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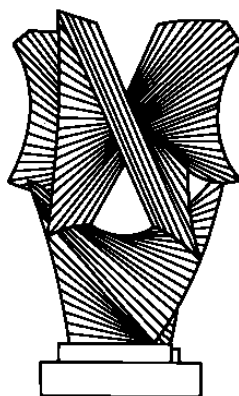
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The Paradox of Spontaneous Formation of Private Legal Systems

Amitai Aviram*

Scholarship on private legal systems (PLS) explains the evolution of norms created and enforced by PLSs, but rarely addresses the evolution of institutions that form PLSs. Such institutions are assumed to form spontaneously (unless suppressed by law) when law is either unresponsive or incapable of directing behavior in welfare-maximizing manners.

But, as this paper demonstrates, PLSs typically cannot form spontaneously. Newly formed PLSs cannot enforce cooperation since the effectiveness of mechanisms used to secure this cooperation (e.g., the threat of exclusion) depends on the PLS's ability to confer benefits to its members, and newly formed PLSs do not yet confer such benefits.

Successful PLSs bypass this barrier by building on extant foundations—preexisting institutions that already benefit members, typically through functions requiring less costly enforcement. The threat of losing preexisting benefits disciplines members to abide by the PLSs' rules, which in turn allows the PLSs to regulate behavior. This pattern indicates that rather than developing spontaneously, PLSs develop in phases, initially facilitating activities that are unrelated to regulating behavior and incur lower enforcement costs, the provision of which enables the PLS to regulate behavior in the second stage. The paper suggests normative applications of this observation in the fields of antitrust, critical infrastructure protection and corporate governance.

I. Introduction: Pax Dei as a Parable

Life in Western Europe of the late Tenth Century was, for most people, dismal and unsafe. The decline of the Carolingian Empire created a political vacuum and intensified decentralizing forces that had plagued the Empire from its inception. Throughout the region, independent warlords consolidated power through private warfare, unhindered by the ineffective central government.¹ Peasants were among the

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¹ On the Pax Dei movement and conditions in Western Europe at the time of the movement's birth, see: Thomas F. Head & Richard A. Landes (eds.), *The Peace of God: Social Violence and Religious Response Around the Year 1000* (Ithaca, NY: Cornell University Press, 1992); also see: *Peace of God: Pax Dei*, available at: <http://www.mille.org/people/rlpages/paxdei.html>.

main victims of this warfare, since breaching a fortified stronghold was far more difficult than starving it out by destroying the surrounding fields.

Mutual destruction of farms was an unattractive result even to a heartless warlord, but it was the most logical action for each of them: if the warlord's rival was expected to show mercy on the warlord's peasants, then attacking the rival's peasants would bring quick and decisive victory. And if the rival would show no mercy, then certainly the warlord's only chance was to preemptively strike the rival's peasants.

In some similar situations, this gloomy outcome could be averted either through intervention by a third party capable of enforcing its will on the opposing parties, or through self-restraint driven by a desire to create a reputation of fairness, foreseeing the benefit such a reputation can yield in future encounters with the same rival or with others who have learned of the magnanimous party's reputation. But in West Frankland of the Tenth Century, central government was too weak to assume the role of the third party enforcer, and reputation was of little use, since a warlord whose mercifulness was taken advantage of, even just once, would likely die, precluding any future benefit from the benevolent reputation.

The bleak dynamic of mutual destruction was stopped, however, by a unique institution that surfaced in response to the situation: Pax Dei (Latin for 'Peace of God')—one of the world's first decentralized, popular peace movements. The movement formed rules regulating warfare—prohibiting a combatant from harming non-combatants, suspending warfare during the harvest season and during times of religious significance (e.g., during Lent and the Sabbath), etc.

These rules were not promulgated by a king or parliament. Rather, they were voluntarily undertaken by the warlords, who swore an oath to abide by the rules in the presence of large crowds of commoners. These crowds gathered around saints' relics, on which the warlords typically swore their commitments. The enthusiasm and religious fervor driving this movement were great. A chronicler of that time, Ralph (Raoul) Glaber describes one such gathering: "At this all were inflamed with such ardour that through the hands of their bishops they raised the pastoral staff to heaven, while themselves with outspread palms and with one voice cried to God: Peace, peace, peace! -that this might be

a sign of perpetual covenant for that which they had promised between themselves and God.”²

Though voluntary, the warlords’ participation was not necessarily desired by them. Some, perhaps, would willingly refrain from destruction if assured that their rivals would. Other, more ambitious warlords were driven to participate by fear of crossing both the large, enthusiastic crowds and divine will. Unlike governmental decree, the oaths were not enforced by a force stronger than the violating warlords. In this fragmented region, such a force did not exist. Rather, violations of the oath were punished by social and religious ostracism.

The Pax Dei movement provides a colorful example of the formation of a private legal system (also known as ‘private ordering’)³—a non-governmental institution intended to regulate the behavior of its members.⁴ It also offers a good starting point to examine how private legal systems evolve. Pax Dei formed around a religious, mystical social network that centered on the belief that the peace oaths were a covenant with God. Why did it require the aid of religion, rather than spontaneously form among the people in response to a need for order to which government could not respond?⁵ Is there a

² Ralph Glaber, *Miracles de Saint-Benoit*, available at: <http://www.fordham.edu/halsall/source/glaber-1000.html>.

³ This paper regards as ‘private legal systems’ not only complex systems that bear resemblance to legal codes (e.g., the Law Merchant), but also more minimal institutions with less elaborately formulated rules, such as those causing most of us to stand in a queue, to be polite to strangers, etc.

⁴ Though usually discernable, the dichotomy between public and private legal systems is not always a clear one. Some private legal systems have a significant public backing and are very similar to public legal systems. For example, the King of England enacted in 1353 the “Statute of the Staple”, which prohibited Common Law courts from hearing disputes arising from contracts made on the staple markets (markets for important commodities, such as wool). Instead, the statute created Staple Courts and instructed them to apply the (privately formed) law merchant. Thus, private law was given exclusive jurisdiction by public decree. See Todd J. Zywicki, *The Rise and Fall of Efficiency in the Common Law: A Supply-Side Analysis*, __ Northwestern L. Rev. __ (forthcoming 2003), at part III.B.1.b.iii.

Conversely, some public legal forums defer to private ordering (e.g., arbitration proceedings), and some public legal forums compete with other legal fora, and thus act more like private legal systems. For example, the Common Law developed in England from the rulings of judges of the Court of King’s Bench. For centuries this court had competed with several other royal courts (notably the Court of the Exchequer and the Court of Common Pleas), the ecclesiastical courts, town and feudal courts, and merchant courts. *Id.*, at part III.B.1.a. Though the courts had, in theory, limits to their jurisdictions, they each used legal fictions to expand their reach. *Id.* As Adam Smith noted, this led to improved quality and impartiality of judicial decisions. Adam Smith, *An Inquiry Into the Nature and Causes of The Wealth of Nations*, at Book V, Chapter 1, part 22, p. 241-242.

⁵ For example, the peasants could collectively pay the warlords to spare them, or better yet—intimidate the warlords by threatening that an attack on any peasant would result in violent retaliation by all peasants, who though less well armed and trained, were large enough in number to overwhelm the warlord’s companions. This would require coordination between the peasants, but so did Pax Dei.

pattern that can help us predict what institutions would undertake to regulate behavior and facilitate private legal systems?

The private ordering literature examines the institutions facilitating a private legal system (at a point in which the system has fully evolved), and tracks the evolution of rules that are created and enforced by the private legal system,⁶ but the literature pays scant attention to how the institutions themselves evolved to become a private legal system. Perhaps drawing on Ronald Coase's theorem and assuming negligible transaction costs,⁷ and perhaps expanding on Friedrich Hayek's theory of spontaneous order,⁸ most of the literature treats private legal systems as spontaneous creations that sprout in response to a governance need unfulfilled by government. Even the private ordering literature that explicitly addresses the existence of high transaction costs focuses, with rare exception, not on the effects of these costs on the evolution of institutions, but on what institutions eventually evolved.⁹

This paper attempts to contribute to filling the gap, by suggesting a theory on how (and which) institutions evolve into private legal systems by undertaking the function of regulating behavior.¹⁰ *Private legal systems typically do not form spontaneously, but build on existing institutional infrastructure—networks*¹¹ that have existing functions

⁶ See, e.g.: Lisa Bernstein, *Opting Out of the Legal System: Extralegal Contractual Relations in the Diamond Industry*, 21 J. Legal Stud. 115 (1992); Karen Clay, *Trade Without Law: Private-Order Institutions in Mexican California*, 13 J.L. Econ. & Org. 202 (1997); Robert C. Ellickson, *A Hypothesis of Wealth-Maximizing Norms: Evidence from the Whaling Industry*, 5 J.L. Econ. & Org. 83 (1989); Robert C. Ellickson, *Order Without Law: How Neighbors Settle Disputes* (Cambridge, Mass: Harvard University Press, 1991); Avner Greif, *Contract Enforceability and Economic Institutions in Early Trade: The Maghribi Traders' Coalition*, 83 Am. Econ. Rev. 525 (1993); Curtis J. Milhaupt & Mark D. West, *The Dark Side of Private Ordering: An Institutional and Empirical Analysis of Organized Crime*, 67 U. Chi. L. Rev. 41 (2000); David G. Oedel, *Private Interbank Discipline*, 16 Harv. J. L. & Pub. Pol'y 327 (1993).

⁷ On Coase's theorem and its relation to private legal systems see discussion *infra*, in Section II.1 of this paper.

⁸ See Friedrich A. Hayek, *Law, Legislation & Liberty* (University of Chicago Press, Vol. 1, 1973; Vol. 2, 1976; Vol. 3, 1979).

⁹ See, e.g., Robert C. Ellickson, *Of Coase and Cattle: Dispute Resolution among Neighbors in Shasta County*, 38 Stan. L. Rev. 623 (1986); Robert C. Ellickson & Charles D. Thorland, *Ancient Land Law: Mesopotamia, Egypt, Israel*, 71 Chi.-Kent L. Rev. 321, 324-327 (1995). The exception is: Avner Greif, Paul Milgrom & Barry R. Weingast, *Coordination, Commitment, and Enforcement: The Case of the Merchant Guild*, 102 J. Pol. Econ. 745 (1994). This paper discusses the evolution of a specific institution of that became a private legal system—the merchant guild. This paper's contribution will be discussed *infra*, especially in Section II.2.

¹⁰ A 'function' is a service the network provides its members. For example: social interaction; spiritual support; facilities to exchange goods; regulation of members' behavior, etc.

¹¹ 'Networks' are institutions that facilitate interconnection between users of a good or service exhibiting network effects, and thus enable the realization of the network effects. Network effects (or network

other than regulating behavior. Private legal systems lacking existing functionality *cannot* operate effectively (except in rare situations of very low enforcement costs), because of a ‘chicken and egg’-type of paradox, which this paper calls the paradox of spontaneous formation: to efficiently direct behavior they must ensure the cooperation of their members, but the effectiveness of the mechanisms used to secure this cooperation (e.g., the threat of exclusion) depends on the ability to confer benefits to the members—primarily the ability (not yet existing for a spontaneously formed private legal system) to efficiently direct behavior.

This problem may, in theory, be solved through a bonding mechanism that assures the members of the spontaneous private legal system (i.e., a newly formed system not based on a preexisting network)¹² of their mutual abidance to the rules. But, as will be explained below, bonding of this sort is very expensive, often outweighing the benefits conferred by the private legal system and at the very least making the spontaneous formation of a private legal system more costly, and therefore less attractive, than evolving an existing network into a private legal system by having it regulate the behavior of members it had served in other ways hitherto.

To illustrate, let us consider an alternative private legal system that could have formed instead of Pax Dei. The peasants in a region could have convened and agreed to pool their forces and intimidate the warlords into undertaking oaths restricting warfare. This would certainly benefit all the peasants. However, each peasant would know that if he supported this movement while others shirked, the movement would fail and he would be punished for his participation. At this point, the incipient collaboration has no effect on the warlords (as it had yet to act), and may or may not succeed. Given the risk of

benefits) are demand-side economies of scale. That is, the phenomena that the utility to a user of a good or service increases as additional people use it. Often (though not always) realization of network effects requires interconnection between the users through a network. Networks are often well-suited to regulate behavior, because they are efficient in employing certain enforcement mechanisms. See Amitai Aviram, *Regulation by Networks*, 2003 BYU Law Review ___ (forthcoming 2003), working paper version available at: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=387960.

¹² The term ‘spontaneously formed’ private legal system is used, rather than ‘new’ private legal system, because an existing network that has hitherto provided a low enforcement cost function (e.g., social interaction) and has now evolved to provide another, higher enforcement cost function (e.g., restriction of warfare) would be a ‘new’ private legal system in respect to regulating the latter function. However, the preexisting functionality is an important difference in the system’s ability to regulate, and therefore a term is needed to distinguish between a completely new (‘spontaneously formed’) system and an existing system that has now begun to regulate a new function.

joining a failed movement, each of the peasants is expected to shirk. They might try to form some bonding mechanism to ensure each other of the others' participation. If the movement only required the collaboration of a handful of people, perhaps each could offer collateral to assure of his participation. This is prohibitively expensive when the collaboration requires the participation of hundreds if not thousands of impoverished peasants. But even if the cost of these bonds did not outweigh the benefit from the collaboration, it is certainly more expensive than the alternative—evolving an existing, religious social network into a private legal system by adding to its existing functions the regulation of behavior regarding warfare.

Consider the system that actually evolved: The Christian social network in Western Europe of that era provided its members with significant spiritual benefits—a sense of belonging to a community, a sense of security derived from belief in divine oversight, etc. Any person reneging on what was perceived to be a covenant with God would be excommunicated, losing the benefits religion provided. The ability to threaten exclusion from the religious group thus facilitated the cooperation of even those members of the group who personally believed that breaking the peace oaths would not incur divine wrath (as long as they did anticipate that the group will exclude them for breaking the oaths).

This paper explores the effect of the existing functionality of a network on its ability to evolve into a private legal system. Differences in characteristics of existing functions significantly affect the cost of regulating behavior. Key characteristics that affect enforcement costs are the utility conferred by the network to the members (i.e., the importance of the network's preexisting functions to the members), the degree of divergence in this utility among members, and the function's "game type" (e.g., Prisoners' Dilemma, Chicken, Battle of the Sexes, Stag Hunt, etc.)—that is, members' ranking of preferences between mutual contribution to the function, mutual defection from the function, contribution to the function while others defect, or defecting from contribution while others contribute. "Game types" will be explained in detail, below.¹³

Since policing cartel agreements is a form of regulating behavior (though in a specific, narrow scope of activity), many of the criteria that increase a network's ability

¹³ Each of these games will be explained *infra*, in Section III.

to regulate behavior have been examined in the antitrust scholarship, as criteria that make cartels more stable.¹⁴ The “game type” criteria, however, has not been examined by this scholarship, since cartel enforcement is almost always of the Prisoners’ Dilemma type. This neglected aspect will be emphasized in the paper.¹⁵

The rest of the paper will introduce a method for analysis of the evolution of private legal systems and apply these analytical tools on prominent case studies in the private ordering literature. Section II will introduce the theory of how private legal systems evolve. It will show the flaws in the extant literature’s implied assumption that private legal systems form spontaneously.¹⁶ It will then explain, assisted by a model created by Greif, Milgrom and Weingast,¹⁷ why decentralized bonding is unlikely to assure the members of the private legal system sufficiently to ensure an efficient level of behavior regulation by the system.¹⁸ Then it will examine the role of existing functions of a network in lowering its costs of enforcing a private legal system, and suggest the criteria that determine which of several existing networks has the lowest enforcement costs (and therefore is likely to evolve into a private legal system).¹⁹

After discussing these criteria, the paper will focus in Section III on one key criterion—the ‘game type’ of the preexisting function. A taxonomy of relevant game types (Prisoners’ Dilemma, Meeting Place, Battle of the Sexes, etc.) will be offered. These tools will be applied in Section IV, which will revisit leading case studies in the literature on private legal systems, and will note the pattern of each system’s evolution, to the extent it can be gathered from those studies.

¹⁴ See: George J. Stigler, *A Theory of Oligopoly*, 72 J. Pol. Econ. 44 (1964); Andrew R. Dick, *When Are Cartels Stable Contracts?*, 39 J. L. & Econ. 241 (1996).

¹⁵ Some of the private ordering literature has made use of game theoretic tools. However, they examined the game type of the regulated activity, not that of the preexisting function. For example, Ellickson examined a game type he termed “specialized labor”, which would fit the payoff structure of two people having to decide whether to participate in building a fence, or shirking from this duty. See Ellickson (1991), *supra* note 6, at pp. 162-164. Ensuring an efficient participation in building a fence is among the behaviors the private legal system (in Ellickson’s case, the regional social network in Shasta County) attempts to regulate, not the preexisting functions it provided before regulating behavior (like a sense of community). The evolutionary process of private legal systems depends more on the game type of the latter, however. Typically, providing a sense of community is a Meeting Place game. See *infra*, Section III.2.

¹⁶ *Infra*, in Section II.1.

¹⁷ Greif, Milgrom & Weingast, *supra* note 9, at pp. 751-752, 762-766.

¹⁸ *Infra*, in Section II.2.

¹⁹ *Infra*, in Section II.3.

This literature—Ellickson’s studies of Cattle Trespass,²⁰ Bernstein’s examination of exchanges and trade associations,²¹ Greif’s²² and Clay’s²³ analysis of merchant coalitions, and other works—offer a rich variety of private legal systems, evolving from networks that follow different characteristics and in particular different game types. The methodology described earlier in the paper will assist in evaluating why in each case that specific network had been the lowest cost enforcer and therefore had evolved into a private legal system.

Besides shedding light on an aspect often neglected in the private ordering literature, the paper provides a foundation for some normative analysis. This, as well as a summary of the arguments advanced in this paper, will be set forth in conclusion of the paper, in Section V.

II. A Theory on the Evolution of Private Legal Systems’ Institutions

A. The Paradox of Spontaneous Formation

Nobel laureate Ronald Coase anticipated a significant role for private legal systems. In a world with no transaction costs, states one form of the Coase theorem, inefficient entitlements granted by law would be renegotiated to efficiently allocate entitlements.²⁴ For example, suppose that tort law imposes liability on a rancher whose cattle trespasses into a farmer’s land. In some regions, this rule may be inefficient, perhaps because there are many ranchers and very few farmers, so it is cheaper to fence out the farms and have the cattle roam freely in the pasture, than fence in the cattle.²⁵ If transaction costs are negligible, having this inefficient rule will not result in an inefficient outcome. Instead, the ranchers would agree with the farmers to pay the farmers to fence themselves out, and then the ranchers would let the cattle freely roam. This is feasible, since the cost for the ranchers to comply with the rule and fence their cattle in would be greater than the cost of fencing the farms in (this is why the rule is inefficient). As a

²⁰ Ellickson (1991), *supra* note 6; Ellickson, *supra* note 9.

²¹ Bernstein, *supra* note 6; Lisa Bernstein, *Private Commercial Law in the Cotton Industry: Creating Cooperation Through Rules, Norms, and Institutions*, 99 Mich. L. Rev. 1724 (2001).

²² Greif, *supra* note 6.

²³ Clay, *supra* note 6.

²⁴ Ronald Coase, *The Problem of Social Cost*, 3 J. L. & Econ. 1 (1960).

²⁵ Private ordering of liability for cattle trespass is a central issue in Ellickson (1991), *supra* note 6, and in Ellickson, *supra* note 9.

result, the ranchers would be happy to bear the lesser cost of fencing out the farmers, plus a small premium to get the farmers' consent. The farmers, on the other hand, would agree to opt into the private regime in return for this small consent premium, since the private regime does not increase their exposure to trespass risk (under the public (legal) regime, they would be compensated through tort law for the trespass; under the private regime they would be fenced out, preventing the trespass).

In other words, in a world with no transaction costs private legal systems will form spontaneously, through ad hoc contracting. Of course, no such world exists. There are costs to identifying what is the efficient regime and negotiating its terms with all stakeholders. When there are many ranchers and many farmers, there might be free riding or hold out problems, or other forms of strategic (or irrational) behavior that could prevent an efficient bargain from being reached. And of course, there are enforcement problems, that become acute when parties perform their part of the bargain non-simultaneously, or if law (i.e., the public regime) does not recognize the private regime and allows parties to sue and receive their entitlements under law at any time, even if they purported to contract those away.

Scholars have recognized long ago that institutions form to reduce these transaction costs. Some institutions solve collective action problems by appointing an agent (e.g., a trade association) to act on their collective behalf (thus coordinating their actions);²⁶ other institutions ensure the enforceability of the private regime (e.g., through mandatory arbitration);²⁷ and others still cure or mitigate additional causes of transaction costs.

