 2024). As established in section 2.3, however, these segments are statistical constructs defined by the platform for advertising purposes, analytically distinct from the relational collectives that constitute the meso-economic layer we are proposing.

3.2 The missing meso-economic layer

The relational collective – constituted by interaction, sustained by shared norms or identity, capable of collective action – is the missing layer between individual behaviour and platform-level outcomes. As section 2.4 established, individuals belong simultaneously to multiple overlapping groups, and this overlapping membership generates coordinative and informational value that neither individual-level nor aggregate-level analysis captures. The meso layer matters for four reasons: collective alignment enables coordination and complementarities that statistical segments cannot produce; repeated interaction within relational collectives builds trust and reduces transaction costs; groups structure attention and create cross-group bridging rather than homogeneous echo chambers (Del Vicario et al. 2016) and relational collectives can coordinate voice and bargaining in ways that atomised segment members cannot.

This meso layer is where platform design intervenes most forcefully: by enabling or fragmenting relational collectives, and by determining whether the groups that form develop genuine governance capacity or are merely harvested as advertising inventory.

4. Relational and superadditive value creation

4.1 Two distinct forms of superadditivity

The concept of superadditivity – the value generated by a set of participants exceeding the sum of what they would generate independently – appears in two

analytically distinct forms in platform economies, with very different degrees of empirical support. Conflating them generates both theoretical confusion and misleading policy implications.

The first form is the empirically documented revenue superadditivity. Scala and Delmastro (2023, 2026) show that advertising revenues in group-forming platforms grow faster than quadratically with the number of users. This superadditivity is a property of the platform’s capacity to identify and monetise an explosively growing number of targetable statistical segments. It is extractive by nature: it does not require that users generate value for each other, only that the platform generate value from selling access to them.

The second form is relational superadditivity, theoretically founded but not yet quantified in platform settings. The value generated by a well-organised relational collective exceeds the sum of what its members would produce independently, through coordination, division of labour, trust, and the production of shared resources (Ostrom 1990). This is a structural claim about collective action, not a psychological claim about altruism. Its intensity is amplified by the overlapping membership established in section 2.4: individuals who co-belong to multiple groups carry informational and coordinative potential across contexts, generating bridging value that isolated groups would not produce. The empirical literature on echo chambers provides indirect support by documenting the costs of reduced cross-group exposure (Del Vicario et al. 2016; Sunstein 2017) and noting that overlapping membership persists even in highly polarised environments. However, the relational surplus generated by specific platform communities has not been directly quantified, and this remains an open empirical question.

4.2 The ambivalence of superadditivity

The two forms of superadditivity point in opposite directions for platform design, and this opposition underpins the generative/extractive distinction introduced in section 1.

Revenue superadditivity is maximised by fine-grained segmentation: the more internally consistent the statistical groups the platform can identify, the more targetable and monetisable they are. This is extractive, but it does not *mechanically* entail relational damage. Segmentation is primarily a *reading* of the user base for advertising purposes, not a direct modification of interaction patterns.

Relational superadditivity is depleted by a different mechanism: the optimisation of interaction architectures for engagement. Engagement-maximising curation – whether endogenous through algorithmic selection or exogenous through the incentives it creates for visibility-seeking producers – tends to reward content that reinforces intra-group identity and generates strong emotional response over content that bridges across groups. Over time, this dynamic reduces cross-group exposure, weakens overlapping membership, and erodes precisely the bridging capacity on which relational superadditivity depends (Del Vicario et al. 2016; Sunstein 2017).

