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Economic Governance and Institutional Design

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ABSTRACT

How should institutions be designed to achieve compliance with behavioral rules, including laws, social norms, religious rules, or cultural traditions? This conceptual paper introduces a typology of economic governance institutions and explains how it can be used both by policy makers, administrators, and researchers in all social sciences to improve rule compliance. It explains how effective and efficient institutions can be identified for a given economic governance problem. The framework is built on the microeconomic foundations of economic governance theory, and its applicability extends to any compliance problem that can be formalized as a social dilemma or coordination game. The concepts are applied to two cases: how to create trust in cloud computing technologies, and how to implement data sharing of user-generated information on data-driven markets.

JEL Classification: D02, D71, D78, K23, K42, L33, P48

1 | Introduction

How can society be organized? How should society be organized? These questions arise because *homo sapiens* is not only a *zoon politikon*, a political animal,[1] but because the underlying reason for the ubiquity of social connections is that many activities we engage in directly or indirectly affect others: we jointly participate in traffic; we decide to smoke or litter (or to take care of the young or the old); we work hard, keep our promises and are "good citizens" (or we look for an easy life at the expense of others); we belong to the same communities or states and elect politicians or decide (not) to revolt against an autocrat.

In the language of economics: players' actions generate externalities that are not internalized by the individual's payoff-maximizing choice of action, which may differ with players' preferences. Consequently, the affected others may want some say in their companions' actions. This creates the need for behavioral rules. Determination of the contents of those rules and a social structure that supports everybody's rule compliance are necessary and build the foundation of society.

Notably, this says nothing about *how* rules should be enforced, *who* should enforce them, what *enforcement technologies* are available or socially accepted, let alone what the *contents of the rules* should be. Assume we are looking at rule enforcement at the national level and that you are a policy maker with some discretion how to enforce the rule.[2] For instance, the rule says: *Everybody should pay their taxes*. What can you do to increase rule compliance? Available options include the following (nonexclusive) policies:

This project grew out of joint work with Scott Masten many years ago, which has inspired me until today. I also learned a lot from repeated discussions with Gillian Hadfield and Vatsalya Srivastava, co-authors on other projects, about the fundamentals of institutions and economic governance. I am indebted to their insights and wisdom. Moreover, this paper has benefited from discussions with many graduate students at Tilburg University, who have seen some of the material in this paper in class, colleagues at TILEC and at CCP (especially Cédric Argenton, Panos Delimatsis, Sean Ennis, and Wieland Müller), Jörg Raab, and several seminar audiences providing feedback on the two application cases. All errors are my own.

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1. Passing a new *law* that punishes not paying taxes with a hefty fine.
2. Launching an information campaign conveying the message that it is *ethical* to pay your taxes, that good citizens have a moral duty to pay, and that only asocial free-riders do not pay.
3. Publicize the actual tax payments of every citizen last year, and ask everybody to *stop social interactions* with people they expect to evade taxes.

Option 1 is standard in developed societies but has the major disadvantage that law enforcement of such a complex rule for millions of people is very costly. Option 2 may trigger compliance by some altruists, but many people will trade a bit of bad conscience for less (effectively voluntary) tax payments. Moreover, Maman et al. (2025) find that the effectiveness of voluntary compliance relies heavily on the political environment and policy design, as polarization can undermine the social norms necessary for such 'soft' governance to function.

Option 3 is fundamentally different from Option 2 because the purported reason for tax payments does not depend on an individual's ethical values but on the social fabric surrounding the individual. If that social fabric, also called social capital, works well, Option 3 has good potential to be effective, especially if combined with Option 2.[3]

The ad hoc approach to such problems in developed countries with rule of law usually is: we have laws, courts and police to solve them. We have a government with its legislative, judicial, and executive branches that are tasked to define, adjudicate and enforce rules on behalf of citizens. Next to that, we have markets, where producers and consumers exchange and bargain about goods and services and where competitive forces make sure that market powers are not overwhelming.

However, many transactions take place outside of markets, for example, in families, firms or other close-knit communities (Gibbons and Henderson 2011). Even in the most capitalist countries, commercial transactors often prefer to avoid use of the legal system and court ordering even if the court system is fairly effective (Macaulay 1963; Williamson 2005; Hadfield and Bozovic 2016). Many conflicts throughout history and around the world are solved not by invoking formal laws but through alternative institutions: community norms, religious commandments, standards set by trade associations, arbitration rules, or social media posts.

In the introductory example above, given at least three available policies, the enforcement regime for the rule is endogenized, that is, it is not taken as fixed ("pass a new law!"). Several strands of the literature have studied compliance and enforcement. The policy-instrument literature (Hood 2007; Peters 2018) classifies tools that governments use to change behavior. However, it focuses on public instruments and does not systematically incorporate private-ordering alternatives. The literature on regulatory enforcement (incl. Baldwin et al. 2011, Braithwaite 2011, and Cronert 2022) analyses conditions under which rules bite, yet typically treats the *choice* of enforcement institution as exogenous. Institutional economics (North 1990; Williamson 2005) and economic governance theory (Dixit 2003a, 2009; Greif 2006) develop theoretical concepts for individual institution types but do not produce a unified, decision-oriented typology covering the full menu of institutions.

What is missing is not a study of any single institution, but a coherent conceptual framework covering *all* theoretically available enforcement institutions and providing a practical decision protocol for public and private decision-makers alike. This paper constructs such a framework, built on the microeconomic foundations of Dixit's (2009) three canonical governance problems—property rights protection, contract enforcement, and collective action—which serve as the analytical bedrock for addressing broader economic governance challenges. As demonstrated in Section 5, the framework's applicability easily extends to contemporary problems such as climate change governance. This is this paper's contribution.

The research question studied here is how such a conceptual framework could look like. It should be both theoretically sound, covering all potentially available institutions to solve a given economic governance problem, and practically applicable, telling decision makers in cookbook-style how to proceed step by step. Here, I construct such a theory of institutional design.

The framework has two target groups. *For academics*, it provides the first complete, micro-founded, and efficiency-ranked synthesis of all theoretically available enforcement institutions, integrating fragmented literatures (policy instruments, regulatory enforcement, institutional economics) into a unified system. This enables scholars from all social sciences to derive specific, context-dependent institutional recommendations from their models, moving beyond generic "policy implications" to precise guidance on which institutions are realistic and efficient for a given problem. *For practitioners*, the three-step decision protocol detailed in Section 3 serves as a roadmap for policymakers, administrators, and managers to systematically identify the most effective and efficient institution for their specific governance challenge, from tax compliance to climate change mitigation.

Section 2 defines key concepts and relates them to existing literature, introducing three fundamental economic governance problems, following Dixit (2009). Section 3 contains the main theoretical contribution: a theory of institutional design centered around a typology of economic governance institutions. Section 4 briefly presents two applications as proof of concept and generalizes procedural insights from these applications for operationalization of the framework. Section 5 concludes.

2 | Economic Governance and Institutions

2.1 | Definitions and Key Concepts in the Literature

The existing literature on economic governance supplies essential building blocks for the present framework but does not synthesize them into a unified, decision-oriented typology.

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Hood's (2007) NATO framework conceptualizes policy instruments in terms of governments' control over **n**odality (information), **a**uthority (legal power), **t**reasure (money), and **o**rganization (direct provision), thereby offering a powerful map of the tools governments deploy to influence behavior. What it does not aim to provide is a micro-level, cost-efficiency ranking of alternative enforcement institutions in the sense of the central/auxiliary transaction framework introduced in Section 3 below. Peters (2018) studies how governments choose and combine their available tools to address policy problems. He highlights issues of tool coherence, trade-offs, and implementation capacity. Again, however, the focus is on the design of public policy mixes rather than on a unified typology of all available public- and private-ordering enforcement institutions ranked by their incentive effects and costs. Cronert (2022) analyses when formally stringent "paper tiger" regulations nonetheless generate compliance, implicitly using a game-theoretic "focal-point" approach and stressing how enforcement capacity and political context shape the bite of specific policy instruments. This complements the present framework but does not provide a general classification and efficiency ranking of the underlying enforcement institutions themselves. Baldwin et al. (2011) bring together theories of regulation and enforcement across sectors. They offer a comprehensive overview of how states design and operate regulatory regimes. Their analysis is rich on strategies and institutional design trade-offs within public regulation, but it does not attempt to derive a general, micro-founded typology that also incorporates private-ordering institutions alongside public ones.