No institution reduces transaction costs to zero. However, the lower the transaction costs, the closer the parties get to the efficient allocation of entitlements. The institutions that reduce transaction costs the most are usually adopted. Therefore, the prevalent institutions are likely to be ones that reduce transaction costs in devising, negotiating and enforcing private regimes.

²⁶ See, e.g., Avner Greif, *Reputation and Coalitions in Medieval Trade: Evidence on the Maghribi Traders*, 49 J. Econ. Hist. 857 (1989). For an expanded discussion of institutions facilitating collective actions see: Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge University Press, 1990).

²⁷ See, e.g., Bernstein, *supra* note 6, at pp. 124-130, 132-135, 148-151, 153-157 (discussing the use of arbitration among diamond dealers to enforce their private legal system).

Networks are very often the most efficient private regulators.²⁸ Utilization of network effects empowers four mechanisms, which are frequently more effective than government or bilateral arrangements in mitigating opportunistic behavior. The first of these mechanisms is the information mechanism—collecting & disseminating information on the credibility of member firms. This mechanism, which facilitates the development of reputation capital, is more powerful when used by a network, due to the lower monitoring costs by a network of its members, the economies of scale in gathering and verifying the information, and the credibility of the network as a provider of negative information on its members. The private ordering literature frequently discusses manifestations of this mechanism, and in most cases these mechanisms are employed by networks (e.g., reputation conveying mechanisms in merchant coalitions described in Greif's²⁹ and Clay's³⁰ papers; gossip among neighbors described in Ellickson's paper,³¹ etc.).

The second mechanism is the switching mechanism - replacing a defaulted transaction with an alternative one, with minimal loss of transaction-specific investment. Typical bilateral examples are a buyer covering for a contract breached by the seller or a seller reselling goods sold under a contract breached by the buyer; both are remedies recognized by the Uniform Commercial Code.³² the party injured by a breach of contract enters another contract, with someone else, that most closely resembles the breached contract. This minimizes the injured party's harm from the breach and sometimes deters the breaching party from threatening a breach. An example of the deterrence of such opportunism was provided in a paper by Thomas Palay.³³ His paper describes how railroads and shippers contract to reduce the risk of opportunism resulting from the need to make a transaction-specific investment to ship certain goods by rail. Specially-fitted rail cars are needed to safely transport certain goods, and this feature exposes one of the

²⁸ See Aviram, *supra* note 11, at Section II.2. The following paragraphs summarize some of the arguments made in this paper.

²⁹ Greif, *supra* note 6, at 526, 528-531.

³⁰ Clay, *supra* note 6, at 208-212.

³¹ Ellickson, *supra* note 9, at 677-678. Ellickson (1991), *supra* note 6, at 57-58, 180-182, 210, 213-215, 232-233.

³² Uniform Commercial Code §2-706 (seller's right to resell), §2-712 (buyer's right to cover).

³³ See: Thomas M. Palay, *Comparative Institutional Economics: The Governance of Rail Freight Contracting*, 13 J. of L. & Econ. 265 (1984).

parties to opportunistic renegotiation of the contract by the other party: once one of the parties—a railroad or a shipper—made this investment, the other party would be in a position to renegotiate the terms of the contracts in its favor, knowing that its partner would lose the transaction-specific investment it made if it refused to renegotiate the transaction. Palay examined what elements of the transaction assure the vulnerable party against this risk of renegotiation. He found that one of the important assurances was the knowledge of the potentially opportunistic party that the other party could contract with another party without losing much of its transaction-specific investment.³⁴

While Palay describes a bilateral switching mechanism (one bilateral transaction is negotiated in lieu of another bilateral transaction that has been breached), the switching mechanism is usually more effective when it benefits from network effects. Transacting within networks tends to mimic perfect competition better than bilateral contracting, and therefore the market that serves as an alternative to the defaulted transaction is more liquid. Also, investments used to transact within a network tend to be less transaction-specific, and therefore can be salvaged from the defaulted deal and be used in an alternative transaction. For example, good reputation may be required for certain transactions. In a world of bilateral contracting, it takes time and effort to establish a good reputation. If Jill had only established a good reputation with one transacting partner (Jack), she may reluctantly acquiesce to Jack's opportunistic renegotiation of the transaction, knowing that if she refused to renegotiate and the transaction were abandoned, she would have to expend a lot of time and effort in establishing a good reputation with another person. If Jack and Jill transacted through a network (e.g., eBay), however, then Jill's reputation would be established network-wide. If Jack threatened to discontinue transacting unless his new demands were met, Jill could almost costlessly transact with someone else. Therefore, Jack would be deterred from demanding to renegotiate in the first place.³⁵

The third mechanism used by networks to regulate is the control mechanism. In some networks, all transactions are processed through some centralized facilities. For

³⁴ Palay, *id.*, at pp. 271-273.

³⁵ Unlike the other three mechanisms, the switching mechanism does not require the implementation of any rules in order to have effect. The very existence of a network produces both the harm mitigation and the deterrent effects. Nonetheless, this mechanism is no different from the other three in differentiating the abilities of networks to regulate behavior.

example, the electricity grid is centrally managed, and can facilitate transactions between many power generators and power consumers. Similarly, transactions in electronic marketplaces are often facilitated centrally through the marketplace's server, which records the terms of the transaction. This centralized transacting facility reduces the cost of monitoring transactions to detect prohibited behavior, and may serve not only to deter but to prevent harmful (e.g., fraudulent or illegal) transactions, by blocking them. In such manner, for example, eBay can prevent unlawful ticket scalping by delisting offers that violate state anti-scalping laws (prevention), or by reporting such transactions ex post to the relevant attorney general (detection, which leads to deterrence).³⁶ Alternatively, the central facility may be kept transparent, allowing individuals to observe and detect norm violations.³⁷ As with the other mechanisms, the control mechanism may exist in non-networked environments. However, economies of scale often make centralized transacting facilities more feasible in networks than in bilateral transactions, as in the former both total transaction volume and transaction complexity tend to be higher.

Finally, the fourth mechanism used by networks to regulate is the exclusion mechanism—the ability to deny a firm the network benefits of transacting with all the other network members, by excluding the firm from the network, either temporarily (suspension) or permanently (expulsion). This can be seen as an enhancement of the information mechanism, by including an additional element—coordination of the network members' responses to the information provided. This ensures that the totality of the network's transacting power and network effects are denied from the opportunistic party.

The efficient use of these four mechanisms makes networks, in many cases, the least-cost regulator. However, these mechanisms are ineffective when they form

³⁶ See: Troy Wolverton, *Online ticket market pressures scalpers*, CNet News.com, May 21, 2002, available at: <http://msn.com.com/2100-1106-918772.html>. It should be noted, however, that ticket scalping specifically proves to be a more difficult field for networks to combat fraud, because of the great discrepancy between state laws on this matter and the large number of cross-jurisdiction transactions, which raise ambiguity as to the applicable law. See: Will Courtney, *Are online auctions guilty of e-scalping?*, The Eagle-Tribune, March 4, 2001, available at: http://www.eagletribune.com/news/stories/20010304/FP_004.htm; *Will the Net end ticket scalping?*, MSNBC.com, Sept. 2, 1999, available at: <http://zdnet.com.com/2100-11-501311.html?legacy=zdn>.

³⁷ For example, some sport teams monitor eBay auctions to detect ticket scalping. See: Allan Drury, *When it comes to ticket scalping, the Net's the Wild West*, USA Today, Oct. 7, 2002, available at: http://www.usatoday.com/tech/webguide/internetlife/2002-10-07-e-scalping_x.htm.

spontaneously (i.e., imposed for the first time, and unassisted by other, existing enforcement mechanism), due to a “chicken & egg” paradox:³⁸ they are very effective in enforcing behavior once they are perceived as able to enforce, but cannot enforce behavior effectively as long as the network members do not perceive them as able to do so. Therefore, these enforcement mechanisms would rarely form spontaneously; absent existing enforcement power, they would not be as effective as other methods of regulation (e.g., government regulation; bilateral self-regulation, etc.).

Consider, for example, the exclusion mechanism. To enforce a norm, the network threatens its members with ostracism if they fail to conform. The significance of this threat to the member depends on what this ostracism would deny him. In other words, what benefits he currently derives from the network. An established network already provides benefits to the members; even a network doing nothing but preventing opportunistic behavior will provide its members with a more amicable transacting environment once it is effective. But until the network has undertaken enforcement for a while and has assured members of its ability to function, its members significantly discount (or do not consider at all) the purported benefits from membership, and will not be deterred by the threat of exclusion. This becomes a self-fulfilling prophecy as the more skeptical members ignore the threat of exclusion and act opportunistically, dissipating the network’s benefits and persuading those members who initially had faith in the network that the benefit of the network, and hence the cost of exclusion, is negligible.

The same pattern occurs with the other enforcement mechanisms. The switching mechanism, for example, can only deter opportunism if the would-be opportunistic party anticipates that its victim would find an alternative viable transaction. Until the network is active and has proven its ability to offer feasible alternative transactions, would-be opportunists would likely not view it as a deterrent to renegotiating the transaction. As a result honest parties, experiencing a high incidence of opportunistic renegotiation, will avoid this network and seek either another, more effective network or alternative regulation (bilateral contracting or government intervention). The abandonment of the

³⁸ The term “chicken & egg” paradox makes a reference to the jesting question “which came first, the chicken or the egg?”. If the chicken came first, what did it hatch from? If the egg—who laid it?

network by honest members will further exacerbate the problem of finding a feasible alternative transaction, thus weakening the switching mechanism once more.

This paradox does not have to conclude with the desertion of all members. Not all network members are identical. Some find it almost costless to follow the norms, and do so regardless of the perceived effectiveness of the enforcement mechanisms. Other network members benefit so much from the network (as opposed to the next best alternative available to them), that they find it feasible to remain in the network even when compliance to the norm is low (and thus are sufficiently deterred by the exclusion mechanism). This only affects significantly infra-marginal firms, however; that is, the firms that benefit most from the network or find it least costly to follow the norms. Most other firms find the spontaneous network regulator to be ineffective, as described below. These firms seek the least costly alternative regulator. In some cases, this would be a non-network regulator, such as government regulation or bilateral contracts. But in many circumstances, networks are more efficient regulators. In such cases, most firms will seek another network that somehow avoids the paradox of spontaneous formation.

This quest for the least-cost regulator, in the face of the paradox that plagues spontaneous private legal systems, results in a pattern of non-spontaneous evolution—the assumption of responsibility for regulating behavior by networks that hitherto had provided other, non-regulatory functions. I will elaborate on what is non-spontaneous evolution of private legal systems later in this section. Then, in Section IV, this theory will be applied in practice: a review of the some of the more notable work on private ordering will point to documented cases of non-spontaneous evolution.

B. The Limits of Decentralized Bonds

The careful reader may question the speed with which the paper has disposed with spontaneous formation of private legal systems. At the heart of the paradox that impedes spontaneous formation is a problem of assurance—if most network members were assured of the network's ability to enforce a norm, they would follow that norm, and by that action enable the network to enforce the norm on the few strays that violate it. Assurance problems are hardly a novelty to the veteran institutional economist, and are in fact the reason regulation (whether public or private) is needed. Almost any transaction in

which the exchange is non-simultaneous would require the party obligated to act later in time, to assure the other party that it will not renege on this obligation after reaping the benefits it acquires from the transaction.

For example, Jack owns gold bullion; Jill is a famed goldsmith. Jack may hire Jill to create exquisite jewelry from his gold bullion. Under the terms of the transaction, Jack will deliver his gold bullion to Jill, who will then melt it and fashion it into jewelry. She will then deliver the jewelry to Jack, who after inspecting the quality of the work will pay Jill her fee.

The need for mutual assurance should be obvious. Once Jack parts with his gold, Jill may renege on her promise and keep the gold. Jill is also vulnerable—after she has expended time and effort to create the jewelry, Jack may take it and refuse to pay her.

One way of creating mutual assurance is through the public legal system (i.e., the law). Contract law exists for this very purpose—to allow each party to an enforceable agreement use of the enforcement machinery of the state to force the other party to undertake the obligation (or better yet, to deter from renegeing on it). In some cases, criminal law intervenes, replacing private detection of violations (e.g., in contract law), with complete government control over both detection and enforcement. But using the public legal system to assure users of a network of its ability to enforce norms is often questionable: if the network is not as good a regulator as the public legal system, why not do away with the network and have the law regulate directly, rather than support a less efficient regulator (the network). And if the network is more efficient than the public legal system, the use of the public legal system to support the network would usually introduce the costs and inefficiencies of the public legal system, which the network was supposed to replace.

Private legal systems strive, just like their public counterpart, to provide assurance to transacting parties. A key bilateral method of providing assurance is by posting “bonds”.³⁹ Bonds are interests of the assuring party⁴⁰ that are placed at the mercy of the assured party. Upon receiving a bond, the assured party may confiscate or destroy it at

³⁹ See Oliver E. Williamson, *Credible Commitments: Using Hostages to Support Exchange*, 73 Am. Econ. Rev. 519 (1983).

⁴⁰ Such as property, right, reputation or other matter the destruction or confiscation of which affects the assuring party’s utility.

will, causing harm to the assuring party. Knowing that the assured party will use this power if the assuring party reneged on an obligation, the assuring party will not renege. This provides the assured party with peace of mind. But who will assure the assuring party? If a bond can be confiscated at will (rather than only upon default of the assuring party), then the assured party can confiscate the bond despite proper execution of the underlying obligation. To mitigate this risk (and to guarantee the reciprocal obligation in case of a transaction involving obligations from both parties), bonds can be exchanged.

This practice has been termed an “exchange of hostages”,⁴¹ and in fact, a literal exchange of hostages has been among the early forms in which this mechanism was used to assure commitment to peace treaties. Gregory of Tours describes the use of this mechanism in the year 511: “But Theoderic and Childebert entered into a treaty and each took an oath that neither would wage war upon the other. They took hostages so that they might the more firmly adhere to what they had promised. Many sons of senatorial families were thus given...”⁴²

The object of the bond need not be loved ones, property, or anything tangible at all. It may be something as intangible as reputation. Indeed, reputation is in its nature a bond—an asset that affects the owner’s utility (by influencing the owner’s future transactions with others), and can be affected by others (both positively and negatively). Unsurprisingly, the private ordering literature has addressed reputation bonds extensively. Lisa Bernstein describes their development and function among diamond traders.⁴³ Avner Greif and Karen Clay study their effect in merchant coalitions.⁴⁴ Robert Ellickson examines their impact on reducing disputes among neighbors over cattle trespass incidents.⁴⁵

Reputation bonds, however, are not a very useful tool for spontaneous networks. For these networks, like the warlords in the earlier discussion of Pax Dei,⁴⁶ one failed

⁴¹ Williamson, *supra* note 39, at 519, citing Thomas C. Schelling, *An Essay on Bargaining*, 46 Am. Econ. Rev. 281, 300 (1956), at footnote 17 of the cited paper.

⁴² Gregory of Tours, *Enslaving Noble Families, in Patrologiae Cursus Completus* (Paris, 1849, J. P. Migne, ed.), Vol. LXXI, p. 255; reprinted in Roy C. Cave & Herbert H. Coulson, *A Source Book for Medieval Economic History* (Milwaukee: The Bruce Publishing Co., 1936; reprint ed., New York: Biblio & Tannen, 1965), pp. 288-289; available at: <http://www.fordham.edu/halsall/source/511Noblslav.html>.

⁴³ Bernstein, *supra* note 6, at pp. 138-143, 145-148.

⁴⁴ Clay, *supra* note 6, at pp. 207-216 and Greif, *supra* note 6, at pp. 528-531, 535-542.

⁴⁵ Ellickson, *supra* note 9, at pp. 676-682.

⁴⁶ See *supra*, Section I.

episode would lead to elimination, and hence network members discount future interactions with the network (and its members). As discussed in the next subsection, reputation might still be an effective bond if the network members interact with each other outside the network (e.g., are members of the same social circle), or if the network provides other functions that will survive its failure to regulate behavior. But absent either of these, members will not value the establishment of a good reputation in a network that is expected to fail.

Bonding, whether using tangible or intangible collateral, is an expensive assurance system, and usually a crude one. Non-reciprocal bonding (providing a bond without receiving one) leaves the party offering the bond vulnerable to the other party's ability to confiscate the bond without cause. Reciprocal bonding is subject to reciprocal confiscation, which may leave both parties worse off, but not enough to deter an opportunist. For example, if Jack and Jill, wanting to bond each other into performing their contract,⁴⁷ each give the other cash valued at \$100 as collateral, Jill might refuse to return Jack's gold bullion. When Jack retaliates by confiscating Jill's collateral, Jill can confiscate Jack's collateral, so that the bonds will set off each other without a deterring effect.

Some bonds do not offset each other, because they harm one party while not providing the other party with any utility. The hostage exchange between Theoderic and Childebert is one such example—killing a hostage harms his or her kin, but does not provide direct benefit to the murderer. Even with such collateral, there is a risk of insufficient deterrence.

First, destroying collateral upon suffering a perceived offense might be rational even when the destruction of the collateral it is not profitable, because it maintains deterrence—it indicates that the same action may be taken again in the future if that person is offended again. Indeed, as Richard Posner explains, this is the rational basis to the concept of revenge.⁴⁸ But the same mechanism that provides assurance also risks preempting the destruction of the bond. Each party has an incentive to be very sensitive, and react to the most minor slights, in order to deter the other parties from attempting

⁴⁷ See the example of the contract between Jack the owner of gold bullion and Jill the goldsmith, earlier in this subsection.

⁴⁸ Richard A. Posner, *Law & Literature* (Harvard University Press 2000) 49-60.

even minor opportunistic behavior at their expense.⁴⁹ As a result, if there are sufficient repeat transactions between parties, each party will overreact, by confiscating the bond, at the first perception of an offense (in the hope of greater deterrence of the other party in future transactions). But once a bond is confiscated, the other party may do the same, eliminating the assurance mechanism and increasing the likelihood of a cycle of opportunistic (or outright malicious) behavior.⁵⁰

Second, even when exaggerated sensitivity can be avoided, the value of the collateral is hard to determine. There is a cost to providing collateral, even when it is not confiscated (e.g., a work of art given as collateral does not bring joy to its owner while it is held by others).⁵¹ This cost creates an incentive to reduce the size of the collateral as much as possible. On the other hand, collateral only deters from opportunism that is no more profitable than the collateral's value (otherwise, its owner would find it profitable to commit the opportunistic act, pocket the gain and accept the loss of the collateral). Since gains from opportunistic behavior vary widely, it is hard to anticipate the optimal value of the collateral, and almost any level would fail to deter some, extremely profitable opportunistic behavior. Furthermore, since parties exchanging bonds differ in their perceived vulnerability to the other party's opportunism and in their loss of utility from providing the bond, they might disagree on the optimal value of the bond.

Bonds are limited in their ability to deter opportunism. Greif, Milgrom and Weingast offer a formal game theory model that proves that bilateral bonds (such as bilateral reputation mechanisms) do not deter opportunistic behavior when transactions are at what would have been the efficient level absent the threat of opportunism. Their model assumes a city, which may or may not protect the property and safety of merchants doing business in it (failing to do so saves the city the cost of providing protection, and

⁴⁹ *Id.*, at pp. 52-54.

⁵⁰ The example above of the hostage exchange between Theoderic and Childebert may have failed for this reason. As Gregory of Tours describes: "...but when a new quarrel broke out between the kings they [the hostages—A.A.] were reduced to servitude... And those who had taken care of them now made slaves of them...". Gregory of Tours, *supra* note 42, *id.* It is noteworthy that the warring parties made slaves of the hostages rather than kill them. This may be a rational action intended to inflict some harm on the "collateral" (enslaving the hostages), while maintaining future deterrence through the ability to inflict additional harm (by killing the hostages). Another rational explanation for this action may be that by enslaving the hostages, each of the kings gained some benefit from "confiscating the collateral" (the value of the slave labor). Killing the hostages would have brought them no direct utility.

⁵¹ Another element in the cost of providing collateral is also the risk of unjust confiscation of it.

provides the city a gain from property confiscated from the merchants). The merchants in this model consider their past experience with the city, and may boycott it and do their business elsewhere if the city has failed to protect them in the past. The merchants in this model are not able, however, to coordinate their responses. Greif, Milgrom and Weingast demonstrate that when trade is at an optimal level, the future stream of income to the city from the individual marginal merchant is almost zero, and therefore smaller than the value of the goods confiscated or the cost of the protection services that can be withheld.⁵² Thus, absent coordination, bonding is insufficient to deter opportunism when the transacting level is optimal.