The two mechanisms are analytically distinct but economically complementary. Engagement optimisation produces more homogeneous, high-attention audiences;

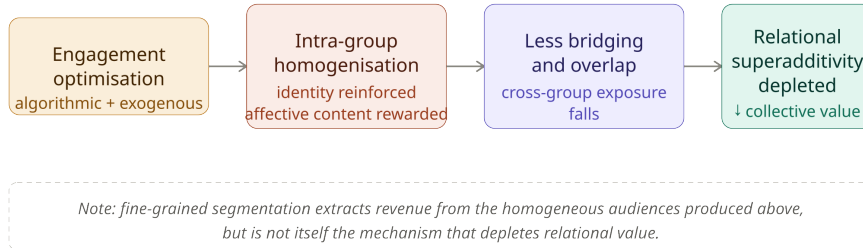


Figura 2: Engagement optimisation depletes relational superadditivity indirectly: by reinforcing intra-group homogenisation and reducing cross-group bridging and overlapping membership. These steps are not visible in revenue metrics.

fine-grained targeting then monetises them more effectively. Revenue superadditivity and relational depletion are therefore not the outcome of a single design choice, but of a structural alignment between monetisation technology and interaction architecture.

This also implies that no single regulatory lever addresses both dimensions: limiting segmentation granularity does not remove the engagement incentive, and adjusting curation rules does not, by itself, change the underlying monetisation logic. Generative growth, by contrast, expands relational superadditivity: it supports overlapping membership, cross-group bridging, and the governance capacities that sustain collective action. Extractive growth captures revenue superadditivity while depleting the relational substrate: it aligns engagement incentives and targeting technologies in ways that systematically reduce bridging and collective autonomy.

This structural decoupling – not market failure in the conventional sense – helps explain how platforms can exhibit explosive financial growth while simultaneously producing declines in information quality, social trust, and democratic discourse (Zuboff 2019; Akerlof and Shiller 2015). Measurement frameworks that track only revenue superadditivity will systematically misread platform performance, rewarding extractive architectures and rendering relational depletion invisible. This motivates the measurement agenda developed in section 5.

5. Beyond standard indicators: measurement for group-forming economies

5.1 The limits of existing indicators in platform settings

Standard indicators of market health – concentration ratios, price-cost margins, profitability – carry well-understood interpretations and support established policy tests in markets characterised by diminishing marginal returns. Those

tools were built for a specific structural environment that the emergence of group-forming platforms has shifted in ways that create new measurement challenges.

Such platforms operate in a different structural environment. As the empirical evidence in Scala and Delmastro (2023, 2026) documents, advertising revenues in these markets grow with scaling exponents well above two – in some cases consistent with exponential growth. Applying tools calibrated for diminishing-returns markets to platforms with strongly convex scaling risks systematic misclassification, not because the tools are wrong, but because the underlying market structure has changed and the standard presumptions underlying competition analysis can fail in ways that are not immediately visible to conventional measurement.

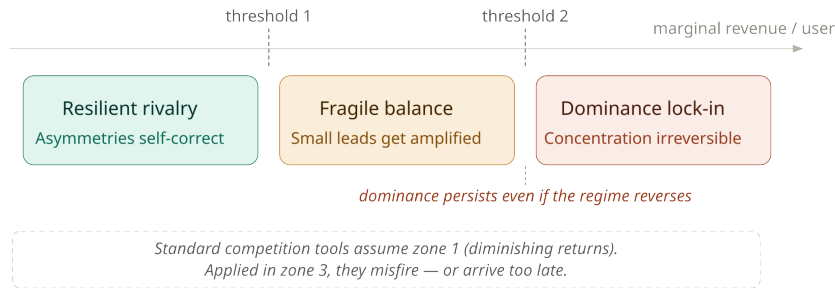


Figure 3: Three competition regimes under superlinear monetisation. Standard competition tools assume zone 1 (diminishing returns). Beyond threshold 2, dominance persists even if the regime reverses.

A parallel problem arises for welfare measurement. In group-forming economies, core productive assets include trust, participation capacity, diversity of interaction, and the ability to sustain collective action. These assets are partially non-market, partially non-rival, and often depleted invisibly. Standard indicators that track monetised output will record the revenue superadditivity documented in section 4.1 as unambiguous value creation, while remaining blind to the simultaneous depletion of relational superadditivity that the same architectural choices can produce.