Dixit (2009:5) defines economic governance as "the structure and functioning of the legal and social institutions that support economic activity and economic transactions by protecting property rights, enforcing contracts, and taking collective action to provide physical and organizational infrastructure." Hence, economic governance refers to legal and social institutions that tackle three fundamental problems: property rights protection, contract enforcement, and collective action.

Dixit's definition leads to the next questions: what is an *institution*, and what is an *organization*? Several disciplines have developed various theories. Institutional theory is often used to explain the adoption and spread of formal organizational structures, including written policies, standard practices, and new forms of organization (David et al. 2019). An early and influential perspective, often referred to as "old institutionalism," was offered by Selznick (1957), who viewed organizations as formal, technical systems designed to achieve specific goals, while institutions emerge when organizations become infused with values beyond their immediate instrumental aims. March and Olsen (1989) see institutions as systems of rules, norms, and meanings that shape behavior. March and Simon (1993) understand organizations as meso-level systems coordinating actions among individuals with diverse preferences, bridging micro-level behavior and macro-level outcomes. Institutions provide collective rules that create order.

Powell and DiMaggio define institutions as systems of rules, norms, and frameworks that determine "acceptable" organizational behavior (e.g., expressed by certain standards), constraining and enabling organizations. In their recent reflection on their own work, Powell and DiMaggio (2023) emphasize that isomorphism (the process that organizations get more similar over time) remains pervasive today but now operates in digitally mediated, globalized contexts, such as technology platforms enforcing standardized behaviors via algorithmic rules. Thereby, through digital technology institutions are both more dynamic and more contested today, shaped by transnational networks and digital infrastructures (e.g., social media platforms shaping norms of communication).

Notably, political scientists use a broader definition of economic governance, encompassing institutional arrangements regulating markets and economic exchange more generally (see e.g., Dyson 2000; Schmidt 2002). An introduction to institutional theory in political science is offered by Peters (2019). He characterizes institutions as multidimensional systems with complex structures that shape behavior through formal and informal rules, norms, and cognitive frameworks. Organizations are understood as entities that operate within and are shaped by institutional environments. This paper, however, adopts Dixit's (2009) narrower, microeconomically grounded definition because it enables the formal precision, incl. the prisoner's dilemma representations in Figures 1 and 2 below, that a broader definition would not support.

North's (1990) classical definition is: *institutions are the rules of the game; organizations are the players*. Based on this definition, recent Nobel Laureates Acemoglu et al. (2001) define institutions as the formal and informal rules that govern how societies function. These can either be inclusive, promoting broad participation and economic growth, or extractive, concentrating power and hindering development.

Following Greif (2006), we distinguish *central transactions* from *auxiliary transactions*.[4] In a *central transaction*, at least two players interact and value is created. For instance, if a seller values a good at \$10 and a buyer at \$20, a transaction at \$15 creates \$10 total surplus. Many central transactions contain opportunities for opportunistic behavior, potentially leading to value losses or transaction breakdown. The field of economic governance studies how this can be avoided.

As institutions are rules, assume a rule that says, both players agree to forego opportunities to maximize individual payoff at the other's expense. A player acting according to this rule *cooperates*; otherwise, they *defect*. The rule can be expressed generally: all players should cooperate. The next—and

i / x	Not steal	Steal
Invest	$h, 0$	l, w
Not invest	$0, 0$	$0, 0$

FIGURE 1 | A one-sided Prisoner's Dilemma.

i / x	Cooperate	Defect
Cooperate	h, h	l, w
Defect	w, l	d, d

FIGURE 2 | A two-sided Prisoner's Dilemma.

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crucial—question is whether and, if so, why players will comply with the rule. To formalize the incentives to do so, or not, Greif (2006) introduces the notion of an *auxiliary transaction*. An auxiliary transaction does not create value in itself; it only serves to increase incentives for cooperation in the central transaction. For this purpose, it specifies which player(s) should take which action if, and only if, one of the players in the central transaction defected. Hence, the auxiliary transaction is a behavioral rule that gets triggered by defective behavior in the central transaction and helps to increase cooperation incentives in the central transaction.

Putting the pieces together, *an institution consists of (a) players and behavioral rules in a central transaction; (b) players and behavioral rules in an auxiliary transaction; (c) it must be self-enforcing*. If punishment incentives in auxiliary transactions are insufficient, the institution will break down.

For the analytical purposes of this paper, two of the abovementioned definitions are crucial: North's (1990) conception of *institutions as rules of the game* and Greif's (2006) operationalization of those rules as *central* and *auxiliary transactions*. The remaining definitions supply useful orientation but are not required for the formal analysis that follows.

This paper assumes a *microeconomic* perspective: we start from fundamental economic governance problems and show how institutions can be designed to solve them. This perspective is appropriate because enforcement ultimately operates at the level of individual incentives, that is, whether a given player prefers to *comply* or *defect* given the expected consequences. Macro-level and organizational perspectives explain institutional environments but do not yield a mechanism precise enough to rank enforcement institutions on efficiency grounds. By contrast, the central/auxiliary transaction framework of Greif (2006), the prisoner's dilemma structures of Dixit (2009), and the Folk Theorem logic all operate at this micro level and constitute the tools required for cost-efficiency ranking. However, each of these works describes particular institutional forms. The analytical advance of the paper at hand is *integrative*: it draws on these foundations to construct the first complete, efficiency-ranked typology of economic governance institutions that is directly applicable as a decision-making protocol.

2.2 | Three Fundamental Economic Governance Problems

Historically, the expansion of *impersonal exchange*, that is, cooperative trade beyond an individual's immediate circle, played a crucial role for substantial economic development (Lopez 1971). The problem of impersonal exchange is that it is inherently risky: meeting unknown people in one-shot interactions without effective governance institutions provides no incentives to honor deals, respect property rights, or support collective action. What is needed is *good economic governance:* an institutional arrangement that effectively solves an economic governance problem.

Dixit (2009) lists three fundamental problems: property rights protection, contract enforcement, and collective action. These are Dixit's canonical categories, not an ad hoc selection. They represent the three elementary social dilemmas whose solution has historically been most consequential for economic development. Contract enforcement receives the most detailed treatment in Section 3 below because it is the most general template: once the methodology is clear, readers can transfer it to property rights protection and collective action, as Section 3.4 demonstrates.

Property rights protection: Without secure property rights, rational players fear others will appropriate fruits of their efforts. If fruits require investments, incentives to invest are limited. This can be modeled as a *one-sided prisoner's dilemma* with investor i and potential thief x, where we assume $h, w > 0 > l$ and $h > w + l$. Efficiency requires (Invest, Not Steal), but the unique Nash equilibrium is (Not invest, Steal).

Contract Enforcement: Most transactions involve staged delivery of obligations. The party delivering second is tempted to renege, reducing first-party incentives. This creates a *two-sided prisoner's dilemma*:

Assume $w > h > 0 > d > l$ and $2h > w + l$. Efficiency requires (Cooperate, Cooperate), but the unique Nash equilibrium is (Defect, Defect).

Collective Action: Coordinated behavior improving everyone's long-term payoff is important for public goods production. In multilateral prisoner's dilemmas with citizens $1, \ldots, n$, efficiency requires mutual cooperation, but the unique Nash equilibrium is universal free-riding. Hence, absent good economic governance, the public goods, such as social safety nets, will not be provided in equilibrium.

2.3 | Some Final Clarifications

2.3.1 | Governance Versus Government

Despite their semantic similarity, these are two very different concepts. *Government* refers to the set of organizations in public ownership that rule a certain territory, often but not always on behalf of the people who live there. *Governance*, by contrast, comes in two shapes: economic governance, as defined above by Dixit (2009), and organizational or corporate governance. The latter concept refers to the allocation of control rights and income rights in organizations: who can do what and who benefits from it in which way?[5]

Therefore, the concept of governance is significantly broader than government: achieving rule compliance by public ordering, that is, using the state's coercive powers to enforce rules, is only one of the options that economic governance offers—and organizational governance increases the breadth of the term governance even more.