Greif, Milgrom and Weingast also demonstrate, that when coordination (and enforcement of it) is feasible, merchants may be able to deter the city's opportunistic behavior, because the income lost from harming the marginal merchant is not only rents accruing from that merchant's future dealings, but from those of all coordinated merchants.⁵³ Applying this to the inquiry, it is possible that coordinated (centralized) bonding can assure members of a network, which has just begun to regulate behavior, to a degree sufficient to escape the paradox of spontaneous formation.

Since individuals seek the least-cost regulator, it is expected that in situations in which network-based regulation is more efficient than other forms of regulation (e.g., government intervention or bilateral contracting), networks will evolve in a manner that ultimately overcomes the paradox of spontaneous formation, by developing from preexisting coordinated bonding mechanisms. This is the non-spontaneous evolution the paper is set to explore.

C. The Role of Existing Functionality in the Evolution of Private Legal Systems

Centralized bonding mechanisms are almost invariably network-based. By having the ability to coordinate a response to a party's opportunism (and thus deterring opportunism), the centralized coordinator is providing a benefit to its members. This benefit is characterized by network effects—the more individuals' responses are coordinated, the greater the deterrence of would-be opportunists. Thus, the addition of

⁵² The reader is referred to their paper for the model and proof. See Greif, Milgrom & Weingast, *supra* note 9, at pp. 751, 764-767.

⁵³ *Id.*, at pp. 751-752, 767-771.

another member to the centralized bonding mechanism increases the utility of each existing member—precisely the definition of a network effect.⁵⁴

The evolutionary process that results in a private legal system has two stages. First, a network creating a centralized bonding mechanism would form (most likely, not as an end of its own, but as a side effect of some other function the network serves). Then, at stage two, the network would undertake regulating behavior, using its enforcement ability.⁵⁵ The most ubiquitous example of a network that facilitates centralized bonding is a social network. Social networks use reputation bonds. I argued earlier that reputation bonds are ineffective when individuals expect the network to fail. Many social networks, however, continue to exist over long periods of time—one’s neighbors, for example, will continue to affect one’s social life indefinitely (this subsection will explain, below, why social networks may spontaneously form, while regulating networks tend to fail if they form spontaneously). By gossiping about each other within the social network, and by reacting to the gossip according to common norms, the social network can align most members’ responses to any member’s deviant behavior. When members of the same social circle are also part of another network that attempts to regulate behavior, they will care for their reputations, for while the regulating network cannot in itself harm them, the negative reputation they build will carry on to the social network, and there the centralized bonding mechanism will punish them. There is no need for two separate networks, however—one to regulate and the other to punish deviance. If there is demand for certain regulation and networks are the efficient providers, existing networks that enable centralized bonding—such as social networks, religious groups, etc.—will evolve to provide the required regulation.

Looking again at the Pax Dei movement, one may now understand better what made the warlords abide to the imposed constraints on warfare. The religious network provided each member, including the warlords, with fulfillment of spiritual needs, a sense

⁵⁴ The investment each member of a network makes in a network is in itself a bond, that expulsion from the network will confiscate. See Rachel E. Kranton, *The Formation of Cooperative Relationships*, 12 *J. of L. Econ. & Org.* 214 (1996).

⁵⁵ Admittedly, the difference between regulation and non-regulatory functions of a network is murky at times. The correct differentiation is, for reasons explained later in this subsection, the underlying “game type” of each function. However, regulation of behavior tends to involve some of the more expensive to enforce game types, such as Prisoners’ Dilemma and Stag Hunt. This is why regulation of behavior is often undertaken only in a later stage of the evolution of the network.

of security and well being derived from belonging to a community. Coordination was achieved both through formal means (religious leaders such as bishops) and informal means (norms and beliefs deep-rooted in the members of the community). Then, when a need to restrict warfare arose, the religious network was the least-cost regulator and quickly evolved to accommodate this need. The community was driven to act in uniform hostility to breaches of the peace because their formal coordinators—bishops and keepers of saints’ relics—told them to do so, and because norms viewing certain forms of violence as “unchristian” could easily take shape. Once the religious network evolved to undertake not just spiritual salvation but also regulation of warfare, the warlords were threatened by their religious network with ostracism (which would deny them the spiritual and social benefits provided by the religious network), and possibly faced a coordinated violent response from the members of the religious network. This enforcement power, that existed before the network undertook the regulation of warfare, was effective, for a time, in restricting the warlords’ belligerence.

But how do social or religious networks overcome the paradox of spontaneous formation, and create a centralized bonding mechanism? After all, for the centralized bonding mechanism to succeed, the network usually needs an ability to enforce on its members uniform adherence to its decisions. For example, in 1284 a German trading ship was attacked and pillaged by Norwegians. The German merchants responded by prohibiting the sale of grain, flour, vegetables and beer to Norway. To enforce the embargo, the German towns posted ships in the Danish Straits. Ultimately, according to the chronicler Detmar, “there broke out a famine so great that [the Norwegians] were forced to make atonement”.⁵⁶ The network of German merchants succeeded. But how did they manage to acquire stable enforcement abilities, despite the theory that has been elaborated for much of this section of the paper?

The reason that some functions (e.g., social or religious interaction) can be facilitated by spontaneously formed self-enforcing networks, while other functions (e.g., restricting warfare) are only availed when a preexisting network evolves to encompass that function as well, lies in enforcement costs. People migrate to the lowest-cost

⁵⁶ Greif, Milgrom & Weingast, *supra* note 9, at p. 757, citing: Philippe Dollinger, *The German Hansa* (Stanford University Press, 1970) 49.

regulator (holding regulation quality constant). Thus, less costly enforcement mechanisms are likely to survive, while higher cost counterparts are likely to fail, even if their benefits outweigh the enforcement costs (because the same benefits would be achieved by a less costly regulator).

The high-enforcement cost functions do not remain unregulated for long, however, since low enforcement cost networks expand to encompass them.⁵⁷ Once a network provides a function that has low enforcement costs, the (less costly) enforcement mechanisms it has developed are able to enforce more costly functions, bypassing the spontaneous formation paradox.⁵⁸ Thus, the network evolves to accommodate the new function.⁵⁹

For example, reconsider the (lower enforcement cost) function of providing social and spiritual services and the (higher enforcement cost) function of restricting warfare. The social/religious network, due to its low enforcement costs, is likely to survive and provide its members with a sense of community, social interaction, and spiritual guidance; this, in turn, will strengthen its enforcement mechanisms (for example, it will increase the harm it can inflict on a member by excluding her from the network). In contrast, a spontaneously formed network attempting to restrict warfare is likely to fail due to the difficulty its fledgling enforcement mechanisms will have in overcoming the high enforcement costs. This failure—the paradox of spontaneous formation—will occur even if the benefits of restricting warfare outweigh the costs of enforcing it. The reason for failure is not necessarily the infeasibility of enforcing restrictions on warfare, but the

⁵⁷ This is true, of course, only if enforcement costs do not outweigh the benefits of enforcement. But as was demonstrated above, *infra* Section II.1, spontaneously formed networks will fail to enforce functions with high-enforcement costs even when those costs are lower than the benefits internalized by all members together, because of the spontaneous formation paradox. This is where other, preexisting networks may evolve to enforce the high-cost, yet welfare-enhancing function.

⁵⁸ Of course, a network can only expand to enforce another function if its existing enforcement mechanisms are effective against the individuals who need to be disciplined in order to enforce the new function. For example, a social network in a certain town can perhaps assume a new function of enforcing peace among the members of that town. But it cannot enforce peace between members of other towns, since the enforcement mechanisms of that network can only be employed against network members, and enforcing peace in other towns requires influencing non-members (the villagers of the other towns).

⁵⁹ Since it is the least costly enforcer that will likely become the regulator, two additional conditions must be satisfied in order for a network providing a certain function to evolve into enforcing a function with more costly enforcement: (1) a network is the lowest cost regulator of this function (as opposed to government intervention or bilateral contracting, for example); and (2) the network has lower costs of enforcement than any other network governing the same group of members.

lack of spontaneously formed enforcement mechanisms to overcome the collective action problem.

Since the barrier to regulating warfare lies not in infeasibility of doing so, but in an absence of a spontaneously formed enforcement mechanism, it would be beneficial for the social/religious network to utilize its enforcement mechanisms to regulate warfare. Initially, it can threaten to withhold from non-complying members their benefit from the religious and social functions of the network. Then, after this threat causes members to comply and peace ensues, the network's enforcement mechanisms become even stronger, as expulsion from the network results not only in a loss of social and spiritual benefits, but in exclusion from the benefits of the restraints on warfare (i.e., members are not restricted when waging war on the excluded party). The expanded network, now wielding more powerful enforcement mechanisms, may now evolve to encompass even more costly (yet beneficial) functions.⁶⁰

To recap, the conditions that a network needs to satisfy in order to expand into regulation of another, higher-cost function are: (1) the network's original function needs to have sufficiently low costs of enforcement to form spontaneously and survive (i.e., succeed in enforcing the low cost function); (2) the benefits to be internalized by network members from the newly assumed function outweigh the costs of enforcing the function, yet the enforcement costs are sufficiently high to prevent spontaneous formation of a

⁶⁰ Implicit support for the above expectation (that every successful step in the evolution of a private legal system strengthens its enforcement mechanisms and may enable it to then attempt to regulate even more expensive functions) is found in the paper by Greif, Milgrom and Weingast. They note that the monopolistic rents that medieval merchant guilds accrued for their members assisted in the disciplining these members (since expulsion from the guild would cause a merchant to lose those rents. See Greif, Milgrom & Weingast, *supra* note 9, at p. 749: "This type of monopoly rights generated a stream of rents that depended on the support of other members and served as a bond, allowing members to commit themselves to collective action in response to a ruler's transgressions", and at p. 757-758: "These guilds, therefore, were able to provide their members with streams of rents in their hometowns. Receiving these rents, however, could have been made conditional on following the recommendations, rules, and directives of the guild. Hence these rents could serve to tie a member to the guild by making change of residence costly and to ensure solidarity among the guild's members." But this is a static view of the private legal system. At the time that the social network of merchants in the town had evolved to police a cartel within the town, and thus secure these monopoly rents, it could use the rents to enhance the power of the exclusion mechanism and evolve the network yet again, this time into regulating merchants' activities abroad. To acquire the monopolistic position in the first place, the guild had to first evolve from lowest-cost functions (providing social interaction and information), to moderate-cost functions (maintaining a market within town), to relatively high-cost functions (maintaining a cartel within town). After each step of this evolution, the network's enforcement mechanisms increased in power by adding the new benefits to the utility provided the network provides, and can take away. This increase power then enables the network to evolve to even more expensive to enforce functions.

network enforcing only this function; (3) enforcement of the new, higher-cost function is possible through disciplining the existing members of the network; (4) the network has lower costs of enforcement than any other network satisfying the previous three conditions; (5) a network is the lowest cost regulator (as opposed to government intervention or bilateral contracting, for example) of the newly assumed function.

The key to identifying the network that will evolve to regulate other functions is, therefore, enforcement costs. Not all functions have equal enforcement costs. It is easier to get people to socially interact with their neighbors than to get them to keep their contractual obligations to the same neighbors. Social interaction benefits most people more than isolation, and most people would rather interact with some people even if others in the same group snub them. So there are few costs involved in getting people to cooperate in agreeing to interrelate. On the other hand, one would like everyone to commit to their promises, but if some people did not, one is unlikely to commit, fearful of being taken advantage of by others. In some cases, one would not commit even knowing that everyone else is committing, in the hope of taking advantage of the others. In either of these cases, some enforcement costs are necessary to secure members' commitment to promises they had made. This paper will refer to the set of relative preferences of people involved in a given function as the "game type" of that function.⁶¹ The effects of game types on enforcement costs will be addressed in depth later in this subsection and in later sections.

Other factors also affect enforcement costs. For example, it is easier to enforce a norm (or provide another function) when the costs and benefits of the enforcement of a norm are similar for each of the constituents. The greater the divergence between the interests each of the individuals, the more expensive it is to secure adherence to the norms (or to even formulate them). For example, assume a society of people of equal health, but widely differing wealth. It would be relatively easy to enforce a norm mandating that people infected with dangerous contagious diseases should be quarantined. Each person, whether rich or poor, is (roughly) equally vulnerable to diseases, and thus everyone benefits equally from the norm. Each person is also subject to

⁶¹ There are four possibilities among which the relative preferences are considered: cooperating when others cooperate, cooperating when others do not cooperate, not cooperating when others cooperate, and not cooperating when others do not cooperate.

a (roughly) equal probability of being infected by the dangerous disease and thus bearing the cost of the norm— isolation until recovery. The probability and severity of harm from the imposition of the norm is also distributed in a roughly equal manner.

Contrast this with the formation of a norm about tax structure (e.g., progressive vs. regressive taxation; estate taxes, etc.). In this case, benefits from the tax are presumably distributed equally, but the burden of it would shift significantly depending on the tax structure. If the tax is progressive, people with higher income will pay a larger percentage of their income than poorer people; similarly, estate taxes place widely varying burdens depending on accumulated wealth. Disagreement, and with it enforcement costs, are expected to be greater for the latter norm (taxes) than the former norm (medical quarantine).

Not only the variance of costs and benefits of the function affects enforcement costs; so does the average net benefit. A network's use of the exclusion, information or control mechanisms is more effective the greater the utility a member receives from the network. Thus, the enforcement ability of a religious network is likely to be less powerful among a group of secular people than among devoutly religious people, since the latter derive more utility from the spiritual benefits they receive.

Market structure (both in the network segment and in the individuals segment) is yet another criterion affecting enforcement costs. A network that provides significantly more utility to its members than could its rivals is likely to have lower enforcement costs than a network that has to compete with rival networks that can offer members as much (or more) utility. Competition among networks depends not only on the number of alternative competitors, but on switching costs between networks and on the number of networks that provide comparable benefits. Where network effects are significant compared to other elements of the network's utility,⁶² similarity in the transacting volume or membership of networks indicates the provision of comparable utility.

To illustrate the relationship between competition and enforcement costs, consider a sparsely populated, rural area that likely has a single social circle (or several circles interacting sufficiently to form a single network). A more densely populated urban area,

⁶² On the differentiation between the intrinsic value of a network good and the network value of the same good see Robert Ahdieh, *Making Markets: Network Effects and the Role of Law in the Creation and Restructuring of Securities Markets*, 76 S. Cal. L. Rev. 277 (2003).

in contrast, might accommodate several different social networks with little interconnection among them. Enforcement mechanisms would be more effective in the single rural network than in any of the urban networks, which a rogue member can abandon in favor of another social network at low cost.⁶³

This list of factors affecting enforcement costs is not exhaustive. A reader familiar with antitrust scholarship may notice the similarity between these criteria and the criteria that facilitate collusion among firms.⁶⁴ This is no coincidence, as cartels are a form of behavior regulation—firms are disciplined to maintain their prices and outputs at a level maximizing the collective's profits.⁶⁵ The key hazard to a cartel is an inability to enforce its mandates—the same enforcement problem that other, socially beneficial private legal systems face.

The literature on cartel stability is not immediately applicable to the analysis of private legal systems at large, however, since it does not discuss an important element described above—the game type of the function. This is not due to short-sightedness on the part of the scholars in this area, but rather due to a common trait of cartels: the function of policing cartels is nearly always of the Prisoners' Dilemma game type. Each cartel member has the following rank of preferences: (1) she does not abide by cartel rules but other members do (thus increasing her profits above the cartel level by undercutting the cartel); (2) she abides by cartel rules and so do the other members (thus she gains cartel level profits); (3) she does not abide to the cartel rules and neither do the other members (thus she receives competitive market profits); and finally (4) she abides by cartel rules but other members do not (thus she receives zero profits, since everyone undercuts her higher, cartel-level price).

⁶³ This is not to say that less competition among networks is net welfare enhancing. While a reduction in competition increases the network's ability to regulate (which is welfare-enhancing), it also decreases the network's incentive to regulate efficiently, as the network may regulate in a manner that enhances or maintains its market power rather than in a manner that reduces opportunism. Whether the increased ability to regulate outweighs the reduced incentive to regulate or vice versa depends on particular circumstances. On differentiating between networks' ability to regulate and networks' incentive to regulate *see* Aviram, *supra* note 11, at Sections III.3 and III.4.

⁶⁴ *See* Stigler, *supra* note 14; Dick, *supra* note 14.

⁶⁵ Of course, this level is typically not optimal to a single firm assuming that other firms abide by the cartel rules. It is also not optimal from the perspective of all of society (consumers and producers together), since the utility loss by consumers is greater than the utility gain by all producers.

If pricing at cartel level is considered cooperating and undercutting prices is considered defaulting, then the above set of preferences can be summarized as: $\{D,C\} > \{C,C\} > \{D,D\} > \{C,D\}$. The same set of preferences is true for each member of the cartel. As will be explained below,⁶⁶ this set of preferences is characteristic of the Prisoners' Dilemma game.

Thus, as mentioned above, since (almost) all cartels are Prisoners' Dilemma games, the literature examining cartel stability is not concerned with the underlying game type. When considering, however, the broader range of functions that a network can regulate, one finds a richer variety of game types. As explained above, the difference in game types matters—a Prisoner's Dilemma game requires more costly enforcement than, say, a game of Meeting Place. This will make functions that are of the Meeting Place type to be more likely to survive spontaneous formation, while functions that are of a Prisoners' Dilemma type are less likely to do so. Networks enforcing a Meeting Place type of function may, in time, evolve to enforce the Prisoners' Dilemma type functions. A reverse direction of evolution (from the Prisoners' Dilemma type function to the Meeting Place type function) is much less likely.

Given the importance of the function's game type, and the dearth of attention to it in current literature on factors affecting cartels' (and private legal systems') stability, this paper will examine game types in depth in the following section.

III. A Taxonomy of Game Types

This section will describe a few key game types that characterize functions that are commonly regulated by networks.⁶⁷ The list is far from exhaustive—games can be refined infinitely, to suit the unique payoff characteristics of any form of interaction.⁶⁸ Since this is an initial exploration of the effect of a function's game type on the ability of

⁶⁶ *Infra*, Section III.7.

⁶⁷ On game theory generally, *see, e.g.*, Douglas G. Baird, Robert H. Gertner & Randal C. Picker, *Game Theory and the Law* (Harvard, 1994); John Eatwell, Murray Milgate & Peter Newman (eds.), *Game Theory* (Norton, 1987).

⁶⁸ Even generic games that correctly portray incentives may be mere parts of a larger game, with different incentive structures. *See* Baird, Gertner & Picker, *id.*, at p. 45: "One must also guard against looking at interactions between players in isolation. A problem that may look like a prisoner's dilemma or some other simple two-by-two game may be part of a much larger game. One cannot assume that, once embedded in a larger game, the play of the smaller game will be the same."

a network to regulate the function, this section will examine a handful of arch-types that broadly describe most functions, rather than identify exact game types that fit a specific function, in a specific setting (e.g., a specific group, region, time, etc.).

A game type is an abstraction of the incentives of people involved in a given interaction (in this paper's context, a function administered by a network). The abstraction is made by determining a 'payoff' to each player (i.e., benefit conferred on the player) based on both what that player did, and what others interacting with that player do. The payoff is measured in "utils", a generic scale measuring benefits of any kind conferred on a player (e.g., money, other material benefits, spiritual elation, a sense of being loved, etc.). There might be a different payoff to the player for each combination of her and others' actions; mirroring real life, the choice a player makes affects her welfare, but so do the choices others make.