5.2 Toward relational and generativity-based indicators

Developing adequate indicators for group-forming economies is an open research agenda rather than a solved problem. A structural precondition must be stated at the outset: the indicators proposed below exist in interaction graphs, group membership logs, and engagement data that platforms hold exclusively. These data are generated collectively by users through their participation – they are, in this sense, a product of the commons rather than a private platform asset. The Data Governance Act (European Union DGA 2022) and the data access provisions of the Digital Markets Act (European Union DMA 2022) recognise

this partially, establishing mechanisms for data sharing in the public interest and for regulatory oversight. However, these frameworks were designed primarily for competitive and market-efficiency reasons, not for measuring relational welfare. Extending their scope to support systematic relational measurement is a necessary next step – and the theoretical framework developed in this paper provides one justification for doing so.

With this precondition in place, a minimal measurement framework should complement existing indicators along two dimensions.

The first dimension concerns relational capacity: the extent to which a platform architecture supports the formation and sustainability of relational collectives. Relevant proxies include participation capacity, interoperability conditions (European Union DMA 2022) and data portability mechanisms (European Union DGA 2022), diversity and bridging metrics that capture cross-group exposure, and indicators of trust and interaction quality that distinguish genuine collective engagement from algorithmically induced high-frequency shallow contact. A binding constraint on this entire dimension is data access: these indicators exist in interaction graphs, group membership logs, and engagement data that platforms hold exclusively. Without mandatory access for researchers and regulators, relational measurement remains structurally impossible rather than merely empirically underdeveloped – and platforms retain the ability to monitor relational depletion in real time while remaining externally unaccountable for it.

The second dimension concerns generativity: whether platform growth expands or depletes the relational substrate. Here the revenue elasticity with respect to audience size – a measurable property of the monetisation technology – could serve as a continuously monitored market parameter, analogously to how market shares and price-cost margins are tracked in conventional competition analysis. A platform whose marginal revenue per user – what we call revenue curvature – is rising while cross-group bridging and participation diversity are declining is exhibiting the structural signature of extractive growth: revenue superadditivity expanding at the cost of relational superadditivity.

The goal is to extend the toolbox of existing indicators to make visible what they currently cannot see: the accumulation and depletion of relational resources that constitute the productive engine of group-forming economies, and the divergence between financial performance and social welfare that superlinear scaling makes structurally possible.

Conclusions

This paper has proposed the relational collective as an economic primitive for platform economies – a shift in unit of analysis from the individual to the group constituted by interaction, shared norms, and mutual recognition. This is not a purely terminological move. It has consequences at three connected levels.

At the level of value theory, it reveals a structural tension between two forms of superadditivity that standard accounts conflate: revenue superadditivity, empirically documented and maximised by segmentation, and relational superadditivity, theoretically founded and maximised by bridging and overlapping membership.

These two forms respond to architectural choices in opposite directions, and the divergence between them is the mechanism underlying the generative/extractive distinction.

At the level of measurement, it identifies a systematic blind spot: standard indicators track monetisation outcomes while rendering relational depletion invisible. Developing adequate indicators for relational capacity and generativity is an open empirical agenda – one that becomes urgent as platform architectures increasingly determine the conditions under which collective action, trust, and democratic discourse are possible, and one that requires extending existing data access frameworks beyond their current competitive rationale toward a broader welfare mandate.

At the level of regulation, it suggests that tools calibrated for diminishing-returns markets risk systematic misclassification in superlinear regimes – not because they are wrong but because the structural environment has changed. Scale-aware approaches that monitor revenue curvature alongside relational indicators could offer a more adequate foundation for competition policy in group-forming economies.

The three levels are connected by the same analytical move. Recognising the relational collective as a productive unit – rather than an aggregate of individuals or a statistical segment – is what makes the tension visible, the blind spot identifiable, and the regulatory mismatch diagnosable. Platform economies did not wait for economics to catch up – they built the infrastructure of collective life while the discipline was still counting individuals. This is the direction the Renaissance in Economics programme points toward – and where the most urgent empirical and theoretical work remains to be done.

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