2.3.2 | Adjudication Versus Enforcement

To achieve good economic governance we need someone to adjudicate whether rules were broken and someone to enforce

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rules by punishing defectors. These tasks can rest with the same person/organization or be separated.[6]

2.3.3 | The Credibility Problem Versus the Clarity Problem

Most existing work studies the *credibility problem*: how to incentivize players to move from mutual defection to mutual cooperation. This assumes players know which actions constitute "cooperation" and "defection." But think of situations where, for example, two players agree to meet at 12 o'clock noon. One player comes from a culture where arriving 12.15 pm is accepted (counts as cooperation), whereas the other partner's culture holds that 12.05 pm is already late (= defection). This is the *clarity problem* (Gibbons and Henderson 2011), which is anterior to the credibility problem: players must have a common understanding of cooperation/defection before objective checking is possible. Classification institutions solve the clarity problem; while enforcement institutions solve the credibility problem.

3 | A Theory of Institutional Design: How to Implement Good Economic Governance?

3.1 | Principles

This section contains the core contribution: a theory of institutional design, centered around a typology of institutions to identify and implement good economic governance that effectively solves economic governance problems. It can be used to design *effective* and *efficient* economic governance institutions for specific problems, helping policymakers, legislators, managers, and other decision makers.

The typology is developed for contract enforcement because this is the most general and analytically tractable of Dixit's three fundamental governance problems. Once clear how to work with the typology, readers can transfer the same methodology to other economic governance problems. As shown in Section 3.4, the same typology applies, with appropriate adaptation, to property rights protection and collective action. Contract enforcement is therefore the analytical entry point, not the paper's exclusive scope.

Importantly, the framework is descriptively complete: it covers all theoretically available enforcement institutions, including criminal organizations that democratic policymakers in rule-of-law systems will usually not employ. Its breadth is an analytical feature: it reveals *why* certain institutions are unavailable or undesirable in a given context. It is always applied within the normative and legal constraints of the specific context at hand. The theory entails that economic governance problems can be solved in a three-step procedure:

1. Identify the *central transaction*, including players and which real-world behavior constitutes *cooperation* or *defection*.
2. *Apply the economic governance typology* to structure the auxiliary transaction and identify effective institutions and the efficient institution.
3. Design an *organizational governance structure* which ensures all players in both transactions are incentivized to cooperate.

The procedure produces empirically testable hypotheses: for specific cases, the identified efficient economic governance institution and its organizational implementation constitute the "best" solution available. The theory is falsifiable and hence qualifies as scientific theory.[7] Similarly, Depoorter and Marx (2024) demonstrate that specific design attributes in voluntary standards, such as enforcement mechanisms and capacity building, are critical for generating compliance, reinforcing the importance of granular institutional design.

Consider the two-sided prisoner's dilemma in Figure 2. It captures the archetypical contract-enforcement situation, a seller–buyer relationship: either side can *cooperate* by fulfilling contractual agreements (produce high quality, timely payment) or *defect* by opportunistically maximizing own payoff at the partner's expense (low quality, late payment). The economic governance problem is: how can players be motivated to cooperate rather than defect?

Possible answers are given by available auxiliary transactions depending on the specific contract enforcement institution used. The policy maker's task is designing the auxiliary transaction such that cooperation in the central transaction is incentive compatible. For this purpose, we rely on Figure 3, the key figure of this paper. The eight boxes at the top represent available economic governance institutions (illustrated for contract enforcement). Vertical demarcation lines between institutions inform about characteristics distinguishing all institutions on the left versus right of the line. Thereby, each institution is uniquely characterized.

Importantly, exact titles of enforcement institutions are less relevant than delineations below the boxes. If your understanding of "Regulators" differs from Figure 3, start with the characterizations below the boxes and identify which description fits best.

3.2 | Finding Effective Institutions and the Efficient Institution

To find effective and efficient institutions to solve contract enforcement problems, we run through all eight institutions. Start with *Internal Value Systems* on the far left. This refers to situations where players have (pro-)social preferences, enjoying when others have higher payoffs. It captures situations where players like each other (families) or have ethical/religious values about compassion or a sense of duty or honor.

We ask whether *Internal Value Systems* can solve contract enforcement problems by changing the theoretical prediction from *mutual defection* to *mutual cooperation*. Every institution achieving mutual cooperation is called an *effective* economic governance institution. Among effective institutions, we seek the *efficient* governance institution maximizing total surplus while maintaining Pareto efficiency. All effective institutions solve the economic governance problem and produce the same

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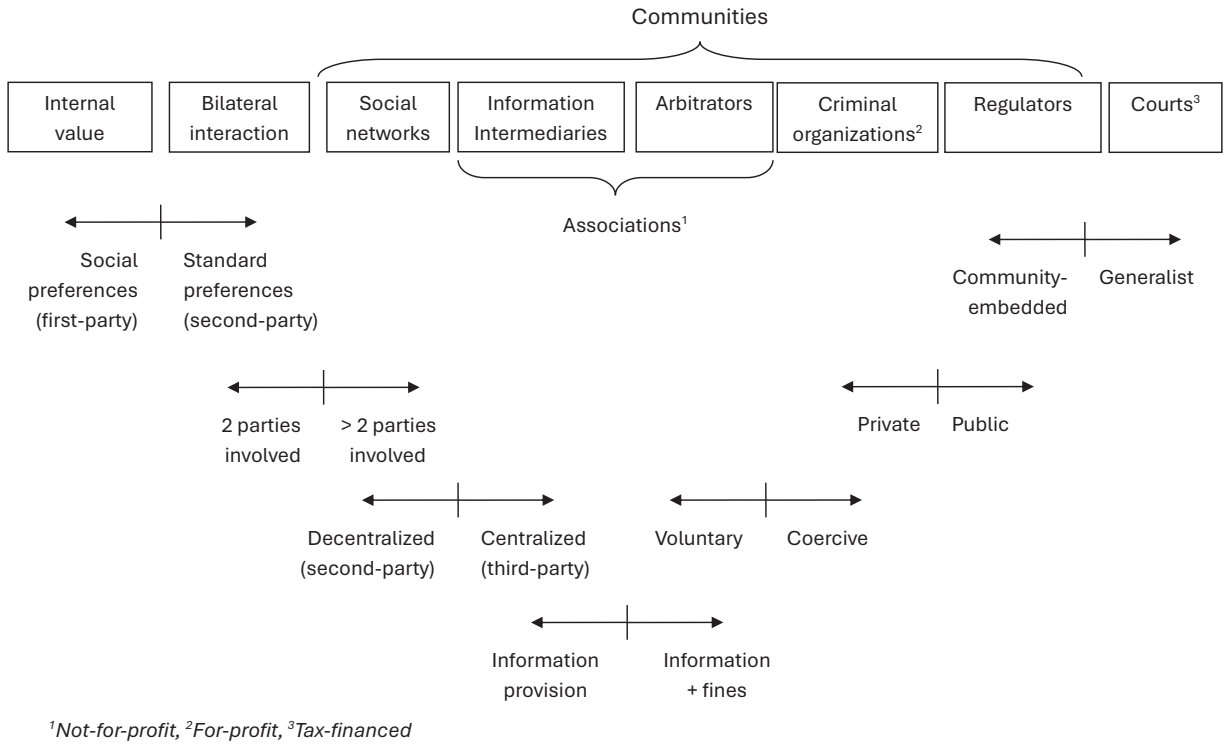

FIGURE 3 | Typology of Economic Governance Institutions (illustrated for contract enforcement).

outcome: cooperative central transactions. In Figure 3, the *instantaneous costs of using an institution* typically increase from left to right.[8] An institution achieving cooperation without involving other players is cheapest. Hence, if *Internal Value Systems* are effective, they are also efficient. Some call this utopia.

Moving right, institutions relying on fewer people are cheaper than those requiring more. Private ordering institutions are cheaper than public ordering institutions, which involve more administration and checks (Bernstein et al. 2015). If only general public courts can achieve cooperation, *courts*, on the very right of Figure 3, are uniquely effective and efficient.

The cost-efficiency ranking should not be read as a normative claim that minimizing cost is always the supreme criterion. Rather, costs enter the ranking as a tiebreaker among *effective* institutions: when two institutions both achieve compliance, the one that does so at lower social cost is preferred on Pareto-efficiency grounds. Non-cost considerations, such as legitimacy, democratic accountability, and equity, remain relevant in practice and should be weighed alongside the typology's recommendations.