To reduce complication, several abstractions will be made in the games examined in this paper. First, it is assumed there are two players—a network member and the other network members (or a network member and the network governance institution). Second, each player is limited a choice between two actions. These actions will change from game to game depending on the illustrative story of the game, but generally they will be called 'Cooperate' ({C}) and 'Default' ({D}).⁶⁹

To clarify the concept of a game type, consider the 'function' of providing a venue for scorn: Statler and Waldorf, the grumpy old men sitting on the balcony in "The Muppets' Show", love to express derision at anything and everything. When the Muppets Show is not on and they find no targets for their venom on stage, they must verbally attack each other. The best that can possibly happen from Statler's point of view is when he says something nasty to Waldorf, and Waldorf does not reply. Second to this "oneupsmanship" is a situation in which they exchange gibes. Much less satisfying is a

⁶⁹ To make the illustrative examples more intuitive, this paper will sometimes call the more socially beneficial of the two actions "cooperating", while the other, less virtuous action will be called "defaulting". But this is not always the case. There does not have to be anything morally or socially better in an action called "cooperating" over an action called "defaulting". In some games, the two options would be equivalent morally and from a welfare-maximizing perspective. For example, in the Battle of the Sexes game, described *supra*, in Section III.3, the "cooperating" action is going to see a baseball game, while the "defaulting" action is going to see a movie. The tags of cooperation and default are used merely to make this game comparable to other games discussed in this section, and not to denote a positive or negative connotation to either action.

situation in which both Statler and Waldorf are nice to each other, and their venom fails to find an outlet. Bad as that sounds, it can get worse—Statler might act nicely to Waldorf, who in return will mock Statler with a nasty jeer; suffering an unanswered jab is even worse than having everyone play nice.⁷⁰

Waldorf has the same preferences as Statler (reversing the roles, of course). Abstracting these preferences into a table, the payoff structure will look like this:⁷¹

	Waldorf acts nicely	Waldorf mocks
Statler acts nicely	1,1	0,3
Statler mocks	3,0	2,2

Placing the payoff information in a table helps us identify the likely outcome. Let's put ourselves in Statler's shoes. If he expects Waldorf to act nicely, Statler is better off mocking him (he will then get 3 "utils" (southwest box) instead of one util (northwest box)). And if Statler expects Waldorf to mock him, Statler will—once again, mock Waldorf (he will get 2 utils (southeast box) rather than zero utils (northeast box)). So Statler will mock Waldorf regardless of what he expects Waldorf to do. Since Waldorf has the same preferences, he will reach the same conclusion, and the two will end up teasing and insulting each other. That's good news—this happens to be the welfare-maximizing solution, since they get two utils each, or 4 total—a larger total than in any of the other boxes.

This game is known as the "Deadlock" game, because if acting nicely were considered to be "cooperating", the parties would be deadlocked in refusal to cooperate.⁷²

The Deadlock game is among the most costly to enforce mutual cooperation—not only do the parties tend to not cooperate, but the welfare maximizing situation for them is

⁷⁰ To summarize, the set of preferences for each player of the Deadlock game is:
 $\{D,C\} > \{D,D\} > \{C,C\} > \{C,D\}$.

⁷¹ For the payoff set in each box, Statler's payoff is noted first, then Waldorf's payoff.

⁷² A commonly cited real world example of this game would be arms control negotiations between two countries who do not want to disarm (i.e., would prefer that both they and their enemy be armed than both they and their enemy be unarmed). The likely result is a failure of the arms control negotiations. *See, e.g.*, Janet Chen, Su-I Lu & Dan Vekhter, Game Theory—Non Zero Sum Games—Other Games, available at: <http://cse.stanford.edu/classes/sophomore-college/projects-98/game-theory/dilemma.html>.

mutual default, so if they could coordinate, they'd attempt to enforce mutual default rather than mutual cooperation. Imagine, for example, Statler & Waldorf's response if Kermit tried to force them to act kindly to each other...⁷³

The following subsections will examine other games, their illustrative stories, their payoff structure, the likely behavior of the players and the relative ease of enforcing cooperation in them.

A. Harmony

The Harmony game can be seen to be an inverse of the Deadlock game.⁷⁴ It is the easiest game in which to enforce mutual cooperation. In fact, no enforcement at all is necessary. Alice and Bill, two very good friends, face a choice between the same two actions that Statler and Waldorf chose from in the Deadlock game: they can act nicely to the other or they could mock him/her. Unlike Statler and Waldorf, each of them prefers to be nice to the other, even if he himself is slighted by the other (after all, the other's slight may have been merely a misperception, and at any rate, they care for each other so much that hurting the other would indirectly hurt them). Next worst possibility is that they themselves somehow failed and mocked the other. In that case, each hopes that the other would show restraint and not mock back (this would be worse than being mocked while acting nicely, since the shame of being rude to one's friend in the former case outweighs the anger at being mocked in the latter case). The worst for these two would be slipping into mutual taunting.⁷⁵ Putting these preferences into a payoff table yields this:⁷⁶

	Bill acts nicely	Bill mocks
Alice acts nicely	3,3	2,1
Alice mocks	1,2	0,0

⁷³ Fortunately, absent externalities on non-players, mutual defection is the optimal equilibrium for a deadlock game, so enforcing cooperation may not be beneficial. If the goal of enforcement is not to achieve mutual cooperation, but to achieve maximum joint social welfare, then the deadlock game is very inexpensive to enforce—it will result in mutual default without any enforcement.

⁷⁴ On the Harmony game *see, e.g.*, Amir N. Licht, *Games Commissions Play: 2x2 Games of International Securities Regulation*, 24 *Yale J. Int'l L.* 61, 108-111 (1999).

⁷⁵ The set of preferences for each player of the Harmony game is: {C,C}>{C,D}>{D,C}>{D,D}.

⁷⁶ In each box, Alice's payoff is noted first, then Bill's payoff.

If Alice anticipates that Bill will act nicely, she will certainly reciprocate (she would get 3 utils in that case, rather than 1 if she mocked him). If Alice anticipates that Bill will mock her, she will still act nicely (as she would get two points for being nice despite Bill's behavior, while she would get zero points if she mocked back). So, Alice will always act nicely towards Bill. Since Bill has the same preferences, he will always act nicely towards Alice. There is therefore only one Nash equilibrium⁷⁷ in this game: mutual cooperation. This means that no enforcement is needed to achieve mutual cooperation.

B. Meeting Place

Meeting Place is the second least expensive game to enforce mutual cooperation (after the Harmony game). Alice and Bill—still very good friends—can either wait at the lobby of the law school, or at the library. Since they enjoy each others' company, they derive the most utility when they are both waiting in the same place—the meeting place. They are indifferent as to whether the meeting place is the lobby or the library, as long as they are both there. If they are not together, they are unhappy to the same degree, whether Alice is waiting at the lobby and Bill at the library, or vice versa.⁷⁸ To put the payoff structure into a table:⁷⁹

	Bill at lobby	Bill at library
Alice at lobby	2,2	0,0
Alice at library	0,0	2,2

What will each of them do? If Alice thought Bill would go to the lobby, she would too. If she thought Bill would go to the library, so would she. Bill would do the same. Each of them may fail to anticipate where the other is going, and as a result they

⁷⁷ A Nash equilibrium is a set of actions, one for each player, under which a player knowing what the other players' actions are could not improve her utility by picking another action. On Nash equilibrium, *see*: John F. Nash, Jr., *Equilibrium Points in n-person Games*, 36 Proceedings of the Nat'l Academy of Sciences, U.S.A. 48 (1950); John Nash, *Non-Cooperative Games*, 54 Annals of Mathematics 286 (1951); David M. Kreps, *Nash Equilibrium*, in Eatwell, Milgate & Newman, *supra* note 67, pp. 167-177.

⁷⁸ The set of preferences for each player of the Meeting Place game can be summarized as: $\{C,C\}=\{D,D\}>\{C,D\}=\{D,C\}$.

⁷⁹ In each box, Alice's payoff is noted first, then Bill's payoff.

would be apart despite both of them wanting to be together. However, the cost of enforcing cooperation is very low—all that is needed is to convey information from one of them to the other as to where he or she will be (the meeting place, from which the game’s name is derived).⁸⁰ There is no need for bilateral communication or for negotiating an agreement—once one knows of the other’s action, the other will adjust behavior to ensure that they both meet.

C. Battle of the Sexes

Battle of the Sexes adds one important element to the Meeting Place game—each player now has an opposing preference as to the location in which they will meet, but they still prefer being together in the disfavored location over being alone in a favored location. Alice and Bill, now wife and husband, make evening plans. As with the other games, they are limited to two choices: either go to a baseball game (Alice’s favorite pastime), or see a movie (Bill’s favorite activity).⁸¹ Loving couple that they are, each prefers to do the activity they less favor but be together, rather than opt for the favorite activity but be alone. Unlike the Meeting Place game, however, they are partial as to where they’d prefer to spend time together (and their preferences conflict).⁸² Also, excessive consideration on the part of both will lead to the worst of possible situations, in which Alice goes to see a movie (to please Bill), while Bill goes to the baseball game (to please Alice). The payoff table may be as follows:⁸³

⁸⁰ Quite often both parties will converge on the same location, even without coordination. See Thomas C. Schelling, *Bargaining, Communication and Limited War*, 1 Conflict Resolution 19, 20-21 (1957) (discussing, inter alia, an experiment in which people were told they are to meet someone in New York City, though they do not have a prior understanding as to when and where the meeting will take place and cannot communicate with that person prior to the meeting. Schelling reported that an absolute majority picked Grand Central Station as the meeting place, and virtually all of them picked noon as the meeting time).

⁸¹ In the original formulation of the illustrative example of this game, a husband wanted to watch a boxing match while the wife wanted to watch a ballet performance. That example is attributed to R. Duncan Luce and Howard Raiffa. See David Crump, *Game Theory, Legislation, and the Multiple Meanings of Equality*, 38 Harv. J. of Legis. 331, 367 (2001), at footnote 156.

⁸² If going to a baseball game is considered as action “C” while going to a movie is considered as action “D”, then in a Battle of the Sexes game the set of preferences for Alice is: {C,C}>{D,D}>{C,D}>{D,C}, while Bill’s set of preferences is: {D,D}>{C,C}>{D,C}>{C,D}.

⁸³ In each box, Alice’s payoff is noted first, then Bill’s payoff.

	Bill sees baseball game	Bill goes to a movie
Alice sees baseball game	3,2	0,0
Alice goes to a movie	1,1	2,3

Absent coordination, the players might find themselves sliding into the worse outcome, and paradoxically this is more likely to happen the greater their mutual care for each other. Consider O. Henry's "The Gift of the Magi", in which a loving but poor couple seek to buy each other Christmas gifts.⁸⁴ Jim sells his pocket watch to buy Della a set of combs; Della sells her hair to a wig maker to buy Jim a gold chain for his pocket watch.⁸⁵

An enforcement mechanism is needed, therefore, to achieve the optimal outcome, though it might suffice that this mechanism would convey to one party information on the other party's expected actions (e.g., notify Bill that Alice has decided to go see a baseball game, in which case Bill will decided to do the same). Unlike the Meeting Place game, however, each player prefers one plan over the other, so allocation of the surplus from cooperating becomes an issue. If this is a repeated game (e.g., Alice and Bill have to make decisions as to evening plans every day), they may act strategically to get the other party to concede to meet at their preferred place. For example, Bill may go to the movies, despite knowing that Alice is going to the baseball game, in order to signal to her that he is interested that they would go together to the movies. He will suffer a loss in the short term (since he prefers to be with Alice at the baseball stadium than alone at the cinema), but his signal may facilitate long-term gains (by going more often together to the movies, rather than going together to the baseball game).

The need to decide how to allocate the cooperative surplus and the likelihood of strategic behavior on the part of either (or both) parties increase both the cost of

⁸⁴ William S. Porter (O. Henry), *The Gift of the Magi*, in *The Best Short Stories of O. Henry* (Modern Library, 1994) 1, available at: http://www.auburn.edu/~vestmon/Gift_of_the_Magi.html.

⁸⁵ The Gift of the Magi might not be an ideal example of a failure in a Battle of the Sexes game, because O. Henry states clearly in the end of the story that the mutual sacrifices are of great value. *Id.* While the gifts were not useable, they did indicate strong affection and therefore provided utility to the players. In a true Battle of the Sexes game, a player derives no utility from knowing the other player made a sacrifice (unless that sacrifice causes the two to be together, in which case the utility would be from being together, not from being the beneficiary of a sacrifice).

negotiating and reaching a plan on where they will go on each day, and a risk that either party will renege on the agreement in order to renegotiate it in his or her favor. However, given that the short-term interests of both parties lie in cooperating, enforcement costs are still much lower than in game types in which the parties do not favor cooperation as a goal of its own.

D. Stag Hunt

The Stag Hunt game is based on a passage from Jean-Jacques Rousseau's *Discourse on the Origin and Basis of Inequality among Men*, which was written in 1754.⁸⁶ Rousseau discusses cooperation among hunters; to hunt deer (which could feed all the participating hunters), each hunter has to stay at his post; if one hunter abandoned his post, the deer could escape. However, continues Rousseau, if any one of the hunters encounters a hare (which can be caught by a single hunter, but only barely provides food for a single hunter), he will likely abandon his post and capture the hare. As a result of at least one of the hunters abandoning the stag hunt in favor of catching a hare, the hunt for the deer will fail.⁸⁷ The payoffs for this game (with two hunters) look as follows:⁸⁸

	Hunter B ambushes deer	Hunter B chases hare
Hunter A ambushes deer	3,3	1,0
Hunter A chases hare	0,1	1,1

Why would a hunter abandon his post and opt for the hare when he can receive more food if the stag hunt is successful? Capturing a hare is completely within the control of the individual hunter; capturing the stag is not. If the hunter suspects one his fellows

⁸⁶ Jean-Jacques Rousseau, *Discourse on the Origin and Basis of Inequality Among Men (Second Discourse)* (Everyman's Library, New York, 1950) 428, available at: <http://www.constitution.org/jjr/ineq.htm>: "In this manner, men may have insensibly acquired some gross ideas of mutual undertakings, and of the advantages of fulfilling them: that is, just so far as their present and apparent interest was concerned: for they were perfect strangers to foresight, and were so far from troubling themselves about the distant future, that they hardly thought of the morrow. If a deer was to be taken, every one saw that, in order to succeed, he must abide faithfully by his post: but if a hare happened to come within the reach of any one of them, it is not to be doubted that he pursued it without scruple, and, having seized his prey, cared very little, if by so doing he caused his companions to miss theirs."

⁸⁷ The set of preferences for each player of the Stag Hunt game is: $\{C,C\} > \{D,C\} \geq \{D,D\} > \{C,D\}$.

⁸⁸ In each box, Hunter A's payoff is noted first, then Hunter B's payoff.

will abandon his post, he too should do so, for the stag will escape (and the hunter will remain with neither stag nor hare) if cooperation is not achieved.

The Stag Hunt is a relatively inexpensive game to enforce, though it is likely to be more expensive to enforce than the two previously described games. Like Meeting Place and Battle of the Sexes, it has two Nash equilibria.⁸⁹ Unlike these two games, however, one equilibrium results in greater welfare for both parties than the other, so unlike the Meeting Place and Battle of the Sexes games, in which a person concerned only with (joint) welfare-maximizing would be indifferent as to which of the two equilibria would result,⁹⁰ the players have a preference in the Stag Hunt for mutual cooperation. This increases the value in ensuring mutual cooperation, but as a result requires expending enforcement costs in order to reach one equilibrium rather than another. Enforcement costs are not very high, however, since both players seek the same equilibrium and therefore would not act strategically to deceive each other. However, each player would need some assurance that the other player will not default.

E. Chicken

The Chicken game is a game of coordination, but not cooperation. Its illustrative story is taken from the movie “Rebel without a Cause”.⁹¹ Jim Stark (actor James Dean) and Buzz Gunderson compete for the heart of Judy by playing the “chicken-run” game. They steal a couple of cars and simultaneously race them towards a cliff. The first driver to jump out of the car is declared the “chicken”; the other driver can then jump out and be considered the winner, gaining Judy’s affection and the respect of his peers. The cars run off the cliff and plunge to the ground, killing a driver who failed to jump out in time.

The order of preferences for each driver is thus as follows: (1) Waiting for the other driver to jump while the other driver “chickens-out” (i.e., jumps early), thus winning the game; (2) chickening-out while the other driver does the same (no shame for

⁸⁹ One Nash equilibrium is {Hunt Stag, Hunt Stag} (in generic terms—{C, C}), the other is {Chase Hare, Chase Hare} (in generic terms {D, D}).

⁹⁰ In the Meeting Place game, one would also be indifferent as to the allocative differences between the two equilibria (because there are none—both players gain the same payoffs in either equilibrium). In the Battle of the Sexes game, however, there are allocative differences (though not differences in total welfare) between the equilibria—Alice is better off if she and Bill went to see a baseball game; Bill is better off if they went to a movie.

⁹¹ *Rebel Without a Cause* (1955), directed by Nicholas Ray.

either driver); (3) chickening-out while the other driver waits (a shameful loss); and worst of all, (4) waiting while the other driver does the same, resulting in both drivers staying in the car too long and plunging to their deaths.⁹² The payoff table is:⁹³

	Buzz chickens-out	Buzz waits
Jim chickens-out	2,2	1,3
Jim waits	3,1	0,0

Each player's action is the inverse of his assessment of the other player's action. If Jim thinks Buzz will chicken-out, Jim would be wise to wait. If Jim thinks Buzz will wait (i.e., not jump until Jim does), Jim should chicken-out so as not to die. When this game is played repeatedly and reputation matters, each party will be wise to invest in building a reputation of aggressiveness, to make clear to the other party that they will not chicken-out (once this reputation is established, the other player would be rational to chicken-out, and so the aggressive player will gain the most favorable outcome (winning the Chicken game) in all future interactions.

Enforcing mutual cooperation (in the context of the Chicken game, mutually "chickening-out") is more expensive than in either Meeting Place, Battle of the Sexes or Stag Hunt games, since the natural equilibrium for a player informed of the rival's move is never mutual cooperation.⁹⁴ There is a demand from the players for a mechanism that will convey the players' intentions, and once one player credibly commits his actions to the other player,⁹⁵ they will both remain in an equilibrium. But this equilibrium will not be mutual cooperation; to reach mutual cooperation, the players must be forced to cooperate. Even once cooperation is achieved, it is not stable. Any success in causing the players to cooperate (mutually chicken-out) will increase the incentive for both parties to each take advantage of the other side's cooperation (chickening out) to default (wait in the car). The result would be continuous pressures to revert from mutual cooperation.

⁹² The set of preferences for each Chicken player is thus: $\{D,C\} > \{C,C\} > \{C,D\} > \{D,D\}$.

⁹³ In each box, Jim's payoff is noted first, then Buzz's payoff.

⁹⁴ Rather, the player will either chicken-out (cooperate) if the other player defaults, or default (wait in the car) if the other player cooperates.

⁹⁵ Credible commitment of aggressive intentions is costly in itself, and most likely both parties will expend this cost in a competition to be deter the other party.

F. Bully

The Bully game is a hybrid of the Chicken game and the Deadlock game. One player has payoffs similar to those in a Chicken game, while the other has payoffs similar to those in a Deadlock game. An example of this pattern is the biblical story of the trial before King Solomon.⁹⁶ Two women gave birth, but one of the babies died soon thereafter. Both women claimed the living infant was theirs. Both women knew which of them gave birth to the surviving child, but no evidence was available to prove this to third parties. The women appealed to King Solomon for judgment. The king offered to cut the baby and give each woman half of it. One woman agreed to this “compromise”, while the other declined and stated she would rather have the baby given to her rival than have it die. King Solomon then decreed that the latter woman is the real mother, and awarded the baby to her.

King Solomon was quick to understand the Bully game underlying the case before him.⁹⁷ The real mother, knowing the baby was hers and therefore loving him was facing Chicken game payoffs. She would most like to claim the baby (default) while the other woman would make no claim (cooperate), in which case, the real mother would receive custody of the baby. Her second preference could have been, perhaps, that both women revoke their claims (mutual cooperation) and the baby would go to someone else, but this was not an option available in the story. The third preference was to revoke her claim (cooperate) while the false mother insisted on her claim (defaulted) and would receive custody of the baby. This was, to the real mother, better than mutual insistence on claims to the baby, which would have resulted in killing the baby (mutual default).

The false mother, driven by jealousy of the real mother rather than care for the baby, had a Deadlock game preference structure. She would most like to claim the baby (default) while the real mother revoked her claim. But for her, the second best option was not having the baby live with others, but depriving everyone of the baby. Thus, her second preference was insisting on her claim while the real mother insisted as well. The third preference would have been depriving the real mother of the baby by having both

⁹⁶ 1 Kings 3:16-28. Using Solomon’s trial as an illustration of the Bully game is not the author’s original idea. However, the author failed to find a reference making this illustration.

⁹⁷ On King Solomon’s strategy in this trial see: Saul Levmore, *Rethinking Group Responsibility and Strategic Threats in Biblical Texts and Modern Law*, 71 Chi.-Kent L. Rev. 85, 91-94.

real and false mothers revoke claims to the baby and hand the baby to others. The worst option, from the false mother's perspective, was to revoke her claim while the real mother insisted on her claim and received custody of the baby.⁹⁸ The payoff structure is, therefore:⁹⁹

	False Mother waives claim on baby	False Mother insists on claiming baby
Real Mother waives claim on baby	2,1	1,3
Real Mother insists on claiming baby	3,0	0,2

Solomon understood that in order to discover the truth in the absence of evidence, he would need to create an incentive structure that would differentiate between the real mother (who would have a Chicken game incentive structure) from the false mother (who would have a Deadlock payoff structure). When the women came before Solomon, each petitioned for her first preference (being awarded the baby). Since both Chicken and Bully payoffs have the same first preference, this could not differentiate the two. By threatening to kill the baby if both women insisted on their claims, Solomon created the payoff structure of a Bully game. The Deadlock player (false mother) had a credible threat of defaulting (insisting on the baby even if this led to the baby's death). Knowing this, the Chicken player had only one equilibrium—to chicken-out (waive claims to the baby) in order to reach a {C, D} result, which is better for it than {D, D}. Since the Bully game has a single equilibrium, in which the Chicken player cooperates and the Deadlock player defaults, Solomon could know that the woman who cooperated was the Chicken player, or in other words—the real mother (or, at least, the woman that cared more for the baby).