As a caveat, technological progress can affect cost-based rankings. Centralized digital reputation systems or blockchain smart contracts might make Information Intermediaries or Arbitrators cheaper than decentralized Social Networks that have no access to such technology. As long as all institutions have the same access to technology, the cost-ranking remains stable.

3.3 | Eight Contract Enforcement Institutions

The previous subsection provided methodology for using the typology. Now we describe how real-world institutions can be categorized as one of eight archetypal institutions using delineations in Figure 3. For each institution we specify (i) the mechanism through which it incentivizes cooperation, (ii) the boundary conditions under which it is effective, and (iii) which actors (public or private) can deploy it. Table 1 at the end of Section 3.3 summarizes public/private actor access. The main text explains mechanisms and conditions.

3.3.1 | Internal Value Systems

This refers to individual objectives. Individual i cooperates with j because i likes j (families, partnerships) or benefits from self-image as a moral or honorable person helping others. Dixit (2009) calls this a "first-party system:" cooperation occurs without further interaction, creating psychological utility. Such prosocial behavior is widely observed (Camerer 2003). Theoretically, social preferences are restricted to within-group interactions competing with other groups. If survival depends on group survival, supporting group fitness by cooperating is rational (Henrich et al. 2001; Tabellini 2008; Baron 2010).

This has business counterparts: mergers can achieve cooperation by common ownership. However, Dixit (2009:12) noted that a merger only transforms contracts into principal-agent problems within firms; it does not eliminate the governance problem. The

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TABLE 1 | Public/private actor access to economic governance institutions.

Institutions	Public actors	Private actors
Internal value systems	Yes (soft governance, framing)	Yes (corporate culture, ethics codes)
Bilateral repeated interaction	Limited (rarely at scale)	Yes
Social networks	Informally (norm campaigns)	Yes (offline and online)
Information intermediaries	Via mandatory reporting requirements	Yes (rating agencies, trade associations)
Arbitrators	Quasi-public (specialist tribunals)	Yes (commercial arbitration)
Criminal organizations	No (rule-of-law constraint)	Rarely (illegal in most jurisdictions)
Regulators	Yes (core public tool)	No (statutory mandate required)
General courts	Yes (core public tool)	No (public institutions by definition)

choice between external and internal enforcement depends on comparing costs. Moreover, Internal Value Systems are also the root cause of the influence (and the potential efficiency) of religious or other charismatic leaders (incl. online influencers): if they can make people comply with rules just by addressing their morality or by means of personal authority, this is very efficient.

As a complement to merging private organizations, a recent, excellent illustration of the behavioral consequences of mergers in public organizations is provided by Askim et al. (2024). These authors study the problem of horizontal neglect, that is, the tendency of local authorities to overspend prior to merging. They find that, in their case study about (forced) merging municipalities in Norway, horizontal neglect can be alleviated through prosocial norms and the framing of decisions in a way that encourages officials to consider the impact on other jurisdictions. Priming local politicians with reminders of their broader responsibilities—a classical way to invoke *Internal Value Systems*—reduces both horizontal neglect and the overspending effect of social norms that stem from local politicians' opposition to the merger of their own municipality.

Mechanism and boundary conditions: The mechanism is value alignment: cooperation is rational for player i if it yields direct utility independent of any external threat. The institution is effective only where genuine prosocial preferences exist that overcome the temptation to defect in the central transaction. This typically holds within families, long-standing partnerships, or communities with strong shared identities. It becomes unreliable in purely transactional, profit-maximizing settings.

Available to: public actors (soft governance, norm-framing campaigns) and private actors (corporate culture, ethics codes).

3.3.2 | Bilateral Repeated Interaction

Without *Internal Value Systems*, we enter the realm of standard preferences, which Dixit (2009) called "second-party systems," requiring a second player's actions to incentivize cooperation.

Cooperation breaks down in one-shot Prisoner's Dilemmas (see Section 2.2). Repeating bilateral interaction provides solutions through trigger strategies making current cooperation dependent on past cooperation. The Folk Theorem (Friedman 1971) shows that both players cooperate if they are sufficiently patient and interact frequently.

Mechanism and boundary conditions: The mechanism is a trigger strategy: player i cooperates as long as j has cooperated in all past periods; upon defection, i permanently switches to noncooperation. The strategy sustains cooperation when the present discounted value of future gains from cooperation exceeds the one-period gain from defection, which requires a sufficiently high discount factor δ and sufficiently frequent interaction. *Available to:* primarily private actors; states rarely engage in sustained bilateral repeated interaction at scale.

Bilateral Repeated Interaction works in small communities with few outside options (Baker et al. 2002; MacLeod 2007). However, as community size grows with more potential partners, this becomes ineffective. Then, we are entering the domain of "Collective Enforcement Institutions": institutions for the enforcement of agreements involving others than just the parties to the transaction themselves. In Figure 3, this includes all institutions right of *Bilateral Interaction* and left of *(General) Courts*, which operate rule-based independent of communities.

3.3.3 | Social Networks

Social Networks are the logical extension of the Folk Theorem to third parties. When the frequency of bilateral repeated interaction is too low, players can leverage trigger-strategy threats by involving others: if player i defects against j, j informs their friends who refuse future interactions with i. If i wants to prevent that, they have to cooperate with j.

Social networks enforce social norms through *decentralized* dyadic information transmission. Every player i connects to n_i others, sending messages about partner behavior. Applications include online networks, traditional communities, and microcredit lending (see Landa 1983; Kandori 1992; Greif 1993; Dixit 2003b; or Masten and Prüfer 2014).

Available to: public actors (informally) via public shaming campaigns or norm communication; private actors via decentralized community governance.

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The benefits of social networks include cheap management costs. However, as they operate without central management, information transmission becomes difficult as network size grows (Ostrom 1990). Because social networks depend on several players' independent compliance, social norms are relatively inflexible when the environment changes, for example, through technological progress. This makes them ineffective in dynamic contexts.

3.3.4 | Information Intermediaries

A natural solution to this problem involves assigning one player the role of network manager, collecting, and disseminating information about the central and auxiliary transaction behavior of all members' partners. This change leads to a move from a two-party to a three-party system. The central player takes institutionalized responsibility, often charging fees for their services in exchange.

This creates *organizations* with central managers and individual members, exemplified by rating agencies, credit bureaus, and industry associations. Membership involves obligations beyond fees, especially reporting duties about experiences with others. Economies of scale in data assembly come with higher infrastructure costs than in decentralized networks, making centralized associations suitable for larger participant numbers. Associations can be member-owned (trade associations) or third-party owned (Standard and Poor's). For formal studies of information intermediaries, see Greif et al. (1994), Baron (2010), Larrain and Prüfer (2015), Prüfer (2016) or Fiedler et al. (2023).

Available to: public actors through mandatory reporting requirements imposed on regulated entities; private actors through trade associations and commercial rating agencies.

The main problem of information intermediaries is their limitation to ostracism as enforcement technology: managers can only threaten defectors with information dissemination and calls for member boycotts. If potential transgressors have good outside options, such threats may be insufficient.

3.3.5 | Arbitrators

Arbitrators differ from *Information Intermediaries* by investigating accused defections, making judgments, and determining fines that transgressors have to pay to prevent group exclusion, instead of only collecting and disseminating information. They gain enforcement power by ordering members not to trade with defecting parties that do not respect their judgments. Consequently, the strength of arbitration associations depends on the number of their members. Where *Information Intermediaries* resemble facilitators, *arbitration* tribunals resemble private courts. Their effectiveness peaks when group exclusion would be disastrous for an individual player, as in tight-knit trade associations or standard-setting organizations. This applies internationally in cases where the stakes for one country aren't high enough for war/coercion (World Trade Organization, Kyoto protocol).

Compared to *Information Intermediaries*, *arbitrators* have harsher punishment options but cost more due to investigation expenses. Compared to public courts, arbitrators are more flexible and knowledgeable about customs, potentially making better case-by-case decisions. Both formal and conceptual models of arbitrators are constructed and studied by Milgrom (1990), Bernstein (1992, 2001), Dixit (2003a), or Prüfer (2016).