Bully games are more stable than Chicken games, but they are even more costly to enforce (into mutual cooperation) than games of Chicken. It would take significant expenditures to prevent the Deadlock player from defaulting, and then, the Chicken

⁹⁸ To summarize, the sets of preferences in the Bully game are, for the Chicken player: {D,C}>{C,C}>{C,D}>{D,D} and for the Deadlock player: {D,C}>{D,D}>{C,C}>{C,D}.

⁹⁹ In each box, the real mother's payoff is noted first, then the false mother's payoff.

player would himself have a strong incentive to default. Furthermore, from the static (single game) point of view, an outcome of {C, D} might not be inefficient; it all depends on the exact payoffs in the specific circumstances.¹⁰⁰ But from a dynamic perspective (repeating games), the Chicken player will eventually either be eliminated or (if it can) withdraw from interacting with the ‘bully’ Deadlock player. This would reduce interaction—and hence network effects—below the level it could be at if the bully were restrained.

G. Prisoners’ Dilemma

The final game described in this abbreviated taxonomy, and the one in which it is most costly to enforce the jointly beneficial outcome, is the Prisoners’ Dilemma game.¹⁰¹ One version of the Illustrative story is as follows:¹⁰² Two men, Carl and Dan, commit armed robbery and are arrested on weapons charges. Both suspects are held in separate rooms where they cannot talk to each other. The district attorney approaches Carl and says, “We know that you robbed the bank. If you testify against Dan we will let you go free and Dan will get 15 years; if you don't we have enough to get you on a weapons charge and you will get three years in jail.” Suspicious of the offer, Carl asks, “What's the catch?” The district attorney replies, “The catch is that we are offering the same deal to Dan and if both of you turn in the other, both of you will get 10 years for armed robbery.”

The set of preferences each of the prisoners has is clear. Best of all would be confessing while the other remains silent (the confessor will receive no jail time, while the other prisoner will serve 15 years). The second best option would be to remain silent while the other prisoner remains silent as well (each will serve 3 years for car theft). Third best would be confessing while the other prisoner confessed (both will serve 10 years for robbery). The worst outcome would be to remain silent while the other prisoner

¹⁰⁰ In the case of the payoffs noted in the table, the equilibrium of {C, D} is actually the welfare-maximizing one, with a total of 4 utils—three to the Deadlock player, one to the Chicken player (this, of course, may create issues regarding the distribution of the gains, regardless of its efficiency).

¹⁰¹ On the Prisoners’ Dilemma game *see, e.g.*, Anatol Rapoport, *Prisoner’s Dilemma*, in Eatwell, Milgate & Newman, *supra* note 67, pp. 199-204.

¹⁰² This specific illustrative fact pattern is taken, with minor modifications, from: Richard W. Painter, *Game Theoretic and Contractarian Paradigms in the Uneasy Relationship between Regulators and Regulatory Lawyers*, 65 *Fordham L. Rev.* 149, 153 (1996), at footnote 24.

confessed (the silent prisoner will spend 15 years in jail while the confessor will receive immunity).¹⁰³ The payoff table is, therefore:¹⁰⁴

	Dan remains silent	Dan confesses
Carl remains silent	2,2	0,3
Carl confesses	3,0	1,1

The prisoners would maximize their joint welfare by mutual cooperation (in this case, by both remaining silent)—they will earn a total of 4 utils. The worst possible outcome (from the perspective of joint welfare) is mutual default (both confess). Yet, if Carl expects Dan to remain silent, Carl is better off confessing (3 utils as opposed to 2). And if Carl expects Dan to confess, Carl certainly prefers to confess (1 util instead of 0). As a result, Carl will confess regardless of what he expects Dan to do. Dan would do the same. They will mutually default—the worst possible outcome for the two.

An amusing example of the logic leading to mutual default in a Prisoners' Dilemma is found in Joseph Heller's "Catch-22". Yossarian, an officer serving in the U.S. Air Force during World War II decides to desert the military. Major Danby attempts to dissuade him, appealing to his sense of duty. Yossarian insists:

“am turning my bombsight in for the duration. From now on I'm thinking only of me.”

Major Danby replied indulgently with a superior smile, ‘But, Yossarian, suppose everyone felt that way?’

‘Then I'd certainly be a damned fool to feel any other way, wouldn't I?’¹⁰⁵

A coordination mechanism (i.e., conveying information to one party on what the other party will do) does not suffice to alleviate the Prisoners' Dilemma. Each prisoner will default regardless of what he expects the other prisoner to do. Also, unlike the Stag Hunt game, forcing one party to cooperate would not suffice, since the other party will default even if it knows the first party will cooperate. To enforce mutual cooperation,

¹⁰³ In other words, as mentioned *infra*, in Section II.3, the set of preferences for each player in the Prisoners' Dilemma game can be summarized as: $\{D,C\} > \{C,C\} > \{D,D\} > \{C,D\}$.

¹⁰⁴ In each box, Carl's payoff is noted first, then Jim's payoff.

¹⁰⁵ Joseph Heller, *Catch-22* (Simon & Schuster, 1955) 456.

deterrence or coercion of both players must be effective. Curiously, as discussed below,¹⁰⁶ some of the most beneficial functions, which are more closely associated with “regulation” (e.g., mitigating opportunism), are of the Prisoners’ Dilemma game type and are thus mutual cooperation is very costly to enforce in them. Such functions are unlikely to be able to form spontaneously. It is for these functions that private legal system evolution is most necessary.

IV. Applying the Theory: The Extant Literature from an Evolutionary Perspective

A. Assessing Enforcement Costs of Regulated Functions

Later subsections will examine how observations made in leading works of private ordering scholarship support the theory of non-spontaneous evolution of private legal systems. This theory anticipates that private legal systems begin as networks regulating low enforcement cost functions, then expand to regulate increasingly expensive to enforce (but also beneficial) functions. Therefore, a rough idea of the enforcement costs of the relevant functions is needed.¹⁰⁷ As discussed above,¹⁰⁸ some of the more significant criteria include: the average utility of the function to the member,¹⁰⁹ the variance in utility among members,¹¹⁰ the market structure both at the network level (the extent of competition among networks)¹¹¹ and at the individual level (relative power of each of the network’s members),¹¹² and the game type of the function.¹¹³

¹⁰⁶ *Infra*, in Section IV.3.

¹⁰⁷ Because the works discussed in this section were not created with the theory of non-spontaneous evolution in mind, they do not contain all the information pertinent to this paper’s thesis. No better can be done at this time than gaining a rough sense of enforcement costs, and using imperfect descriptions of the evolution of the networks described in the works discussed in this section. In the future, case studies specifically aimed at testing this theory may improve on these first steps.

¹⁰⁸ *See supra*, Section II.3.

¹⁰⁹ Generally, the higher the utility, the lower the enforcement costs.

¹¹⁰ Generally, the lower the variance, the lower the enforcement costs.

¹¹¹ The lesser the competition, the lower the enforcement costs. But as stated *supra*, note 63, reduced competition among networks is not necessarily net welfare enhancing. A reduction in competition increases the network’s ability to regulate (which is welfare-enhancing), but also decreases the network’s incentive to regulate efficiently, which is welfare reducing. Which of these has a greater effect on welfare depends on particular circumstances.

¹¹² The lesser the market power of the network’s members, the lower the enforcement costs. Network members with significant market power are more likely to attempt degradation of connectivity within the network (e.g., not following the rules, transacting outside of the network, etc.). For example, Lisa Bernstein notes that larger diamond dealers (presumably having more market power than their smaller rivals) often trade outside of the diamond exchange. *See* Bernstein, *supra* note 6, at p. 120 (“Most large and important dealers are members of the club, but they do not usually conduct their business in the club’s trading hall...

It may be expected that the literature discussing private legal systems would not contain much variety in the average utility to network members; after all, examining networks that provide relatively unimportant services is less interesting than investigating those that serve valuable functions. Variance of benefits is often reflected in game types. For example, Battle of the Sexes is, as mentioned earlier, a Meeting Place game with an added feature of variance in the benefits from mutual behavior (i.e., both players prefer {C,C} and {D,D} over the other outcomes, but one player prefers {C,C} over {D,D}, and the other—vice versa).

Market structure affects enforcement costs both at the network level (the amount of competition among regulating networks) and the individual level (the relative power of each of the network's members). At the network level, the effects of inter-network competition have been thoroughly discussed in the antitrust literature,¹¹⁴ and in the corporations law literature,¹¹⁵ though not quite as much in the private ordering literature. At the individual level, market structure affects the likelihood of a member degrading connectivity with the network (e.g., disobeying the network's rules, transacting outside of the network and by that weakening the network's enforcement mechanisms, etc.), which increases enforcement costs.¹¹⁶ It also often affects the game type of the function.

For example, a Chicken game is more likely to be played in market structures in oligopoly-like structures in which there are a few, large players of approximately equal market power (e.g., the social network in a small, rural community), rather than many

large scale transactions tend to be consummated in private offices.”). On the strategy of degradation, see Jacques Cremer, Patrick Rey & Jean Tirole, *Connectivity in The Commercial Internet*, 48 J. Indus. Econ. 433 (2000); Aviram, *supra* note 11, at Section II.3.

¹¹³ Assessment of relative enforcement costs of the game types was made as part of discussing each game type. See *supra*, Sections III.1 through III.7.

¹¹⁴ See, e.g., William J. Kolasky, *Network Effects: A Contrarian View*, 7 Geo. Mason L. Rev. 577 (1999); Mark A. Lemley & David McGowan, *Legal Implications of Network Economic Effects*, 86 Cal. L. Rev. 479, 500-523 (1998); William E. Cohen, *Competition and Foreclosure in the Context of Installed Base and Compatibility Effects*, 64 Antitrust L. J. 535 (1996); Thomas A. Piraino, Jr., *The Antitrust Analysis of Network Joint Ventures*, 47 Hastings L.J. 5 (1995).

¹¹⁵ See, e.g., Lucian Arye Bebchuk & Mark J. Roe, *A Theory of Path Dependence in Corporate Ownership and Governance*, 52 Stan. L. Rev. 127, 141 (1999) (arguing that network effects may induce persistence of pre-existing corporate structures); Michael Klausner, *Corporations, Corporate Law and Networks of Contracts*, 81 Va. L. Rev. 757 (1995) (discussing the presence and effects of network externalities in corporate contracts); Larry E. Ribstein & Bruce H. Kobayashi, *Choice of Form and Network Externalities*, 43 Wm. & Mary L. Rev. 79 (2001) (presenting empirical evidence that the choice of form of incorporation (e.g., partnership, LLP, LLC, corporation) is driven not by network lock-in effects, but by relative business advantages of a given form over the other forms).

¹¹⁶ See *supra*, note 112.

small players or a few unequally powerful players. In contrast, a Bully game is more likely to characterize payoffs when the market contains one player that is markedly more powerful than the others. It is this power (and hence lesser vulnerability) that enables that player to credibly threaten to play “Deadlock” rather than “Chicken”; weaker players would like to bluff and masquerade as Deadlock players, but lacking market power they cannot credibly persuade their rivals that they will not back off from defaulting in the face of the other player’s threat to also default.¹¹⁷

Game types, therefore, are a key criterion in determining enforcement costs, yet this criterion had not been addressed by the literature on collusion.¹¹⁸ In assessing below the enforcement costs of functions, the paper will give the most attention to the criterion of game type, although other criteria will be regarded as well. The remaining subsections will examine case studies, most of which are leading works in the private ordering scholarship. The next subsection will discuss case studies of functions characterized by the lowest enforcement cost game types: Harmony and Meeting Place. Since functions characterized by low enforcement costs are likely to survive spontaneous formation and develop effective enforcement mechanisms, it is of no surprise that they become foundations for more elaborate, and more expensive to enforce, private legal systems. The final subsection of this section will address functions characterized by higher enforcement cost game types—Battle of the Sexes, Stag Hunt, Chicken, Bully and Prisoners’ Dilemma.

B. Lower Enforcement Cost Functions: The Foundations of Private Ordering

Very little of the private ordering literature pays attention to functions characterized by the lowest enforcement cost game types: Harmony and Meeting Place.

¹¹⁷ There are numerous other structural issues that affect game type. For example, the choice between a Meeting Place game and a Battle of the Sexes game could depend on whether this is the first time the norm in question is set, or whether there are competing norms to choose from. If there are competing norms, most likely each network member has some costs associated with switching to the other norm. As a result, the member will have a preference for the incumbent norm, even if it would as second preference follow another norm rather than be the only one using the incumbent norm while all others used the other one. This is a Battle of the Sexes payoff structure. In contrast, if no member has adopted an existing norm, they may be indifferent among norm alternatives, as long as one norm is agreed upon and adopted universally—this is a Meeting Place payoff structure.

¹¹⁸ For a proposed explanation of the reason that the cartel stability literature did not address the game type criterion, see *supra*, Section II.3.

One reason may be that due to the low enforcement costs, the enforcement mechanisms do not need to be very elaborate. At the extreme, the least-cost game—Harmony—does not need any enforcement whatsoever, since both players will always choose the action “C” (cooperate) without regard to what the other player does.¹¹⁹ As a result, neither coercion nor mere information exchange are necessary to ensure mutual cooperation.

Functions characterized by the Meeting Place game are omnipresent in our lives, and as this paper argues, they form the nucleus of more elaborate, and more expensive to enforce private legal systems. The most ubiquitous Meeting Place type function is the social network. In most cases, people are indifferent (within a certain range of alternatives) to the choice of location of interaction, type of interaction, etc. If these alternatives would be considered the “C” and “D” actions, each person is indifferent between {C,C} and {D,D}. Social interaction requires, however, that both (or all) players choose the same alternative; they would not beneficially interact if they are in different locations or if one has come for a swimming competition while the other has come for a debate match. Therefore, {C,D} and {D,C} are both worse than the mutual alternatives. This is precisely the Meeting Place game structure.

Similarly, members of religious networks, at least in many places and many eras in the past, have Meeting Place-type preferences. Most believers benefit from uniformity in religious doctrine. The choice of religious doctrine is often (especially in societies such as Tenth Century Europe) not a conscious decision by the believer—one often accepts the doctrine that is prevalent in one’s locale. But most believers prefer to conform with the locally accepted doctrine (i.e., a preference for {C,C} and {D,D} over other outcomes, which is a trait of both Meeting Place and Battle of the Sexes games), and furthermore do not feel they are better off under one doctrine rather than another (i.e., indifference between {C,C} and {D,D}, which is the trait of a Meeting Place game but not a Battle of the Sexes game).

Given the vast variety of social and religious networks and of people’s preferences in these realms, certainly these assumptions are not always correct. Some

¹¹⁹ See, e.g., Licht, *supra* note 74, at p. 109: “...one may distinguish between “playing C” in the Harmony game and “cooperation,” where cooperation requires that the actions of parties—which are not in preexistent harmony—be brought into conformity with one another through negotiation. In its pure form, Harmony does not call for any cooperation in the sense of conscious policy coordination, as the players independently converge to the desired CC outcome.” (footnote omitted).

people enjoy being mavericks, which in game terms means preferring {C,D} and {D,C} over the other outcomes. More commonly, people do have a certain preference as to specifics of the religious doctrine or social interaction (e.g., preferring to talk about sports rather than politics and vice versa). In such cases, the social or religious network will be characterized by the moderately costly Battle of the Sexes game, rather than the Meeting Place game. But as mentioned before, people tend to seek the lowest cost regulator. As a result, groups are likely to expel some members and invite others, so that their preferences are similar, and thus the characterizing game type is Harmony or Meeting Place, not Battle of the Sexes. Therefore, people interested in talking about sports will likely find a social network in which members are most interested to talk about sports. It would often be more costly to have within the same network also people who dislike sports and want to talk about politics—even if both groups prefer talking to anyone on anything over talking about their preferred subjects to themselves, they would still be better off finding a group interested in addressing the same interests.¹²⁰ Thus, social, religious, and other similar networks are likely to evolve in a manner that reduces the cost of enforcing the most beneficial interaction, by shifting from the Battle of the Sexes game type to Harmony and Meeting Place game types.

These low enforcement cost networks are the building blocks of private legal systems. Their low enforcement costs are due not only to being Harmony or Meeting Place games, but also due to a high average utility people derive from social and spiritual interaction. Social and religious networks also tend to be more egalitarian—people cannot “corner” social networks as they can “corner” markets, and though some people carry more weight than others in social and religious circles, on average these networks are characterized by lower concentration (and sometimes, by lower barriers to entry) than, say, diamond exchanges.

Social and religious networks overcome another factor that raises enforcement costs—competition among networks—by increasing switching costs between

¹²⁰ Of course, these people might not always find alternative groups that provide the same utility. A sparsely populated area may not have a great variety of social groups, or sufficient people to form a wide variety of groups. Furthermore, network effects in larger groups or other benefits of a specific group may outweigh the benefit of creating a separate group for each social or religious preference.

networks.¹²¹ One manner in which switching costs increase is by developing unique cultures common to the members of that network.¹²² Since the nuances of common cultures are costly and time consuming to learn, and the lack of familiarity in them is easy to detect, they present a relationship-specific investment in a specific social or religious network. A network member considering disobeying the norms regulated by the network will lose the investment she made in learning the network's culture, and will have to make a new investment in learning the culture of whatever other network she joins. In the meantime, she would be identified by the new network as an outsider.¹²³ Ethnic-based groups form an even tighter barrier—a person cannot change ethnicity, and therefore being expelled from or leaving one's ethnic network is irreplaceable.¹²⁴

The private ordering literature notes the importance of reputation in facilitating private legal systems.¹²⁵ Yet this scholarship often fails to note that the disciplining effect of reputation depends on the group in which this reputation is collected. As discussed in the Pax Dei context, creating a reputation mechanism in a spontaneously formed private legal system is futile, as once the system fails, any reputation contained within it will not be meaningful in itself. However, when a preexisting, low enforcement cost system, such as a social network, expands and uses its information mechanism (e.g., reputation within the social network), this reputation has an effect even after the failure of the higher-end function (restricting warfare, in the Pax Dei case), since the social network is stable and will continue to exist indefinitely. Thus, a warlord who has acquired a poor reputation

¹²¹ See, e.g., Greif, Milgrom & Weingast, *supra* note 9, at p. 757-758: "These guilds, therefore, were able to provide their members with streams of rents in their hometowns. Receiving these rents, however, could have been made conditional on following the recommendations, rules, and directives of the guild. Hence these rents could serve to tie a member to the guild by making change of residence costly and to ensure solidarity among the guild's members."

¹²² Of course, reducing competition among networks is just one of the reasons for creating a common culture within a group, and possibly not the leading one. There are other reasons for the creation of a common culture, including satisfying a need to feel associated with a group. Regardless of the reason, the existence of a common culture reduces competition among social and religious networks and thus reduces the enforcement costs of the network.

¹²³ On viewing people as outsiders, even a decade after they joined the a community, see Ellickson, *supra* note 9, at p. 678: "As the Association President later explained in a hearing before the county Board of Supervisors, the problem was that Ellis, a country resident for a decade, 'hasn't been [in the County] all that long.'"

¹²⁴ As Richard Posner observes, some primitive societies have bypassed the non-duplicability of kinship by instituting "barter friendships", which oblige the parties to similar standards of loyalty as they owe their kinsmen. See Richard A. Posner, *A Theory of Primitive Society, with Special Reference to Law*, 23 J. Law & Econ. 1 (1980).

¹²⁵ See *supra*, notes 29-31.

may suffer ostracism from the social or religious network even if and after the high-cost function (restricting warfare) has failed.

One might argue that religious networks govern not by providing to people's spiritual needs, but by invoking the power of God. According to this critique, there is something unique about the belief that one is abiding to the will of an omnipotent being, and it is fear of God (or of Hell) that makes one willing to voluntarily follow a course of action that would otherwise not be contemplated. But this cannot be a complete answer to the effectiveness of religious networks, even in a highly religious (and superstitious) society of Tenth Century Europe. Some warlords must have been cynical about the likelihood of divine repercussions to refusing Pax Dei. These cynics had much to gain if they refused to adhere to the oaths' limitations while other warlords felt constrained (after all, if this is a Prisoners' Dilemma game and the other player was going to cooperate, a defaulting warlord would find himself in the best outcome for him). Other warlords may have thought that divine will supports any means to their accession to power; after all, people are prone to adopt views the consequences of which are favorable to them.