Their main problem is that membership is voluntary (and hence must be incentive-compatible for every member) and that they have no statutory access to coercion.[9] Damage payments that are actually paid in equilibrium are restricted to the net present value that the defector loses by being excluded from future interactions with association members, which is lower than public courts' maxima.

Available to: quasi-public actors through specialist dispute resolution tribunals; private actors through commercial and trade arbitration bodies. Hybrid co-regulatory schemes, combining private information collection with public enforcement, are possible and represent combinations of this and adjacent institution types.

3.3.6 | Criminal Organizations

Due to the weaknesses of ostracism-relying institutions, Figure 3 includes criminal organizations. Dixit (2003a), based on Gambetta's (1993) Sicilian Mafia case study, explains how the Mafia started offering businesses protection from their partners' opportunism, charging a fee. Then the Mafia threatens defectors with harsh coercive punishment, which can deter defection even when partners never meet again, surpassing the limits of future-dependent ostracism. Thereby, the Mafia can *increase* cooperative behavior. Consequently, if state governance is absent or weak, criminal organizations can take over governance and thereby substitute the state—alas with a different objective function.

Economically, criminal organizations work like arbitration tribunals, with two exceptions: they reserve coercive punishment rights, making threats more effective; and they are profit-maximizers. These characteristics combined ruin their effectiveness as general rule enforcers. Like dictators, their temptation to use force for increasing fees grows over time (Olson 2000). Both exploit powers and neglect externalities, keeping only fragile peace with the most powerful players (Greif et al. 1994).

Blattman et al. (2025) support this view in a study on drug gangs in Medellin, Colombia: "we see no evidence that state proximity crowded out criminal rule. On the contrary," (p. 3) "state and gang rule are sometimes complements" (p. 1). Underscoring the importance of criminal organizations' profit motive, they find that "gangs were most likely to compete with the state [for governing a neighborhood] in the neighborhoods close to profitable drug markets. In less profitable neighborhoods, they do not appear to respond to state proximity at all" (p. 3).

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Criminal organizations are included here for analytical completeness: the typology is descriptively accurate only if it covers institutions that actually govern behavior in some contexts. Democratic policymakers in functioning rule-of-law systems will routinely exclude this option at Step 2 of the three-step procedure on both normative and legal grounds. The inclusion of criminal organizations in the typology thus explains *why* they are ruled out—they maximize private profit and exploit coercive power—rather than prescribing their use.

Available to: neither public actors in democracies (excluded by rule of law) nor most private actors (illegal in most jurisdictions).

3.3.7 | Regulators

Interestingly, *Criminal Organizations* and *Regulators* share several characteristics: a centralized organization investigating cases, access to coercive punishment, and community-embeddedness of their decision-makers allowing the utilization of insights from informal connections.

The major distinction is their objective function and mandate. Where *Criminal Organizations* maximize profits, *Regulators* are public organizations acting for the state with objectives including welfare-maximization or consumer surplus-maximization.[10] Real-world regulators include competition authorities, industry regulators (e.g., for finance, healthcare, or energy markets), and specialized courts, where experts judge traders on the state's behalf. All have access to state coercive enforcers, making them highly effective.

The flip-side also comes from community-embeddedness: listening to private industry participants provides insights but can create bias. Community membership implies expectations and strategic information sharing. Higher embeddedness both increases regulators' expertise and capture probability (Larrain and Prüfer 2015).[11] A noteworthy case in point is competition policy makers or antitrust enforcers in Brussels, Washington, or London, which are subject to gigantic lobbying efforts of regulated firms and interest groups.[12]

Available to: public actors only (statutory mandate required).

3.3.8 | (General) Courts

Both *Regulators* and *General Courts* act for the state, constituting *public ordering*, in contrast to private ordering, where the institution is organized by private parties without mandate from the state (Bernstein et al. 2015). Courts investigate cases, judge cooperation versus defection, and determine damage payments in private law cases. Because courts have access to state coercive powers, they can theoretically enforce any payment. In practice, due to asymmetric information and human rights constraints, courts often use "expectation damages" where payments are multiples of victim losses (Hermalin et al. 2007). If traders believe courts are effective, defection is not worthwhile.

Key differences are that *Regulators* are community-embedded while *General Courts* operate fully rule-based. Judges need only to know the law, not any specialized trade. This excludes useful transaction information, but it guarantees highest institutionalized independence from influence and capture. The difficulty that comes with rule-based decision making is that a judge requires *verifiability* of the parties' claims (a certain burden of proof). In contrast, private-ordering institutions can make decisions based on observability of the claims, which is significantly easier to satisfy.[13] Therefore, to make decisions on behalf of victims of infractions that are difficult to prove, courts are sometimes not effective, but private ordering institutions can be. Apart from proof difficulties, courts are expensive: financial costs, long decision times, psychological costs, and potential privacy loss.[14] Financial costs include filing fees, attorney fees, and opportunity costs of management time; long decision times reflect courts' rule-based, procedurally constrained processing of evidence; psychological costs involve the adversarial process itself (anxiety, reputational exposure, relationship damage); and privacy loss arises because court proceedings in most jurisdictions are public record, making commercially sensitive information accessible to competitors (in business cases) or reveal a lot about the private life of litigants (in cases centered on individuals). The various costs are a byproduct of courts' advantages: to be neutral, general, and based on abstract laws, which makes them hard to capture.

General courts can, in principle, develop specialized expertise through specialist chambers (e.g., the UK's Competition Appeal Tribunal). Such bodies share characteristics with regulators and represent hybrid institutions combining courts' independence with sectoral knowledge.

Available to: public actors only (courts are public institutions by definition).

As one key purpose of the typology is to identify choice sets for private and public institutional designers, Table 1 provides a summary of all eight economic governance institutions.

3.4 | Property Rights Protection and Collective Action

The governance typology from Figure 3 also applies to the other economic governance problems identified by Dixit (2009).

3.4.1 | Protection of Property Rights

The one-sided Prisoner's Dilemma captures hold-up, lock-in, or property rights protection situations. With perfect law enforcement, the government could protect everyone's property rights, increasing investment incentives. However, where police cannot ensure protection, private ordering institutions step in: neighborhood watch groups (resembling *social networks*), gated communities with guards (sharing *arbitrator* characteristics), or hiring *criminal organizations*.

An economically related problem is citizens' protection against predatory governments. Here, single individuals are helpless due to coercive power imbalances.[15] Governmental coercion excesses can be mitigated under two conditions: first, victims must be able to form organizations threatening business

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cessation with the autocrat if harmed (Greif et al. 1994). Second, traders threatening an autocrat/predatory regime in this way must reside outside the autocrat's territory and coercive reach.

3.4.2 | Ensuring Collective Action

Collective action problems feature positive externalities leading to underinvestment.[16] Nobel Laureate Elinor Ostrom (1990) empirically identified key lessons for good economic governance of collective action problems based on private ordering and ostracism: (i) *Stability of group composition*: if players often enter/exit, threatening interaction cessation is meaningless. (ii) *Good local information* about members' identity, rights and duties, consequences of misbehavior, and keeping record of members' behavior history. Otherwise, trigger strategies cannot work effectively. (iii) Rules must be *compatible with available information* about relevant actions, for example, punishment should only be triggered by observable misbehavior, not unobservable variables. (iv) *Graduated punishments* and opportunities for defectors to rejoin the community after serving their punishment are more successful in the long term than grim trigger strategies that exclude defectors forever (Greif 2006, Appendix C; Watson 1999, 2002).

More difficult applications involve transnational/multilevel governance (polycentric governance) where externalities exist across countries horizontally and between national/sub-national levels vertically, with heterogeneous interests in multiple dimensions (Paavola 2015). An interesting case study illustrating these difficulties in the context of multilevel internet governance is provided by Koppell (2005).

4 | Applying Institutional Design Principles

Here, I show how the theory of institutional design from Section 3 can be applied by researchers narrowing down effective institutions and by policy makers implementing rules and considering efficient compliance methods.[17] This is demonstrated through two applications: (i) increasing users' trust in cloud computing technologies, and (ii) implementing data sharing provisions on data-driven markets as prescribed in the EU's Digital Markets Act, Art. 6(10, 11).