Anecdotal evidence also suggests that the threat of divine sanction was not a panacea, nor a necessary ingredient for stable private legal systems. Some important private legal systems of approximately the same era were facilitated by non-religious mechanisms. For example, Lex Mercatoria, the medieval customary law of merchants, was enforced by secular, merchant courts. A merchant who ignored their decrees would risk reputation sanctions that likely would cause most merchants to refuse to do business with the offender.¹²⁶ Furthermore, the threat of divine sanction very often failed to direct behavior and resolve disputes, even in the Middle Ages, and even when the parties involved were the clergy. For example, the Great Schism, in which two cardinals claimed to hold to the position of Pope, could not be solved by the church's legal machinery.¹²⁷

¹²⁶ See, e.g., Paul R. Milligram, Douglass C. North & Barry R. Weingast, *The Role of Institutions in the Revival of Trade: The Law Merchant, Private Judges, and the Champagne Fairs*, 2 J. Econ. and Pol. 1 (1990); Lisa Bernstein, *Merchant Law in a Merchant Court: Rethinking the Code's Search for Immanent Business Norms*, 144 U. Pa. L. Rev. 1765 (1996); Eyal Benvenisti, *Exit and Voice in the Age of Globalization*, 98 Mich. L. Rev. 167, 176 (1999), at footnote 35. An important reason for the inability of the Law Merchant to rely on religious enforcement was that the merchants governed by it were of different religious persuasions. This did not, however, prevent the formation of a stable private legal system, enforced by other social networks.

¹²⁷ *The Great Schism: Manifesto of the Revolting Cardinals, Aug 5, 1378*, in Oliver J. Thatcher, and Edgar Holmes McNeal, eds., *A Source Book for Medieval History*, (New York: Scribners, 1905), pp. 326-327,

Finally, a General Council of prelates convened, forced out the two popes and elected another pope.¹²⁸ This General Council was the backbone of the network that provided spiritual services, and was itself a social network. If fear of divine sanctions motivated the people, then a decree from God's agent on earth (whichever of the popes a person believed was legitimate) would determine this conflict. Rather, the mobilization of the bulk of the social/religious network suggests that it was the support of this network that was crucial to any resolution of the conflict.

Low enforcement cost functions have received very modest attention in the private ordering community. Richard McAdams discusses the importance of the social network in forming and regulating norms. His 'Esteem Theory of Norms' argues that people are induced to cooperate by receiving esteem from the group—a non-material good that is one's status within a group.¹²⁹ The groups McAdams refers to are generally ones that this paper would term as Harmony or Meeting Place game types; usually, social networks. The advantage of esteem as a regulating mechanism, according to McAdams, is that esteem sanctions are very inexpensive for each group member to administer.¹³⁰ Again, this argument is in the same vein as the proposition that the Harmony and Meeting Place type networks are the least-cost enforcers. McAdams adds another feature that enhances compliance—esteem competition. Esteem is relative, and thus compliance by

available at: <http://www.fordham.edu/halsall/source/grtschism1.html>; *The Great Schism: University of Paris and the Schism, 1393*, in Oliver J. Thatcher, and Edgar Holmes McNeal, eds., *A Source Book for Medieval History*, (New York: Scribners, 1905), pp. 326-327, available at:

<http://www.fordham.edu/halsall/source/grtschism2.html>; *The Great Schism: Council of Pisa, Competency to Try Popes, 1409*, in Oliver J. Thatcher, and Edgar Holmes McNeal, eds., *A Source Book for Medieval History*, (New York: Scribners, 1905), pp. 327-328, available at:

<http://www.fordham.edu/halsall/source/grtschism3.html>;

¹²⁸ See, e.g., Norman P. Tanner (ed.), *Decrees of the Ecumenical Councils: Council of Constance 1414-18*, available at: <http://www.piar.hu/councils/ecum16.htm>.

¹²⁹ Richard H. McAdams, *Cooperation and Conflict: The Economics of Group Status Production and Race Discrimination*, 108 Harv. L. Rev. 1003, 1019 (1995): "If neither material self-interest nor altruism explains the residuum of cooperation, what can? And why does the level of cooperation vary so significantly with the manner in which individuals are categorized by group? This section proposes an answer: group-based status production. In the experiments discussed above, individuals behave selfishly, not altruistically, but their selfish end is the production of the non-material good of esteem. If individuals seek such nonmaterial ends, members of social groups have another means of solving collective action problems—by allocating esteem to induce members to make contributions to group welfare."

¹³⁰ Richard H. McAdams, *The Origin, Development, and Regulation of Norms*, 96 Mich. L. Rev. 338, 365 (1997): "The key feature of esteem is that individuals do not always bear a cost by granting different levels of esteem to others. Because the cost is often zero, esteem sanctions are not necessarily subject to the second-order collective action problem that makes the explanation of norms more difficult."

some people raises the cost of non-compliance for the others, since the esteem collected by the compliant parties devalues the group status of non-complying members.¹³¹

McAdams' esteem theory does not differentiate between groups, however, and as a result does not address the evolutionary pattern of private legal systems described in this paper. As discussed above, different "groups" (i.e., regulating networks) have widely varying enforcement costs. If all groups were the same, spontaneous formation would be possible for every network. But this is not the case; low-enforcement cost functions (and the networks that enforce them) are the only ones that are likely to survive spontaneous formation, and they expand to encompass other, more expensive to enforce functions, which in turn strengthens further their enforcement mechanisms. In the next sub-section the paper will proceed to examine the more expensive to enforce game types and the private ordering literature that addresses them.

C. Higher Enforcement Cost Functions: Gradual Evolution of Private Ordering

The private ordering literature on functions that are more expensive to enforce is much richer than that on low-cost functions. The high cost functions are more elaborate, and more closely resemble the public legal system (i.e., "the law"). This subsection observes case studies from the private ordering literature and examines how expensive-to-enforce functions usually evolve from Harmony or Meeting Place type of functions. These functions include moderately expensive, Battle of the Sexes type functions such as forming exchanges¹³² and merchant coalitions,¹³³ as well as more expensive, Chicken and Prisoners' Dilemma type functions such as prohibiting opportunistic behavior in exchanges,¹³⁴ restricting warfare and resolving trespass disputes between neighbors.¹³⁵

The exceptions to this rule are also noted. In some cases, moderately expensive game types (such as Battle of the Sexes) require disciplining a group of individuals that are not all members of any single inexpensive function (such as a social or religious group), and therefore none of the inexpensive networks can evolve to attend to the

¹³¹ McAdams, *id.*, at p. 366: "Because the desire for esteem is relative, competition for esteem can progressively raise the standard the norm imposes."

¹³² For example, diamond exchanges described in Bernstein, *supra* note 6; Bernstein, *supra* note 21.

¹³³ Such as the Maghribi traders coalition described in Greif, *supra* note 6 and Greif, *supra* note 26.

¹³⁴ Bernstein, *supra* note 6; Bernstein, *supra* note 21.

¹³⁵ Ellickson (1991), *supra* note 6; Ellickson, *supra* note 9.

moderately expensive function. For example, traders from different regions and religions may not share a single social or religious network that could expand to regulate trading interaction. In some cases, such as merchant coalitions in Mexican California¹³⁶ and pre-Hanseatic League German Kontore (merchant organizations),¹³⁷ a regulating network managed to spontaneously form despite the lack of a low enforcement cost foundation. However, as discussed below, these private legal systems were not very effective, and could not evolve to regulate higher-enforcement cost functions such as coordinating a multilateral punishment. This led, in the case of the German merchants, to the formation of the Hanseatic League—an expansion of the underlying, low enforcement cost social function to cover the individuals that required regulation of a higher cost function (providing security to merchants while abroad). Once formed, the Hanseatic League quickly evolved to form a more effective replacement to the pre-League Kontore. These findings support the theory espoused above, in Section II.

Merchant coalitions and exchanges typically exhibit Battle of the Sexes game type characteristics. Merchant coalitions, for example, protect participating merchants from being defrauded by their agents by conveying information on prospective agents' honesty, and possibly by coordinating a boycott of dishonest merchants.¹³⁸ Different merchants have differing vulnerabilities to agent dishonesty: some think they are better at identifying honest agents; others do not use agents very frequently, or only use trusted family members as agents. As a result, there is a disparity in how different merchants view the risk of agent dishonesty, and hence the investment they are willing to make in the coalition to reduce this problem.

In this case, the “C” action would be a large investment in identifying and punishing dishonest agents (perhaps it includes a duty to refrain to deal with any agent the coalition deems dishonest, no matter how profitable dealing with him may be to a specific merchant), while the “D” action would be a small investment in identifying dishonest agents. The more vulnerable merchants will prefer a {C,C} outcome over all others, while their less vulnerable counterparts will prefer a {D,D} outcome. However,

¹³⁶ Described in Clay, *supra* note 6.

¹³⁷ Described in Greif, Milgrom & Weingast, *supra* note 9.

¹³⁸ See, e.g., Greif, *supra* note 6, at p. 526; Greif, *supra* note 26, at p. 858-859; Clay, *supra* note 6, at p. 203.

both would opt for either of the mutual outcomes rather than disagree {C,D} or {D,C}, in which case no coalition will form and each merchant will have to fend for their own—the worst outcome for all merchants. This is a Battle of the Sexes preference set.¹³⁹

Similar to merchant coalitions, exchanges also exhibit Battle of the Sexes characteristics. Any given norms of trading favor some over others. Smaller merchants lacking facilities to operate 24 hours a day prefer to limit the scope of time in which trading is possible.¹⁴⁰ Other traders might benefit from certain trading systems and be harmed from alternative trading systems. Again, however, due to the network effects involved in having a large market, most members prefer trading in a larger, more liquid market with somewhat less favorable trading rules, than trading in a small, illiquid market that uses the rules most favorable to them.

In some cases, markets split, just like social and religious groups described in the previous sub-section, in order to accommodate the preferences of smaller groups and turn the network's characteristic game type into Harmony or Meeting Place. However, this is less frequent in exchanges and merchant coalitions, perhaps because network effects tend to peak earlier in social and religious groups, while the network effects of an exchange are still large enough to outweigh the greater enforcement costs of regulating the heterogeneous preferences of the members; and perhaps because the maintenance of a market, which is a Battle of the Sexes function, is closely tied to a more expensive, Prisoners' Dilemma type function—that of mitigating opportunistic behavior in transactions within the market. Mitigating opportunism is characterized by the Prisoners' Dilemma game because each merchant would most like to be able to be opportunistic while others are not; then, as a second preference, she would like that neither she nor others would be opportunistic. Her third preference is that both she and the others are opportunistic, because, if everyone else is acting opportunistically, she'd be a fool not to, wouldn't she? This, of course, is the preference set for a Prisoners' Dilemma game.

Since markets often undertake to both facilitate exchange (Battle of the Sexes game) and mitigate opportunism (Prisoners' Dilemma game), splitting a market so as to

¹³⁹ See *supra*, Section III.3.

¹⁴⁰ See, e.g., Justice Brandeis' reasoning in: *Chicago Board of Trade v. United States*, 246 U.S. 231, 38 S.Ct.242, 62 L.Ed. 683 (1918). For a critique of this reasoning, see: Robert H. Bork, *The Antitrust Paradox* (Free Press, 1993) 41-47.

reduce preference heterogeneity among members will not reduce enforcement costs since it does not reduce significantly the costs associated with mitigating opportunism. More importantly, scaling down and reducing preference heterogeneity is usually made unnecessary because the higher-cost functions—maintaining a market and reducing opportunism in it—can be regulated by evolving a lower-cost regulator, typically a social or religious network. For example, Janet Landa discusses trading relationships among ethnically homogenous group of Chinese traders engaged in the marketing of rubber in Singapore and West Malaysia, and explains how homogeneity facilitates more efficient trading among the group's members.¹⁴¹ Similarly, Lisa Bernstein's important study of diamond exchanges observes that the diamond industry has been dominated by Orthodox Jews,¹⁴² and that Jewish law,¹⁴³ religious courts,¹⁴⁴ and social activities.¹⁴⁵

Barak Richman expands Bernstein's insights, making a direct connection between the social/religious network of Orthodox Jews and the mitigation of opportunism in diamond dealing.¹⁴⁶ Forming a model that takes into account network effects of religious goods provided by the Orthodox Jewish community,¹⁴⁷ Richman exposes how religious

¹⁴¹ Janet T. Landa, *A Theory of The Ethnically Homogenous Middleman Group: An Institutional Alternative to Contract Law*, 10 J. Leg. Stud. 349 (1981).

¹⁴² Bernstein, *supra* note 6, at p. 140: "Because the diamond industry has long been dominated by Orthodox Jews, it was able to take advantage of the existence of these conditions [Homogenous Group Regime—A.A.]."

¹⁴³ *Id.*, at p. 141: "Jewish law provided detailed substantive rules of commercial behavior... Jewish law also provides rules governing the making of oral contracts and lays down rules for conducting commercial arbitration. In the diamond industry, Jewish law provided a code of commercial fair dealing..."

¹⁴⁴ *Id.*, *Id.*: "...the Jewish community provided an array of extralegal dispute resolution institutions... under Jewish law, a Jew is forbidden to voluntarily go into the courts of non-Jews to resolve commercial disputes with another Jew. Should he do so, he is to be ridiculed and shamed."

¹⁴⁵ *Id.*, at p. 139: "The Diamond Dealers Club still functions like an old-fashioned mutual-aid society. It provides kosher restaurants for its members. A Jewish health organization provides emergency medical services, and social committees are organized by neighborhood to visit sick members and their families. There is a synagogue on the premises, and contributions to a benevolent fund are required. Group discounts on packaged family vacations are also available so that members' families can travel together during the month that the bourse is closed."

¹⁴⁶ Barak D. Richman, *Community Enforcement of Informal Contracts: Jewish Diamond Merchants in New York*, Harvard John M. Olin Discussion Paper No. 384 (2002), available at: <http://papers.ssrn.com/abstract=349040>.

¹⁴⁷ Richman, *id.*, at p. 34-35 ("...the Ultra-Orthodox preference for religious goods fits very comfortably into the notion of a utility function. They truly gain enjoyment—the definition of utility—by participating in religious activities such as attending synagogue, studying religious texts, and performing holiday or life-cycle rituals. Moreover, many of these activities require the participation of fellow communitarian members, this one member's enjoyment from these activities is partly dependent on the character of his colleagues." [emphasis added]).

obligations encompass contractual compliance and fair disclosure,¹⁴⁸ and how the religious community's institutions enforce commercial norms,¹⁴⁹ sometimes with extreme subtlety.¹⁵⁰ The regulation of a high enforcement cost function (such as mitigating opportunistic behavior) can be done jointly by more than one pre-existing network; Richman points out to dual, symbiotic regulation of diamond dealing by both the social and the religious networks.¹⁵¹ These findings corroborate this paper's expectation that the Prisoners' Dilemma-type, high enforcement cost function of mitigating opportunistic

¹⁴⁸ Richman, *id.*, at p. 35-38 ("Complying with contractual obligations thus take [sic] on an awesome, divine quality. Fulfilling one's contractual obligations is an act that, like other religious behavior, is commanded by the divine law... Jewish legal commandments for ethical behavior in commerce extend beyond contract compliance. The doctrine of the 'just price' and the theory of 'misrepresentation' also use religious language and divine incentives to compel efficient behavior. The just price doctrine led to strict rules for accurate weights and measures... Ultra-Orthodox merchants view their actions as a part of moral example they assume as members of a religious community...").

¹⁴⁹ Richman, *id.*, at p. 38-41 ("One blunt instrument is to use rabbinical courts to excommunicate an offender... Rabbinical courts are more likely to impose less severe measures, such as stripping an individual of a community honor... or an order to make a charitable contribution to a community charity. Nonetheless, the mere power to excommunicate, even if it is rarely invoked, is probably the most effective instrument the rabbinical courts have to induce cooperation. The [New York Diamond Dealers Club] arbitration committee itself can initiate a proceeding in a rabbinical court, and the close connection between the two forums illustrates the diamond industry's reliance on community institutions to help enforce contracts. Less formal institutions also play a role in enforcing contractual compliance. When the community is familiar with a member's failure to comply with contractual obligations, a withholding of excludable community goods... often occurs. Excludable religious goods include participation roles in daily prayer, honors in life-cycle ceremonies, and access to classes or teachers that are in limited supply or enrollment in particularly select educational institutions... Hovering throughout those specific goods is community respect... One outstanding expression of community respect pertains to how easily—and with how prominent a family—parents can arrange their children to marriage.").

¹⁵⁰ Richman, *id.*, at p. 40, *quoting* an unidentified diamond merchant: "It doesn't really happen very often, but sometimes an individual has poor judgment and is unable to deliver on a business promise... We don't try to punish him—you have to understand the financial pressures that come with the business and with the burdens of raising a large family. But we remember. So he probably doesn't get Shishi [the sixth Torah reading in Sabbath services, which is considered a great honor among many Ultra-Orthodox]." This withdrawal of but a few community goods allows greater proportional and incremental sanctions than do the public (and many alternative private) legal systems.

¹⁵¹ Richman, *id.*, at p. 37 ("The threat of flight from the community, though extremely unlikely, is possible, and Ultra-Orthodox communities do watch some members leave for less observant communities or other Ultra-Orthodox sects. Such defections from the community can dilute the effectiveness of community enforcement, and membership in the Ultra-Orthodox community may be a necessary but not a sufficient condition to another's diamonds. Accordingly, diamond merchants will look for other assurances that will keep a diamond contractor committed to cooperation, such as a merchant's family or social connections to the community..."). Also see Richman, *id.* at p. 37, *citing* Eli Berman, *Sect, Subsidy and Sacrifice: An Economic View of Ultra-Orthodox Jews*, Q. J. Econ. (August 2000) (discussing expectations within the Ultra-Orthodox Jewish community that a male will remain a full-time student of religious studies for several years after he has begun a family, so that by the time he assumes economic responsibilities, he has a spouse and children entrenched in the community, and thus he is less likely to depart and is deemed more trustworthy).

behavior in commercial transactions would be regulated by networks that originally provided low enforcement cost functions (the social and religious networks).

Low enforcement cost functions evolve to regulate not only Battle of the Sexes and Prisoners' Dilemma type functions, but also Bully and Chicken games. Robert Ellickson's influential work on the resolution of cattle trespass disputes among neighbors in rural Shasta County provides a lucid example.¹⁵² Some residents of Shasta County own large numbers of cattle, and graze them in the "traditional" way, i.e., let them roam freely in unfenced areas.¹⁵³ The cattle occasionally stray into neighbors' lands, destroying gardens and otherwise harming the property. Since it is not realistic for a rancher to control his cattle, preventing the cattle from trespassing requires either that the cattle be fenced in, or that the neighbors' properties be fenced out.

The interaction between two ranchers who grade cattle traditionally is (roughly) characterized by the Chicken game. Each rancher would most want his neighbor to fence his lands (action "C"), while he does not fence (action "D"). This would prevent most trespass incidents by fencing his cattle out of his neighbor's property and the neighbor's cattle out of his property. The rancher may be indifferent between {C,C} and {C,D}, with perhaps a slight preference for mutual cooperation, as double fencing might eliminate an occasional trespass that a single fence did not. Finally, the worst outcome for the rancher is {D,D}, since the damage from the neighbor's cattle trespassing on his property is greater than the cost of fencing the neighbor's cattle out.

¹⁵² Ellickson developed a specific game to describe the relationship between the ranchers in Shasta County. See Ellickson (1991), *supra* note 6, at 162-164. This game, which he called "specialized labor", has the following payoff structure:

	Build Fence	Shirk
Build Fence	3,3	0,7
Shirk	7,-2	1,1

While this game may be more refined to the specifics of Shasta County trespass disputes, the Chicken and Bully games also fit the situation reasonably well. Since this paper attempts a preliminary study of the implications of game types on a function's enforcement costs (and thus, on the evolution of private legal systems), the analysis focuses on generic games, that are comparable across many different case studies.

¹⁵³ Ellickson, *supra* note 9, at p. 637-638. Compare these "traditionalists" to the "modernists", who keep their cattle fenced and use sprinklers to maintain the ranchland vegetation during the summer. *Id.*, at pp. 638-639.

But not all farmers pose equal risks of cattle trespass. Ellickson notes that some ranchers fence their cattle,¹⁵⁴ and some others are ranchette owners who do not raise cattle (or at least not a significant amount of cattle), and only pose a rare risk of trespass by their horse or dog.¹⁵⁵ The asymmetrical risks change the preference ranking of the riskier rancher. Not fearing being a victim of trespass, he would prefer that neither party fence (i.e., {D,D}) rather than he would need to fence ({C,C} and {C,D}). His preference order: {D,C}, {D,D}, {C,C}, {C,D} is that of a Deadlock player. The other, vulnerable rancher or ranchette owner still maintains the Chicken player's preferences. The result, as discussed above,¹⁵⁶ is a Bully game.

Both of these are high enforcement costs games, and the fact that different residents of Shasta County pose widely different risks of trespass also raises enforcement costs. Thus, absent low-enforcement cost foundations it would have been very difficult, if at all possible, to spontaneously form a network regulating the prevention and resolution of trespass disputes. On the other hand, the people affected by these disputes are geographically concentrated in one region, and are almost entirely within a single social network.¹⁵⁷ Furthermore, several structural features of the social network in Shasta County reduce its enforcement costs. First and foremost, there are no real competitive alternatives to the social network; the area is not densely populated, and people in the area seem to belong to a single social circle. Second, though the population in the area has grown over time, most families have been in the area for a long time—often several generations—increasing the investment they have in the social network.¹⁵⁸ Third, the

¹⁵⁴ *Id.*, at pp. 638-639.

¹⁵⁵ *Id.*, at p. 636 (“Ranchette owners may keep a farm animal or two as a hobby, but few of them make significant income from agriculture”), and p. 674 (“Even the ranchette owners have, if not a few hobby livestock, at least several dogs, which they keep for companionship, security, and pest control. Unlike cattle, dogs that trespass may harass, or even kill, other farm animals.”)

¹⁵⁶ *See supra*, Section III.6.

¹⁵⁷ The people who are on the edge of the social network and least connected to it are usually those who disobey the cattle trespass norms most frequently. *Id.*, at p.676-677, and p. 685 (“In both instances [of trespass lawsuits—A.A.] neither the trespass victim nor the cattle owner was well-socialized in rural Shasta County norms. Thus other respondents tended to refer to the four individuals involved in these two claims as ‘bad apples’, ‘odd ducks,’ or otherwise as people not aware of the natural working order.”)

¹⁵⁸ *Id.*, at p. 634 (“Approximately half of these ranches are owned by descendants of families that have been in the county for several generations.”), and p. 677 (“People tend to know one another, and they value their reputations in the community. Some ranching families have lived in the area for several generations and plan to stay indefinitely. Members of these families seem particularly intent on maintaining their reputations as good neighbors. Should one of them not promptly and courteously retrieve an estray, he might fear that any resulting gossip would permanently besmirch the family name.”)

population is relatively homogenous in its power—generally, none of the families can force their will on other families. Physical violence is very limited, and in the rare cases that it occurs, seems to be aimed at a trespassing cattle and serve as punishment for the trespass,¹⁵⁹ not as intimidation. Political battles are also complex, and no family or group of families has control over such political struggles as decisions on ordinances affecting cattle trespass liability.¹⁶⁰ Finally, the issue of cattle trespass of preventing cattle trespass is, on average, important to the members of the social network, so the average utility from regulating the matter is significant.

It would come as no surprise, therefore, that the social network has evolved to regulate cattle trespass matters. Ellickson's work does not focus on the chronological evolution of the norms, so it is not possible to demonstrate from his work the chronological path that this paper's theory anticipates. It is clear, however, that the social network has handled other, lower-cost functions; members of the social network interact on "water supply, controlled burns, fence repairs, social events staffing the volunteer fire department," etc.¹⁶¹ Some of these functions are lower-cost than the expensive to enforce Bully and Chicken games. By and large, the social network manages to contain disputes, and the norm is not to act on a single incident of trespass, but only on a chronic imbalance of behavior (i.e., repeated incidents of being harmed by the neighbor, without sufficient redeeming occasions in which either the person received a favor from his neighbor, or the person harmed the neighbor).¹⁶² When discipline is necessary, the main disciplinary action is spreading negative gossip. As Ellickson assesses: "This usually works because only the extreme deviants are immune from the general obsession with neighborliness."¹⁶³

Furthermore, it is very clear that the social network—the concept on neighborliness—is the key driver to cooperation. Many quotes provided by Ellickson

¹⁵⁹ *Id.*, at p. 678-679.

¹⁶⁰ See the description of the politics of issuing closed-range ordinances. *Id.*, at pp. 643-653.

¹⁶¹ *Id.*, at p. 675.

¹⁶² *Id.*, at pp. 673-676.

¹⁶³ *Id.*, at p. 677.

stress the neighborliness theme.¹⁶⁴ One cattleman states: “I think the whole thing is good neighbors. If you don’t have good neighbors, you can forget the whole thing.”¹⁶⁵

Shasta County presents a case study in which the enforcement costs of the low-cost nucleus are unusually low. In contrast, when the low-cost nucleus is weak or non-existent, some higher-enforcement cost functions manage to spontaneously form, but their enforcement abilities are poor and they often either ultimately fail or are at least unable to evolve to regulate higher-cost functions. Compare two observations on merchant coalitions—Avner Greif’s work on Maghribi traders in the Middle Ages Mediterranean Sea, with Karen Clay’s work on merchants in 1830s Mexican California. Greif describes a merchant coalition of Maghribi traders, a group of Jewish merchants who originally lived in the Abbasid caliphate (centered in Baghdad), and then migrated to North Africa. The Maghribi traders retained some distinct self-identity,¹⁶⁶ but did not establish a separate community apart from the Jewish communities in which they lived.¹⁶⁷ They made use of the Jewish community’s enforcement mechanisms.¹⁶⁸

In contrast, Karen Clay’s description of trade in Mexican California circa 1830s indicates a mix of traders from various European countries, or of European or European-Native American descent.¹⁶⁹ While British and American traders seemed to be more dominant than others, and while many of them converted to Catholicism and became Mexican citizens,¹⁷⁰ diversity among the merchant population was too great to allow a strong sense of community.¹⁷¹ Furthermore, most merchants held significant market

¹⁶⁴ *Id.*, at p. 681: (“Tony Morton: ‘[I never press a monetary claim because] I try to be a good neighbor.’ Norman Wagoner: ‘Being good neighbors means no lawsuits.’”)

¹⁶⁵ Quoting Chuck Searle. *Id.*, at p. 624.

¹⁶⁶ Greif, *supra* note 6, at p. 862: “Although the Maghribi immigrants integrated into existing Jewish communities, they also retained a strong sense of identity and solidarity among themselves... In 1030 a letter from Fustat to the head of the yeshiva in Jerusalem happily reports that some Maghribis have joined the Fustat yeshiva’s synagogue. Twenty-four years later, in a report sent to Jerusalem concerning the condition of that synagogue, the ‘Maghribi people’ are still mentioned as a separate group.”

¹⁶⁷ *Id.*, *Id.*: “It is important to note that the Maghribi traders did not establish a separate religious-ethnic community apart from the Jewish community. Nor did they represent a ‘natural’ group, which binds together individuals in all (or at least most) important aspects of their lives.”

¹⁶⁸ *Id.*, at pp. 862-863: “Indeed, when a Maghribi trader wanted to impose social sanctions against another trader, he made a public appeal to the Jewish communities.”

¹⁶⁹ Clay, *supra* note 6, at pp. 204-207.

¹⁷⁰ *Id.*, at p. 206.

¹⁷¹ One possible explanation for the failure of a common religion to bind the merchants and ensure their honesty is that in this particular case it seems that conversion to Catholicism was a necessity for a non-Catholic in order to settle in the area. As a result, many converted opportunistically, and had little true affiliation to the religion. Thus, the religious institutions may not have had much power over some of their

power, as in many towns there were only a few active merchants, and sometimes a town contained a single merchant.¹⁷² The difference in the effectiveness of the enforcement mechanisms was significant. While the traders in Mexican California exchanged information on dishonest colleagues, they very rarely succeeded in imposing collective punishment. The Maghribi traders, on the other hand, used collective punishment much more frequently.¹⁷³

The significant enforcement advantage of an exclusion mechanism over an information mechanism is demonstrated in Greif, Milgrom and Weingast's examination of the evolution of merchant guilds in medieval Europe.¹⁷⁴ They describe the difficulties of German merchants to secure a commitment from the rulers of foreign trade centers to protect them and their property while in the trade center. The foreign rulers had a strong incentive to promise protection, in order to attract foreign commerce. However, once the traders made an investment and brought their property to the foreign town, their goods became an attractive target for confiscation, and their protection was quite costly. As a result, rulers often reneged on their vows to protect foreign traders.

One way to protect the traders was for their government to threaten the foreign ruler with military responses to harm visited upon the merchants in the ruler's territory. But in the high Middle Ages defense (such as castles) was more powerful than offense,

half-hearted flock. In addition, Catholicism was ubiquitous in the region. While social and religious networks have network effects (positive returns to scale of membership), network effects are not infinite. There is a gradual dilution in the binding power of a social or religious network as it expands. The flip side of this phenomenon is that in small groups that are outcast or harshly treated by people outside of the group, the members of the group tend to adhere more to the group norms. *See, e.g.,* Yoram Barzel, *Confiscation by the Ruler: The Rise and Fall of Jewish Lending in the Middle Ages*, 35 *J. L. & Econ.* 1 (1992) (discussing how discrimination against Jews in many professions allowed them to effectively bond themselves in the banking industry). For a similar point regarding cartel enforcement (which is a group norm) *see:* Bruce H. Kobayashi, *Antitrust, Agency and Amnesty: An Economic Analysis of the Criminal Enforcement of the Antitrust Laws Against Corporations*, 69 *Geo. Wash. L. Rev.* 715, 742 (2001) (arguing that high antitrust penalties may deter defection from cartels).

¹⁷² Greif, *supra* note 6, at p. 214: "While the Maghribi traders moved their business easily from one merchant in a port to one of the several other merchants in the port, at most a few California merchants or, in some cases, only one were active in each town."

¹⁷³ *Id., Id.*: "The striking thing about the merchant coalition in California is the infrequent use of collective punishment. The other context in which we observe a merchant coalition is the western Mediterranean during the eleventh century (Greif, 1989, 1993). In both cases, disputes between principals and agents inevitably arose because of imperfections in the information network and contingencies not specified in the implicit or explicit contract. In the western Mediterranean, however, the Maghribi traders used collective punishment more frequently in the course of their interactions."

¹⁷⁴ Greif, Milgrom & Weingast, *supra* note 9, at pp. 758-762.

and therefore attacking a fortified rival was a costly affair.¹⁷⁵ Also, as Greif notes, “in the age prior to the emergence of the nation-state, alien merchants could expect little military or political aid from their countrymen.”¹⁷⁶ As a result, the threat of war was not very credible.

Another, more feasible way to protect traders was to credibly threaten the ruler with a merchant boycott of his town. Enforcement of this boycott was crucial, since some merchants either had more to lose from the boycott, or felt more secure than others. Merchant guilds served to enforce the boycotts. The guilds built on the existing social network of the individual town, and therefore most guilds regulated merchants residing in a given town.¹⁷⁷ Their enforcement powers came both from the town’s social network and from the town governance institutions.

The volume of trade in most major Italian cities was sufficient that a guild governing merchants of a single town could deter a foreign ruler from renegeing on a promise to protect the merchants. Not so for the German towns. Since each town’s volume of trade was relatively small compared to towns of other nations,¹⁷⁸ they German towns could not individually coordinate a sufficient sanction to discipline foreign rules. Thus, the German merchants tried to coordinate by forming Kontore—offices in the foreign cities, which represented and coordinated the actions of merchants of all German towns.¹⁷⁹ However, the Kontor was not based on a low-cost enforcer such as a tight social network; the social network containing all German merchants was much weaker than the

¹⁷⁵ *Id.*, at p. 751: “Military action might seem another important alternative. In the late medieval period, however, defensive technology was superior to offensive technology, and the costs and risks of offensive military action at distant ports limit its credibility as a sanction for trade violations.”

¹⁷⁶ *Id.*, at p. 747.

¹⁷⁷ *See, e.g., id.*, at p. 755: “The core of a merchant guild was an administrative body that supervised the overseas operation of merchant residents of a specific territorial area and held certain regulatory powers within that territorial area. In England, for example, the merchants of a town were granted the right to establish a society of merchants that retained specific commercial privileges in the internal and external trade of the town... On the European continent, many towns were controlled by the mercantile elite who organized a merchant guild to advance their interests.” Guilds in Italian cities (and some German cities) were not named “guilds”. Rather, they were the city administration itself, which undertook the roles assigned to guilds elsewhere. *Id., id.*: “In some Italian and German towns the merchant guilds were virtually identical with the town’s government itself, and in some Italian cities the merchants’ operations were supervised by the city.”

¹⁷⁸ *Id.*, at p. 761-762: “And, because none of the [Italian] cities was a ‘marginal player’ in the ports in which they traded, coordination among cities was unnecessary... the German towns were small, and before the establishment of the Hansa, most were relatively insignificant in large trading centers such as Bruges.”

¹⁷⁹ *Id.*, at p. 759.

social network containing the merchants in a given town. Being disconnected from the social networks of the individual towns, the Kontor could not impose sanctions on merchants in the towns in which they resided.¹⁸⁰

As Greif, Milgrom and Weingast describe, this weakness led to the ineffectiveness of the Kontor. In 1280, many foreign guilds, including the German Kontor, declared an embargo of Bruges and moved their trade to Aardenburg in response to Bruges' failure to protect foreign merchants. After two years, Bruges capitulated and agreed to protect the merchants. However, while it respected this agreement in regards to the rights of some merchants, it ignored the agreement in its treatment of German merchants.¹⁸¹ Bruges realized that the Kontor lacked sufficient enforcement power; it lacked any control over German merchants not present in Bruges, and could not enforce its decisions in the hometowns of the German merchants. Therefore, while Bruges had to yield to the embargo of the more effective Spanish and Italian merchant organizations, it was not intimidated by the Kontor, and thus reneged on its agreement with the Kontor.¹⁸²

Following this failure, the German towns realized that in order to form an effective regulator of merchant operations they had to build on the foundations of the low-cost social network. But as these networks were too small to have a sufficient effect on the foreign rulers, they created a network of (social) networks, expanding the social and political network to encompass the more important German mercantile towns. This new social and political institution was known as the Hanseatic League.¹⁸³ Though it initially dealt with matters of governance within the towns, it quickly expanded to control the merchants' affairs abroad. Initially, there was some friction between this social network and the older, town-based network. Thus, when an embargo was declared on Norway in 1284, merchants from the city of Bremen refused to cooperate. The network

¹⁸⁰ *Id., id.*

¹⁸¹ *Id., id.*: "Seemingly successful, the embargo failed to guarantee the property rights of German merchants, since Bruges simply ignored its agreement with them... It should be noted, however, that Bruges did respect the rights of other alien merchants who frequented the city."

¹⁸² *Id.*, at p. 760.

¹⁸³ *Id.*, at p. 760-761. The original meaning of the 'Hanse' was a toll collected by the merchants in a specific town (in some cases the toll was also collected from foreign merchants who had presence in that town). See *Medieval Sourcebook: Siegfried, Archbishop of Bremen: Remittance of the "Hanse" (1181)*, available at: <http://www.fordham.edu/halsall/source/1181hanse1.html>. A set of alliances between the Hanse created the Hanseatic League. See, e.g., *Agreement between Hamburg and Lubeck for Protection (1241)*, available at: <http://www.fordham.edu/halsall/source/1241lubeckhamburg.html>.

between the other German towns was by then strong enough, however, that they excluded Bremen's merchants from the all the German Kontore.¹⁸⁴ By 1307, the Hanseatic League had evolved to successfully regulate merchant behavior of all its members. In that year it had again declared an embargo on Bruges, this time acting on its own (without participation of other foreign merchants). After a two year boycott Bruges conceded, and this time, facing effective coordination of the German merchants, honored its commitments.¹⁸⁵

This case study supports the theory of non-spontaneous evolution. The former part of the story—an attempt to enforce an embargo by spontaneously formed Kontore that were not based on lower-cost foundations, supports the argument that the paradox of spontaneous formation is likely to doom all but low enforcement cost networks to fail, or at most to be limited in effectiveness. Enforcing an embargo, like enforcing a cartel, or restricting warfare, is either a Prisoners' Dilemma¹⁸⁶ or a Stag Hunt¹⁸⁷ type function. These higher enforcement cost functions can only rarely, in very favorable market structures, survive spontaneous formation. Typically, to be sustained they require strong enforcement mechanisms, typically from a network that has already evolved earlier to enforce other, less costly functions.

It seems that this is precisely what happened in this case study. The latter part of the story—the formation of the Hanseatic League and its subsequent expansion from a network of social and political sub-networks to a regulator of merchants' behavior outside of the League's territory, is a form of the evolution anticipated by the theory.

¹⁸⁴ See Greif, Milgrom & Weingast, *supra* note 9, at p. 760.

¹⁸⁵ *Id.*, *id.*

¹⁸⁶ It is a Prisoner's Dilemma type of function is the preference order for each player is: (1) Be allowed to sell despite the embargo (or sell below the cartel price, or fight unrestricted) while others abide to the embargo (or the cartel pricing, or the warfare restrictions); (2) Both the player and everyone else abides by the embargo, cartel or warfare restrictions; (3) Neither the player nor anyone else is restricted by the embargo, cartel or warfare restrictions; (4) The player abides by the restrictions, but others do not.

¹⁸⁷ It is a Stag Hunt type of function if the player benefits more from an ordered world in which everyone follows the constraints, rather than that the player ignores the constraints while others abide by them. For example, if an individual merchant disobeying an embargo can reap supercompetitive gains, but by her actions prevents the embargo from being successful and thus does not receive protection from the foreign ruler while in a foreign market, the lack of protection might outweigh the supercompetitive gains, and she might prefer mutual abidance to the embargo over profiting from breaking it. However, despite this preference she would disobey the embargo (and gain profits from it) if she thought someone else is likely to disobey the embargo and cause it to fail. This preference order is characteristic of the Stag Hunt game. See *supra*, Section III.4.

V. Normative Applications and Conclusion

While this paper aims to illuminate an oft-neglected aspect of private ordering literature—the evolution of private legal systems’ enforcement mechanisms, it also provides a foundation for some normative analysis. I will briefly suggest three such applications, in antitrust, critical infrastructure protection and corporate governance. A summary and conclusion to the paper will follow.

A. Normative Application: Antitrust

Several fields of law, and in particular antitrust and laws regulating network industries (exchanges, commerce, the internet, telecommunications, energy, etc.) are predisposed to suspect private networks’ attempts to regulate behavior.¹⁸⁸ It is of little wonder that they do: the ability to regulate behavior is sometimes used by a network to enforce a cartel, rather than socially beneficial behavior. But policing a cartel is a Prisoners’ Dilemma game—an expensive game to enforce. Other, social welfare enhancing forms of regulation often involve functions characterized by less costly game types—Stag Hunt, Battle of the Sexes, or even Meeting Place.¹⁸⁹ Where a network’s enforcement powers are limited, it may opt to evolve into regulating less costly aspect of behavior, rather than expensive cartel policing.¹⁹⁰

While the evolutionary pattern described in this paper suggests that a spontaneously formed cartel would not be stable under most circumstances, it also proposes that cartels may be stable if they make use of the enforcement mechanisms of lower-cost (and hence more stable) functions (e.g., tight social or religious networks, exchanges or trade associations, etc.). The analysis of the potential for coordinated effects should thus shift some of its focus from the market structure in which the suspected cartel may form to the market structure and characteristics of the lower enforcement cost networks that may evolve into policing a cartel.

¹⁸⁸ For a critique of antitrust law’s suspicion of private ordering, see: Frank H. Easterbrook, *The Limits of Antitrust*, 63 Tex. L. Rev. 1, 1-14 (1984).

¹⁸⁹ For explanations of these games see *supra*, Sections III.4, III.3, and III.2, respectively.

¹⁹⁰ See: Bryan Caplan & Edward Stringham, *Networks, Anarcho-Capitalism, and the Paradox of Cooperation* (manuscript, May 2001; forthcoming in Review of Austrian Economics), available at: <http://www.gmu.edu/departments/economics/bcaplan/network2.doc>.

By understanding how private legal systems evolve, (public) law will have better tools to assess the likelihood of a network evolving into an anticompetitive cartel as well as the opposite case, in which a network evolves (if not hindered by law) into a socially beneficial private legal system.