The two cases are selected on three grounds. First, *methodological tractability*: both provide all three inputs required by the three-step procedure: a well-defined central transaction, clearly observable cooperation/defection, and a traceable selection among institution types. Second, *policy salience*: both sit at the frontier of digital-market regulation, a domain of vivid current interest both to academics and policy makers. Third, *theoretical diversity*: one case results in a private-ordering solution (arbitration/certification) and the other in a public-ordering solution (regulator), demonstrating that the typology is not biased toward a single answer. The fact that both applications draw on the author's own published work is a feature rather than a limitation: using independently peer-reviewed results ensures reproducibility and prevents reverse-engineering of the framework to fit the illustration.

This section reports the gist of published work addressing these problems: Prüfer (2013, 2018) on trust in cloud computing technologies, and Graef and Prüfer (2021) on the implementation of a rule forcing large technology firms to share certain user-generated data on data-driven markets. The purpose here is to exemplify how to apply the economic governance typology to specific problems, not to discuss the rationales for the rules altogether.

The methodology is identical in both cases: first, specify the *economic governance problem* (define the abstract problem and relevant players); second, use the typology to identify the efficient institution; third, solve the *organizational governance* problem by designing incentive schemes, thereby fitting Greif's (2006) definition of institutions and improving societal objectives like total welfare or consumer surplus.

4.1 | Trusting Privacy in the Cloud

This case is a *contract enforcement* problem: a Cloud Service Provider (CSP) promises contractual privacy and data security, while the user promises payment. The central transaction is thus between a CSP (seller of secure cloud services) and a user (buyer). Potential CSP defection (delivering lower privacy protection than promised) is the governance problem to be solved.

This subsection draws on Prüfer (2013), deriving efficient economic governance institutions to increase users' trust in Cloud Service Providers' (CSPs) privacy and data security promises and Prüfer (2018), which constructs a game-theoretic model to study whether the suggested organizational governance scheme improves the previous situation.

4.1.1 | The Economic Governance Problem in Cloud Computing

Cloud computing enables convenient, on-demand network access to shared configurable computing resources that can be rapidly provisioned and released with minimal management effort (US NIST 2011). The public cloud market saw end-user spending of about 595 billion U.S. dollars in 2024, expected to grow to approximately 723 billion by 2025.[18]

Simultaneously, many end users worry about privacy risks when storing private data in the cloud. Businesses, especially SMEs, worry about data security for crucial services (Pearson 2011). Cloud computing's global nature allows CSPs to move data between countries with different security levels undetected, creating regulatory ambiguity and business costs. These problems are amplified by the industry's complexity and dynamism. Consequently, users underutilize cloud computing opportunities, mitigating innovation, and economic growth.

Let us formulate this as an economic governance problem. A CSP promises contractual privacy and data security protection at specific levels, while users promise to pay for secure cloud services. This resembles a classic contract enforcement problem. Since prices can be required in periodic

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installments (subscription models), user-side moral hazard is limited. The best model is a one-sided Prisoner's Dilemma (Figure 1), where CSPs "cooperate" by adhering to contracts and "defect" by producing lower privacy protection than promised.

Key questions are: How can CSPs be incentivized to keep contractual obligations and install privacy-protective procedures? How can we ensure users trust providers' promises and pay premium prices?

4.1.2 | Applying the Economic Governance Typology

Starting left in Figure 3, can *Internal Value Systems* solve contract enforcement? Cloud computing is a global industry where players interact digitally with unknown people from different cultural backgrounds. Most people will not forego profitable (=defective) behavior in such a situation. Hence, internal value systems cannot solve global contract enforcement problems involving profit-maximizing corporations.

Moving right, *reputation mechanisms* are powerful online, and social networks offer opportunities for organizing collective action against wrongdoers. However, research shows that *social networks* only support contract enforcement with rather symmetric trader importance and small trader numbers (Greif 1994; Dixit 2003b). Too many unknown potential cloud users exist for effective joint boycotts against defecting CSPs. While digital technologies theoretically enable decentralized governance, Hammerschmid et al. (2023) find that national digitalization strategies often reinforce traditional administrative structures rather than shifting toward the purely collaborative network governance predicted by early institutional theories. Hence, *social networks* cannot effectively deter defection by CSPs. *Bilateral interaction* is even less effective.

Information intermediaries offer a better organized version of social networks. Many of them exist online, for instance, in the form of online feedback systems, but empirical evidence has shown that they are largely unreliable, can be easily gamed, and never reach all users needed (Dellarocas and Wood 2008; Cabral and Hortacsu 2010).

Concentrating on the three right institutions in Figure 3, it is apparent that *criminal organizations* are ineffective because cloud computing's global character creates information problems rather than enforcement problems, which criminal organizations could potentially solve effectively. Hence, the Mafia is no solution here.

Public ordering institutions also face problems on this market: multinational providers can escape national regulators quickly. The dynamic, innovative cloud computing industry challenges procedure-based public authorities to quickly create and adjust appropriate rules reflecting technological development. Additionally, ministries often handle both data protection *and* public safety questions, creating the potential for political "compromises" favoring security over privacy.[19] It follows that public ordering offers no effective solution for this governance problem, either.

4.1.3 | Candidate Solution: Arbitration Associations

This leaves *arbitration associations*, combining private information collection and case investigation with centralized organizations relying on members' coordinated boycotts of convicted defectors. In cloud computing, the specific arbitration associations could be *certification agencies* providing *quality labels* as credible proof of CSP's privacy-protection standards.

However, Edelman (2011) shows websites with "trust" labels are *more* likely to behave untrustworthily than uncertified sites. Classical certification agencies replace CSPs' credibility problems with certifiers' credibility problems: How to ensure *certifiers* aren't captured and lack incentives to misreport audit findings?

Economic theory addresses this question. Strausz (2005) and Mathis et al. (2009) show profit-maximizing certification agencies' reputation concerns can mitigate shirking incentives. If caught issuing false certificates, certifiers lose all future business. Therefore, as long as the certification business offers higher profits than alternatives, certifiers are incentivized to cooperate and truthfully award certificates only to sufficiently secure CSPs.

This governance scheme's practical problem is its dependence on quick, cheap, reliable information transmission about certifier behavior to all industry participants. These requirements aren't fulfilled in global industries with heterogeneous, decentralized users lacking expert IT knowledge to judge certificate reliability.

Fortunately, practically existing schemes inspire hope. The problem of the theory models is that they assume *one-layered* certification processes, where users and providers play central transactions while profit-maximizing certifiers run auxiliary transactions. In practice, *two-layered* certification is frequent, where certifiers are checked by certifiers of certifiers.

This insight starts Prüfer's (2018) model showing that a two-layered certification scheme can solve underutilized cloud services by focusing on the contract enforcement problems, where the central transaction is played between a CSP selling cloud services of certain privacy protection to users, who are willing, in equilibrium, to pay a premium for the high service quality. This is achieved through an appropriate auxiliary transaction around a so-called *cloud association*: a private, international, nonprofit club of cloud service providers, who share control over the certification protocol with user representatives and source certification of CSPs out to for-profit certifiers who, in turn, depend on a license of the cloud association for future business.

The key is to incentivize users receiving low-quality services from certified CSPs to complain directly to user representatives on the cloud association's board through easy-to-use complaints mechanisms and promises of free high-quality substitute services (followed by case-by-case investigations). This mechanism ensures that licensed auditors know a false certificate issuance will be revealed, costing them future

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profits. Knowing auditors won't shirk, CSPs have no incentive to apply for certificates when producing low-quality services. Summarizing, the result shows that a specific private ordering institution can avoid market breakdown in a dynamic, global industry and support market growth. The scheme's effectiveness depends on a careful composition of its organizational and institutional features.

4.2 | Implementing Regulation of Big Tech: Data Sharing

This case involves all three dimensions of economic governance: a *contract enforcement* problem between data senders and data receivers (will each party comply with data-sharing obligations?); a *collective action* dimension at the market level (shared data enables innovation incentives that benefit all market participants, with individual platforms tempted to free-ride); and a *property rights* dimension regarding ownership of and access to user-generated data.