B. Normative Application: Critical Infrastructure Protection

Even before the tragic events of September 11, 2001 increased the public's sensitivity to homeland security, policymakers realized the need to enhance protection of critical infrastructure (such as financial, communications, energy and transportation networks, water distribution systems, etc.). Following a report by the Presidential Commission on Critical Infrastructure Protection, President Clinton issued in 1998 Presidential Decision Directive (PDD) 63,¹⁹¹ which aimed not only at enhancing protection of government owned or controlled critical infrastructure, but also of those facilities controlled or owned by the private sector (which in some critical infrastructure sectors, are the majority of facilities).¹⁹²

PDD 63 recognized a need for information sharing among private firms (in addition to information sharing between private firms and the government), in order to enhance both detection of attacks and coordination of defenses. It encouraged the development of Information Sharing and Analysis Centers (ISACs), which were to serve as “mechanism[s] for gathering, analyzing, appropriately sanitizing and disseminating private sector information to both industry and the [National Infrastructure Protection Center].”¹⁹³ PDD 63 did not determine the structure or membership of the ISACs.¹⁹⁴

To date, twelve ISACs are in operation, enjoying mixed success.¹⁹⁵ Members from relevant industries cite three causes for a reluctance to share information: (1) fear of increased liability due to the disclosure of information on vulnerabilities and specific

¹⁹¹ Presidential Decision Directive 63 itself is classified. For a description of its contents see: Critical Infrastructure Assurance Office, *The Clinton Administration's Policy On Critical Infrastructure Protection: Presidential Decision Directive 63 (1998)*, available at: <http://www.ciao.gov/resource/paper598.html>.

¹⁹² Peter Lichtenbaum & Melanie Schneck, *The Response to Cyberattacks: Balancing Security and Cost*, 36 Int'l Law. 39, 41 (2002).

¹⁹³ Critical Infrastructure Assurance Office, *supra* note 191, under headline ‘Information Sharing and Analysis Center (ISAC)’.

¹⁹⁴ *Id.*, *id* (“The actual design and functions of the center and its relation to the NIPC will be determined by the private sector, in consultation with and with assistance from the Federal Government”).

¹⁹⁵ John McCarthy, *Focus on Information Sharing*, 1 The CIP Report, Vol. 8, p. 1 (2003).

incidents of attack; (2) risk of antitrust violations resulting from the information exchange; and (3) Loss of proprietary information, primarily through use of the Freedom of Information Act to access information disclosed to the ISAC and through it to the government.¹⁹⁶ Some have viewed these concerns as not substantial enough to explain the limited information exchange that takes place.¹⁹⁷ Furthermore, Congress is considering a bill that would provide exemptions from antitrust laws and the Freedom of Information Act likely to cover most information sharing done through an ISAC.¹⁹⁸

There may be other reasons for the limited information sharing activity among ISAC members. Collecting information has significant fixed costs and very low variable costs of dissemination and use by others. Absent some form of enforcement, each ISAC member faces a Prisoners' Dilemma game type in deciding whether to collect and share information or not: If the others are providing her with information, she would be better off receiving the information but expending no costs in reciprocating. If others—making the same calculus—fail to share information with her, she would still be better off not sharing information with the others. Thus, all parties shirk, and no information is shared.

When the contemplated information exchange is made among competitors, as is the case in most ISACs, an additional concern reduces information sharing further. Since withholding information from a competitor gives the ISAC member an edge in competing with her rival, there is a significant hidden cost in sharing the information: tougher competition from the now more knowledgeable (and thus more effective) rivals.¹⁹⁹ Again, this is a Prisoners' Dilemma game type, in which (absent public or private enforcement) each ISAC member would refrain from providing information whether she expects her rival to provide her with information or not.

¹⁹⁶ Emily Frye, *The Tragedy of the Cybercommons: Overcoming Fundamental Vulnerabilities to Critical Infrastructures in a Networked World*, 58 Bus. Law. 349, 374-375 (2003).

¹⁹⁷ See, e.g., *id.*, at p. 374 (arguing that fear of increased liability is unfounded if all firms provide information); Emily Frye, *Information-Sharing Hangups: Is Antitrust Just a Cover?*, 1 The CIP Report, Vol. 8, p. 6-7 (2003) (arguing that antitrust liability is unlikely in most circumstances, and that a better explanation for the limited information-sharing among ISAC members is lack of trust among them).

¹⁹⁸ The proposed bill is the Cyber Security Information Act, H.R. 2435, 107th Cong. (2001). On the bill, see: Lichtenbaum & Schneck, *supra* note 192, at p. 45-46.

¹⁹⁹ For a more thorough analysis of this impediment to information sharing, see: Amitai Aviram & Avishalom Tor, *Barriers to Information Sharing Among Competitors: A Behavioral Economic Analysis* (unpublished manuscript, June 2003).

The key to overcoming these barriers is, as we alluded, effective enforcement. Under an assumption that private legal systems form spontaneously, we would expect every ISAC to police its members and ensure that they share information. But as this paper demonstrated, high enforcement cost functions do not form spontaneously. They evolve from pre-existing private legal systems that regulate lower cost functions of the same parties involved in the high-enforcement cost function.

Thus, an ISAC is unlikely to succeed in regulating information sharing unless it relied on a pre-existing system that governed the same parties that now require enforcement of efficient information sharing. Facilitating this reliance on pre-existing systems may be a consideration in determining ISAC membership: In order to overcome barriers to information exchange and function effectively, ISAC membership needs to be similar to the membership of a pre-existing low-cost regulator (such as a tight social or commercial network). As we have seen earlier in this paper, in such cases the social or commercial network is likely to assume the responsibility of ensuring that its members share information with each other despite incentives to shirk.

Currently, ISACs are delineated by industry.²⁰⁰ The industry categories are very broadly defined, which may result in over-inclusion (i.e., including firms that are in the same industry but do not transact much with most other members and do not share membership in a low enforcement cost regulator), as well as under-inclusion (i.e., including firms that are not within the same industry, but transact frequently with ISAC members and are members of the same low enforcement cost regulator).

For example, even if there is a single trade association encompassing all firms in sectors such as ‘the food industry’ or ‘the information technology industry’, these sectors involve so many differently situated firms that smaller commercial and social networks are likely to be more significant in individual firms’ transactions and in the lives of these firms’ managers. At the same time, these pre-existing networks might encompass others not in the industry, but with which the firm frequently transacts and would benefit from sharing information with. By adding these out-of-sector firms into the ISAC, and splitting

²⁰⁰ Existing ISACs include: Financial Services, Chemicals Industry, Electric Power, Emergency Fire Services, Emergency Law Enforcement, Food, Information Technology, Interstate, Oil & Gas, Surface Transportation, Telecommunications and Water Supply. 1 The CIP Report, Vol. 8, p. 4 (2003).

current ISACs into groups that share tight social or commercial networks, information sharing within the ISAC should increase.²⁰¹

Thus, a sector-wide membership criteria for ISACs may not be conducive to an efficient self-enforcement of information sharing.²⁰² This paper shifts the focus, in facilitating self-enforcing information exchange, to identifying a pre-existing, effective social or commercial network that may serve as an enforcer of efficient information sharing. The more the ISAC membership resembles the membership of this pre-existing network, the lower the barriers would be to efficient information sharing.

This analysis may become especially important if the bill exempting ISAC members from antitrust laws and FOIA is enacted.²⁰³ Any exemption from these laws carries a social cost that may be offset by a redeeming benefit—the enhanced protection of critical infrastructure, in this case. But for this tradeoff to be socially beneficial, the protected ISAC should achieve this redeeming benefit; that is, it should be able to effectively facilitate information sharing. To do that it must enforce on its members their commitment to report information they have. Such self-regulation is unlikely to form spontaneously, but may occur if the ISAC membership is designed to take advantage of the regulatory abilities of pre-existing private legal systems.

C. Normative Application: Corporate Governance

A series of financial scandals in conspicuous American businesses²⁰⁴ has shaken public trust in businesses and made some question the ability of corporations, under

²⁰¹ Information sharing between these smaller ISACs is possible even if they are not within the same network, by having a secondary ‘network of networks’, in which members from each ISAC, acting as hubs of information, would share information with their counterparts from other ISACs. Of course, to be effective, these hubs need to be members of a low enforcement cost regulator themselves, and the selection of the firm that should serve as a hub in each ISAC should take that into account.

²⁰² A sector-wide membership criterion may also not be optimal from the perspective of the information exchange that is facilitated. It is possible that to protect critical infrastructure, information need be shared not with all members of an industry, but with a smaller group of firms that frequently interact with each other and affect each other’s security. This group may even include firms that are not within the same industry (e.g., suppliers, customers), while not including some rivals with which the firm has little interaction.

²⁰³ *Infra* note 198.

²⁰⁴ For a brief summary of the more visible scandals, see The Washington Post website, at: <http://www.washingtonpost.com/wp-srv/business/scandals/primer/index.html>. For a summary of the Enron scandal, which is possibly the scandal receiving most public attention, see, e.g., Note, *The Good, the Bad, and Their Corporate Code of Ethics: Enron, Sarbanes-Oxley, and the Problem with Legislating Good Behavior*, 116 Harv. L. Rev. 2123, 2128-2130 (2003).

current structure and law, to ensure that managers act to maximize the profits of shareholders (rather than the managers' own interests).²⁰⁵ This concern spurred legislation and regulatory action that imposed on managers complex procedures designed to foster more accountability to shareholders, most notably the Sarbanes-Oxley Act of 2002.²⁰⁶

Both corporation law (which is predominantly state law) and securities law (which is federal law) accept as their baseline the freedom of parties to design a corporation and its capital structure in ways they see fit. The laws do not prevent a party from agreeing to risky or even downright foolish terms. State corporate laws tend to leave corporate governance arrangements to private ordering, assuming the people forming the corporation will design the optimal arrangements for that firm. Delaware law, for example, places most powers and responsibilities in the hands of the board of directors, subject to a fiduciary duty that is examined *ex post*.²⁰⁷ Indeed, many firms have devised arrangements deviating from the default rules on corporate governance, such as requiring outside directors.²⁰⁸

Federal securities laws, which apply to firms that have made public offerings of their securities, take a more intrusive, though not unrestrained role in affecting corporate governance.²⁰⁹ Even prior to the Sarbanes-Oxley Act, securities laws imposed extensive disclosure requirements on management. The Sarbanes-Oxley Act and new SEC rules have expanded the scope of intervention further.

²⁰⁵ Robert W. Hamilton, *The Crisis in Corporate Governance: 2002 Style*, 40 Hous. L. Rev. 1, 35-40 (2003).

²⁰⁶ Pub. L. No. 107-204, 116 Stat. 745 (to be codified in scattered sections of 11, 15, 18, 28, and 29 U.S.C.). On the legislative and regulatory responses to the series of scandals *see*: Robert B. Thompson, *Corporate Governance After Enron*, 40 Hous. L. Rev. 99, 100-107 (2003).

²⁰⁷ Thompson, *id.*, at p. 108-109. As an exception to this principle, there are some actions that require shareholder votes, such as director elections, approval of mergers and similar transactions, or cleansing board decisions when board members have conflicts of interest. *Id.*

²⁰⁸ Thompson, *id.*, at p. 109.

²⁰⁹ The federal government's involvement in corporate law, mainly through securities regulation, faces limits dictated by federalism. Though federal laws have increasingly affected corporate law, the Supreme Court has maintained that state corporate law cannot be displaced by federal law. *See, e.g.,* Cort v. Ash, 422 U.S. 66, 84 (1975) ("Corporations are creatures of state law, and investors commit their funds to corporate directors on the understanding that, except where federal law expressly requires certain responsibilities of directors with respect to stockholders, state law will govern the internal affairs of the corporation."); Santa Fe Industries, Inc. v. Green, 430 U.S. 462, 479 (1977) ("Absent a clear indication of congressional intent, we are reluctant to federalize the substantial portion of the law of corporations that deals with transactions in securities, particularly where established state policies of corporate regulation would be overridden.").

Behind the increased intervention lies the belief that current laws and existing private enforcement (whether through privately designed governance structures or through personal morality of managers) are insufficient to eliminate the incentives managers have to advance their interests at the expense of shareholders'. But this intervention is not without costs. First, there are costs expended in complying with the requirements. Second, tighter regulation might preclude, make too cumbersome or litigation-prone, certain actions directors can take to increase shareholder value. Opponents of government intervention note that intervention replaces shareholders' discretion with government's, even though government is not as familiar as the shareholders with the business and the unique circumstances of a given firm, and furthermore, government does not have the direct incentive that shareholders have to maximize their wealth. Some scholars suggest that the impetus for the current wave of corporate governance legislation (and other securities law legislation before it) is not the realization of calculated, thoughtful new insights on corporate governance, but a cyclical emotional response to a market crash that ends a speculative bubble.²¹⁰

Another critique of the government's response to the series of scandals anticipates a different cost resulting from detailed, rule-based mandates. According to this critique, such rules may displace the personal morality of managers, who will feel that following government's directive absolves them of additional moral considerations.²¹¹ Following that line of thought, the increase in government regulation may be offset by a decrease in self-regulation,²¹² leaving the utility of shareholders unimproved or worse.

Generally, the lower the regulatory abilities (or incentives) of non-government entities, the more beneficial government regulation would be for shareholders. This paper provides suggests that in assessing the abilities of private regulators, attention should be given to the availability of a pre-existing low enforcement cost regulator. In this

²¹⁰ See Larry E. Ribstein, *Bubble Laws*, 40 Hous. L. Rev. 77 (2003).

²¹¹ See: Lawrence E. Mitchell, *Cooperation and Constraint in the Modern Corporation: An Inquiry into the Causes of Corporate Immorality*, 73 Tex. L. Rev. 477 (1995) (arguing that increased rule-based regulation weakens corporate morality).

²¹² 'Self-regulation', as used here, regards personal morality (regulation by the self), not the broader 'private regulation', which encompasses regulation by anyone but government (e.g., the self, other shareholders, gatekeepers, etc.). See Aviram, *supra* note 11, at part III.1 (defining self-regulation and other types of private regulation).

application, two separate regulators need to be considered: potential misbehaving managers, and the shareholders who are the victims of such misbehavior.

First, the potential malfeasants. Usually, a single manager cannot succeed in his misbehavior without the cooperation (or at least acquiescence) of one or more other managers. Each manager incorporated into the scheme can either go along with it or blow the whistle. This is a Stag Hunt game: if the others go along, the manager would want to go along with the scheme as well (and reap the profits of the misbehavior). If the others blow the whistle, so should the manager (in order to mitigate or avoid punishment for the discovered scheme). But among those two options, the manager would prefer that both he and the others go along with the plan, rather than both he and the others blow the whistle (or scrap the plans). The Stag Hunt game is one of moderate enforcement costs—a regulator of it (i.e., entity that ensures that no one blows the whistle) is unlikely to evolve spontaneously, but the function is cooperative enough that even a weak pre-existing regulator (e.g., an ‘old boys’ club’ to which the managers belong) may create sufficient assurance that ‘no one will blow the whistle’, and therefore all managers would feel confident enough to cooperate in the misbehavior.

So, we anticipate a higher likelihood of managerial misbehavior if managers who may know about attempted misbehavior belong to some pre-existing low enforcement-cost network. Less powerful networks would suffice to bond the managers, in comparison to the low enforcement cost networks contemplated in the previous two applications, since it does not take as much to facilitate cooperation in a Stag Hunt game, as it does to facilitate cooperation in a Prisoners’ Dilemma game.

The second regulator that needs to be considered, who has an opposite goal of preventing the misbehavior, is the victim of the managerial misbehavior—the shareholders. If the managers are part of the same low-enforcement cost function as the shareholders—for example, if the managers and the shareholders are part of the same core social network—then regulation by this group is likely to be successful (e.g., the managers, fearing loss of all of their social capital if their fraud is detected, will not attempt it). But if the managers are not part of the shareholder’s low enforcement cost network, the best the shareholders can do is to use the network to detect managers’ misbehavior, and leave punishment—through private and public suits—to the (public)

legal system. This, of course, results in a more limited ability of the shareholders to deter managerial misbehavior.

In summary, assessing the risk of managerial misbehavior and the abilities of private regulation of managers requires examination of: (1) whether the managers that are likely to know of managerial misbehavior (and possibly benefit from it) are members in a low-enforcement cost network (that would allow them to overcome the Stag Hunt game and cooperate in the misbehavior). If they are—the risk of managerial misbehavior is higher; (2) whether the managers that are likely to know of managerial misbehavior are members in the same low-enforcement cost network as the shareholders. If they are, private regulation of managerial misbehavior is likely to be effective.

D. Conclusion

The private ordering literature has shed a good deal of light on the efficiency of norms enforced by private legal systems, the enforcement mechanisms a private legal system uses to achieve adherence to those norms, and the evolution of the norms. However, little attention had been paid thus far to the evolution of the enforcement mechanisms themselves, despite calls by some scholars to study this issue.²¹³ Most scholarship seems to assume, in the spirit of Coase's Theorem, that private legal systems form spontaneously (unless impeded by government) when the benefits to the group governed by the legal system exceeds the cost of enforcing the system.

As this paper demonstrates, spontaneous formation of private legal systems is unsuccessful for all but the lowest enforcement cost functions. Private legal systems formed without the benefit of preexisting enforcement mechanisms suffer from the paradox of spontaneous formation: to efficiently direct behavior they must ensure the cooperation of their members, but the effectiveness of the mechanisms used to secure this cooperation (e.g., the threat of exclusion) depends on the ability to confer benefits to the members—primarily the ability (not yet existing for a spontaneously formed private legal system) to efficiently direct behavior.

²¹³ See, e.g., Eric A. Posner, Law, Economics and Inefficient Norms, 144 U. Pa. L. Rev. 1697, 1743 (1996): "Let me identify two [problems—A.A.] that seem most urgent and should provide the basis for future research. First, there is not yet a precise understanding of the way norms work and evolve..."

As the paper discusses, decentralized bonding (i.e., bonding not achieved through a centralized, network-based institution; typically bilateral bonds) is unlikely to overcome the paradox of spontaneous formation at the optimal level of intra-network transactions. However, this barrier may be overcome by centralized bonding, through an evolutionary process of extending preexisting networks to regulate higher enforcement cost functions, making use of the established enforcement mechanisms of the preexisting network.

Enforcement costs of a function depend on several criteria, most of which are similar to the criteria affecting the stability of a cartel. These criteria include, *inter alia*, concentration and competition between networks providing the function;²¹⁴ concentration of power among the people using the function;²¹⁵ the utility conferred by the network to the members;²¹⁶ the degree of divergence among members in the amount of utility derived from the function;²¹⁷ and the function's "game type" (e.g., Prisoners' Dilemma, Chicken, Battle of the Sexes, Stag Hunt, etc.).²¹⁸ The criterion of "game type" has not been explored at all in the literature on cartel stability, because cartels are of a single game type (Prisoners' Dilemma). This paper therefore examined expansively the effects of game types on enforcement costs.²¹⁹

The evolutionary pattern described in this paper usually begins with the spontaneous formation and survival of low enforcement cost networks (while higher enforcement cost functions fail). These networks provide low enforcement cost functions such as social and spiritual utility.²²⁰ After establishing themselves, these networks have

²¹⁴ Naturally, the more competition among networks and the more similar their sizes (and thus the network effects they confer), the higher the enforcement costs of each network, as renegade members can abandon one network for another without incurring as severe a loss of network effects.

²¹⁵ The greater the discrepancy in power between members, the more likely some would have credible counter-threats to the network's enforcement mechanisms, and the more likely that more powerful members would have incentives to degrade the network. On degradation, see Aviram, *supra* note 11; Cremer, Rey & Tirole, *supra* note 112.

²¹⁶ That is, the importance of the network's preexisting functions to the members. The greater the benefit members derive from a function, the stronger the enforcement abilities of a network regulating the function.

²¹⁷ As mentioned *infra*, in Section II.3, greater divergence among members' benefits from a function increases the cost of agreeing on the optimal regulation, and increases the risk of degradation by the members who benefit least from the network.

²¹⁸ A function's "game type" is the network members' ranking of preferences between mutual contribution to the function, mutual defection from the function, contribution to the function while others defect, or defecting from contribution while others contribute.

²¹⁹ *Supra*, Section III.

²²⁰ Both of these functions have a Harmony or Meeting Place game types, which are the least expensive to enforce. See *supra*, Section III.2.

enforcement mechanisms capable of regulating higher enforcement cost functions such as facilitating exchanges and creating markets.²²¹ Upon successful enforcement of these more expensive (but also very beneficial) functions, the network's enforcement mechanisms are augmented, and the network can expand again to yet more expensive functions (such as mitigating opportunism).²²² This gradual expansion of scope, following a progression in the effectiveness of the network's enforcement mechanisms, is the non-spontaneous evolutionary process that creates private legal systems.

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²²¹ Both of which are of the Battle of the Sexes game type. See *supra*, Section IV.3.

²²² Mitigating opportunism is sometimes a Prisoners' Dilemma game type and sometimes a Stag Hunt game type. See *supra*, Section IV.3.

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