4.2.1 | The Theory of Harm on Data-Driven Markets

This section's background is Graef and Prüfer (2021), studying effective and efficient implementation of legal data-sharing provisions on data-driven markets as prescribed in the EU's Digital Markets Act, Art. 6(10, 11). The economic rationale for mandatory data sharing is developed by Prüfer and Schottmüller (2021), focusing on *user information*: data about individual user preferences and characteristics stored automatically and virtually free on digital markets. A *data-driven market* is defined as a market where a firm's marginal costs of innovation decrease in a provider's amount of user information, that is, if it is subject to specific feedback effects (*data-driven indirect network effects*). Prüfer and Schottmüller (2021) show in a dynamic game-theoretic model that user information almost surely leads to market tipping (monopolization) on data-driven markets.

The problem is that tipped data-driven markets with one dominant firm and potentially few small niche players feature low innovation incentives for both dominant firms and challengers. Smaller firms, even with superior ideas/technologies, face higher marginal innovation costs lacking access to large user information piles available to dominant firms through significantly larger user bases. If smaller firms heavily invest in innovation and roll out high-quality products, dominant firms can imitate quickly at lower innovation costs and regain quality leads. Smaller firms find themselves again in runner-up spots with few users and low revenues while paying large innovation attempt costs. Foreseeing this, entrepreneurs and financiers won't invest in smaller firm innovation. Dominant firms, knowing about deterring disincentives for competitors, are protected by large, constantly renewed user information streams and can rest on lower innovative efforts. These low innovation rates constitute Prüfer and Schottmüller's theory of harm.

To remedy market tipping and low innovation rates, Prüfer and Schottmüller (2021) study the consequences of regulatory intervention: requiring the sharing of anonymized data about user preferences and characteristics among competitors. They show that such policy interventions could mitigate market tipping and have positive net innovation and welfare effects if data-driven indirect network effects are sufficiently strong. The results are confirmed empirically by Klein et al. (2025) for the search engine market.

4.2.2 | The Economic Governance Problem on Data-Driven Markets

The economic governance framework from Section 3 can be applied to identify the efficient institution for implementing mandatory data sharing. Assuming data-sharing obligations exist, the two credibility problems in the central transaction are: (i) whether data senders comply with obligations; (ii) whether data receivers use incoming data appropriately, offering and improving services for end users while respecting privacy protection. Compliance means *cooperation*; otherwise, parties *defect*.

Economic governance institutions must identify in auxiliary transactions (i) whether players cooperated or defected (adjudication) and (ii) who takes which punishment actions for defection (enforcement). Starting left in Figure 3, data-driven market transactions rarely occur between close-knit community or family members. Most interactions occur via computers, often supported by bots and software programs, making transactions impersonal. These characteristics rule out the effectiveness of *internal value systems*.

Moving right, the reliance on ostracism, connecting *bilateral interaction*, *social networks*, and *associations*, strongly deteriorates their usefulness for mandatory data sharing. The problem is that a dominant firm hates data sharing with competitors because it diminishes its data advantages and lowers marginal innovation costs, making markets more competitive and hence decreases the dominant firm's profits. Dominant firms also lack interest in long-term relationships with data receivers (competitors). Hence, no substantive incentive exists to enforce cooperation by competitors threatening to stop delivering data for privacy breaches because this requires costly monitoring and may infringe competition law. Hence, ostracism-relying institutions offer no solutions.

The remaining three institutions enforce rules via coercion threats. *Criminal organizations* are unsuitable here (again) because they maximize private objectives (profit/power), whereas our goal is identifying solutions maximizing consumer welfare and innovation. These considerations suggest the solution lies in the realm of *public ordering*. The combination of presumed consumer-welfare maximization objectives with state enforcement powers is critical for expecting rule adherence. This leaves *regulators* and *generalist courts*.

Generalist courts are bound by strict laws and staffed by judges with extensive legal knowledge. Their main advantage is institutional independence and impartiality. However, the main challenge on data-driven markets is not judicial bias but the enforcement of a technologically complex rule (mandating the sharing of specific data in specific ways), which requires specialized industry knowledge and community embeddedness that generalist courts lack by design.

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4.2.3 | Candidate Solution

Regulators improve on these shortcomings of generalist courts. They operate with flexible decision-making rules and are often staffed by multidisciplinary experts (lawyers, economists, data scientists). Regulators are embedded in expert communities, implying better industry understanding than generalist judges and more information via informal channels from greater source varieties. Consequently, the probability of committing decision errors is lower among regulators than among generalist courts.

Regulators' main disadvantage is community-embedding accompanied by higher influence or "capture" likelihood. However, this problem can be minimized via specific *organizational governance* structures detailing which players take over three key mandatory data sharing enforcement tasks: investigation, decision making, and enforcement. Evaluating all trade-offs, we find that *regulators* are the best available institution for solving economic governance problems regarding mandatory data sharing on data-driven markets. Crucially, this insight is not an assumption, as in many legal and economic papers immediately assigning market intervenor roles to regulators or competition authorities. It is a result.

4.3 | Operationalizing the Framework

Generalizing the two examples presented in the previous subsections, the typology is not only theoretically grounded but also *empirically testable* and *practically actionable*.

4.3.1 | Empirical Operationalization (Exemplary)

The framework generates falsifiable hypotheses about institutional effectiveness and efficiency. For the sake of the argument, consider the following as ad hoc example:

Hypothesis: In high-social-capital environments, internal value systems and social networks will be more effective than regulators for contract enforcement. Hence, intervention by public ordering is less needed (and should be avoided, on efficiency grounds). *Test:* Compare compliance rates in regions with varying social capital (e.g., using World Values Survey trust indices) for similar governance problems (e.g., tax evasion, environmental regulations). *Preliminary evidence:* Depoorter and Marx (2024) apply this logic to voluntary sustainability standards, finding that enforcement mechanisms and capacity-building attributes critically affect compliance.

Researchers can use the typology to: (i) classify existing institutions across cases using the eight categories in Figure 3; (ii) predict compliance outcomes based on institutional fit with problem characteristics; and (iii) test predictions using cross-sectional or panel data.

4.3.2 | Practical Application of the Three-Step Protocol

To illustrate the framework's actionability, here we sketch the application of the three-step protocol to the problem of *mandatory data sharing on data-driven markets*. Table 2 presents the same material as Section 4.2 in compressed fashion through the lens of the framework and, hence, shows how it can be used to restructure a governance problem.

4.3.3 | Matching Problems to Institutions

Finally, as a non-definitive guide to helping practitioners, Table 3 offers a match of often effective governance institutions based on problem characteristics.

5 | Conclusion

The theory of institutional design, centered around the typology of economic governance institutions explained in Section 3, offers a comprehensive and consistent toolkit for addressing economic governance problems. Its dual contributions are (i) *academic* (providing the first complete, micro-founded synthesis of all enforcement institutions, enabling scholars to derive precise institutional recommendations from their models); and (ii) *practical* (offering a three-step protocol for policymakers

TABLE 2 | Applying the three-step protocol to mandatory data sharing.

Steps	Actions	Framework application and results
1. Identify central transaction	Define players, cooperation, defection	*Players:* Data holders (firms) versus regulators. *Cooperation:* Sharing data as required. *Defection:* Withholding data.
2. Apply typology	Evaluate each institution in Figure 3	*Internal Value Systems:* Ineffective (firms prioritize profits). *Bilateral Repeated Interaction:* Limited (oligopolistic markets reduce repeated interactions). *Social Networks:* Ineffective (diffuse responsibility). *Arbitration:* Partial (requires credible threats). *Courts:* Effective but costly. *Regulators:* Most efficient (combines authority, treasure, and organization; minimizes capture risk via organizational design).
3. Design organizational governance	Assign roles (investigation, decision, enforcement)	*Investigation:* Regulator audits. *Decision:* Independent panel. *Enforcement:* Fines + reputational sanctions.

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TABLE 3 | Institution selection by problem characteristics.

Problem characteristics	Recommended institutions	Rationale
Small, homogeneous groups	Internal value systems, bilateral repeated interaction, maybe social networks	Low monitoring costs, high social capital
Large, anonymous societies	Regulators, courts	Need for coercive power, scalability
High-stakes, global scale	Arbitration (with exit costs), regulators	Credible threats, enforcement capacity
Path-dependent contexts	Hybrid (e.g., Regulators + Social Networks)	Leverage existing institutions while addressing gaps

and practitioners to identify effective and efficient solutions). This includes rules that policymakers or other officials from the public or business spheres wish to implement, as well as private rules, starting from within-family behavior via conduct in online environments to the organization of clubs and international political treaties. Thereby, it offers a unified framework to address governance issues in society, politics, and the economy.

The theory entails that economic governance problems can be solved in a simple, three-step procedure. First, identify the central transaction, including the players and which real-world behavior constitutes *cooperation* or *defection*, respectively. Second, apply the economic governance typology as explained in Section 3 to structure the auxiliary transaction and identify effective institutions and the efficient institution. Third, design an organizational governance structure, potentially but not necessarily by means of a game-theoretic model, which makes sure all players identified in both transactions are incentivized to cooperate.

Returning to the introductory example: a policymaker tasked with increasing tax compliance now has a structured procedure at hand. Step 1 identifies the central transaction (citizens vs. the state, cooperation = paying taxes, defection = tax evasion). Step 2 endogenizes the economic governance institution and applies the typology: internal value systems are effective only among high-trust, civic-minded populations; bilateral repeated interaction and social networks can complement hard enforcement in small communities; public courts and regulators provide the backbone in large anonymous societies with rule of law. Step 3 designs the organizational implementation, for instance, combining a credible audit threat (by a regulator or a court) with information campaigns invoking social norms or nudging internal value systems, as Option 3 in the introduction suggested.

This procedure should be helpful both for policy makers and public administrators (just as many researchers in law, public administration, political science, and economics), who all too often only consider the tools of public ordering and dismiss private ordering's enforcement capabilities (and that several types of private ordering exist). Endogenizing enforcement institutions and, beforehand, classification institutions can significantly broaden the available governance toolkit that decision makers have at hand to solve diverse social dilemmas.

The typology can be applied to most pressing societal problems. Think of *climate change*: Step 1 identifies cooperative emission reductions as the central transaction, with free-riding as defection. A tour de force through Step 2 then indicates that, given the global scale and heterogeneous discount rates of nation-states, neither bilateral interaction nor social networks are effective. Arbitration institutions such as international agreements with enforcement panels may be effective for sufficiently high stakes, but absent coercive backup enforcement the typology predicts they succeed only where exit costs, such as reputational and economic isolation, are high enough. This is consistent with the comparative effectiveness of Paris Agreement mechanisms versus the Kyoto Protocol.[20] Step 3 then concerns the design of organizational governance: allocating investigation, decision, and enforcement roles across international bodies (e.g., the UNFCCC secretariat aka "UN Climate Change"),[21] powerful states or blocs, and transnational civil society in a way that makes sanctions for noncompliance credible while maintaining sufficient political legitimacy for long-term cooperation.

Similarly, the framework can structure *governance of AI* development (who adjudicates and enforces transparency obligations?), *inequality* (how to enforce redistributive obligations across jurisdictions?), and the *resilience of democratic institutions against populist and autocratic co-optation of technology*. In each case, the three-step procedure channels analytical effort toward the enforcement institution that is both effective and efficient given the specific structural features of the problem.

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Data Availability Statement

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

Endnotes

[1] See Aristotle (1984).

[2] Imagine yourself as a governmental minister, a key legislator, or a high-ranking civil servant in a public agency.

[3] See Fukuyama (1995) or Putnam (2000) for classical works studying social capital.

[4] Some people prefer the terms *primary* and *secondary* transactions but here, for clarity, we stick with Greif's original terminology.

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[5] It is helpful to distinguish between contracted and residual control rights and between contracted and residual income rights (Hansmann 1996). "Residual" refers to all those rights that have not been contracted out to any other party and, hence, define ownership of an organization. Residual control rights tell us who can decide about how the organization's assets are used (Grossman and Hart 1986), whereas residual income rights tell us who gets the profits, potentially negative, that the organization produces after all other costs have been paid and all obligations have been honored.

[6] See Hadfield and Weingast (2012) for a description of governance in medieval Iceland, where adjudication rested with an assembly of citizens but enforcement was decentralized.

[7] https://plato.stanford.edu/entries/popper/#BasiStatFalsConv.

[8] There may be indirect or set-up costs necessary to build certain institutions, which are ignored here. For instance, instilling certain moral values in young people can be a long and expensive investment by parents and society at large (Tabellini 2008). Once installed, however, the instantaneous cost of using *Internal Value Systems* to obtain mutual cooperation is smaller than the alternatives'.

[9] In practice, some arbitration tribunals do have access to the coercive powers of public courts/the police to enforce their judgments, but those are de facto a mixed institution between a private arbitration tribunal and a public court and come with specific problems, as arbitration tribunals are subject to less scrutiny than public courts, for example, they usually lack appeals procedures. See Leeson (2008).

[10] Corruption and nepotism do exist in public organizations. Nevertheless, as compared to general social goals these forces seem to be secondary in democratic countries. See https://www.unodc.org/e4j/en/anti-corruption/module-3/key-issues/corruption-and-democracy.html.

[11] See Yackee (2024) for an illustrative empirical study showing how influencing occurs even within the public administration, where US governors and presidents strategically pick the heads of public agencies to foster their political goals. Rittberger et al. (2024) provide empirical support for the embeddedness paradox, showing how political principals manipulate institutional independence to balance the demand for technical competence with the risk of agency drift.

[12] For impressive numbers supporting this "embeddedness paradox" (expertise versus capture) see https://wien.arbeiterkammer.at/service/broschueren/Lobbying_in_Brussels_2019_3.pdf or https://www.citizen.org/wp-content/uploads/ftc-big-tech-revolving-door-conflicts-report.pdf.

[13] Verifiability is a characteristic of a transaction, where a third party, such as a court, could verify ex post who cooperated and who defected. Verifiability is required to get *contractibility*: a situation where the players can write a meaningful contract about everybody's rights and obligations ex ante because they know that a victim would be able to prove to a court that they cooperated and the other player defected ex post. By contrast, observability is a characteristic of a transaction, where it is sufficient that the players know who played what, without the necessity of being able to prove it to a third party.

[14] Masten and Prüfer (2014) show that and why courts are also not used in equilibrium, even if available, if the value in the central transaction is too low compared to the costs of using the court system. Leijon and Moberg (2024) illustrate how the specific institutional design of administrative review mechanisms determines their effectiveness in limiting bureaucratic discretion.

[15] A recent example illustrating this truth perfectly is the case of Jack Ma, the founder of China's big tech firm Alibaba, who criticized Chinese authorities in public on October 2, 2020, being one of the richest individuals in the country. He quickly disappeared, only to apologize several weeks later for his earlier statements at his next public appearance. In January 2023, Ant Group, which Ma had founded, reported that he would relinquish control and see his voting rights shrink from above 50% to 6.2% (Financial Times, "Jack Ma cedes control of Ant Group," January 7, 2023).

[16] Collective action problems are related to but different from *coordination problems*. In the language of game theory, a collective action problem has a Prisoner's Dilemma structure (see Section 2.2 for the formalization), which implies it only has *one* Nash equilibrium in a one-shot game: (*Defect, Defect*). A coordination game, by contrast, has *two* pure-strategy Nash equilibria, where one dominates the other one but players may be stuck in a bad equilibrium. Therefore, it is easier to create good economic governance in a coordination game than in a collective action problem. See Ellingsen (2024) for details and discussion.

[17] More generally, any decision maker seeking rule compliance can use the typology, including company executives, sports club managers, and parents.

[18] https://www.statista.com/statistics/1313892/end-user-spending-forecast-of-public-it-cloud-services-worldwide/.

[19] Think of current political debates contrasting "growth and innovation" arguments with proper procedure, for example, in antitrust enforcement or technology regulation (https://www.ft.com/content/d6cd798d-b9d6-474a-9153-0d13ecffe591).

[20] Compared with the Kyoto Protocol's top-down approach focusing on developed countries' emissions, which led to limited participation and effectiveness, the Paris Agreement's universal, bottom-up nationally determined contributions combined with regular review and transparency requirements have generated broader participation and stronger, though still insufficient, implementation. See https://www.cfr.org/backgrounders/paris-global-climate-change-agreements.

[21] https://unfccc.int/about-us/about-the-secretariat.

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