Coordination, Commitment, and Enforcement: The Case of the Merchant Guild

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We interpret historical evidence in light of a repeated-game model to conclude that *merchant guilds* emerged during the late medieval period to allow rulers of trade centers to commit to the security of alien merchants. The merchant guild developed the theoretically required attributes, secured merchants' property rights, and evolved in response to crises to extend the range of its effectiveness, contributing to the expansion of trade during the late medieval period. We elaborate on the relations between our theory and the monopoly theory of merchant guilds and contrast it with repeated-game theories that provide no role for formal organization.

One of the central questions about the institutional foundations of markets concerns the power of the state. The simplest economic view of the state as an institution that enforces contracts and property rights and provides public goods poses a dilemma: A state with suffi-

cient coercive power to do these things also has the power to withhold protection or confiscate private wealth, undermining the foundations of the market economy. In the particular case of medieval cities, these threats were sometimes realized, discouraging trade by foreign merchants to the mutual disadvantage of the ruler and the merchants. It is our thesis that merchant guilds emerged with the encouragement of the rulers of trading centers to be a countervailing power, enhancing the ruler's ability to commit and laying an important institutional foundation for the growing trade of that period.

European economic growth between the tenth and the fourteenth centuries was facilitated by the "Commercial Revolution of the Middle Ages"—the reemergence of Mediterranean and European long-distance trade after an extended period of decline (e.g., Lopez 1976). For this commercial expansion to be possible, institutions had to be created to mitigate the many kinds of contractual problems associated with long-distance trade. Assessing the significance of these institutions requires a subtle analysis. Indeed, the effectiveness of institutions for punishing contract violations is sometimes best judged like that of peacetime armies: by how little they must be used. Thus, when one reads the historical record to determine whether a major role of merchant institutions was to ensure contract compliance, the number of instances of enforcement is not a useful indicator. Instead, one must ask, What were the things that threatened, and on occasion thwarted, efficient trading? Can the powers and organizational details of merchant institutions be explained as responses to those threats? Did failures of enforcement trigger major changes in these institutions?

A comprehensive analysis of a contract enforcement institution must consider why the institution was needed, what sanctions were to be used to deter undesirable behavior, who was to apply the sanctions, how the sanctioners learned or decided what sanctions to apply, why they did not shirk from their duty, and why the offender did not flee to avoid the sanction. Some analyses meeting these criteria have been developed. One is Greif's (1989, 1993a) analysis of the contractual relations between merchants and their overseas agents in eleventh-century Mediterranean trade. To reap the benefit of employing overseas agents, an institution was required to enable the agents to commit to act on behalf of the merchants. One group of merchants known as the "Maghribi traders" managed their agency relations by forming a coalition whose members ostracized and retaliated against agents who violated their commercial code. Interrelated contractual arrangements motivated merchants to participate in the collective retaliation against agents who had cheated, and close community ties assured that each member had the necessary information

to participate in sanctions when necessary.[1] Similarly, Milgrom, North, and Weingast (1990) have argued that the use of merchant courts in the Champagne fairs during the twelfth and the thirteenth centuries can be analyzed as an institution that created proper incentives for gathering information, honoring agreements, reporting disputes, and adhering to the judgments of the merchant courts. Moreover, by centralizing certain record-keeping functions and effectively permitting only merchants in good standing to remain at the fairs, this institution also achieved significant economies in transaction costs relative to other feasible enforcement institutions.

The cited papers provide consistent analyses of institutions used to overcome contractual problems among individual merchants active in long-distance trade. Individual merchants, however, were not the only important parties: the rulers of the trading centers at which the merchants met and brought their goods were an important independent force. Trading centers needed to be organized in ways that secured the person and property of the visiting merchants. Before a trading center became established, its ruler might be inclined to pledge that alien traders would be secure and that their rights would be respected. Once trade was established, however, the medieval ruler faced the temptation to renege on that pledge, failing to provide the promised protection or abusing the merchants' property rights by using his coercive power. In the age prior to the emergence of the nation-state, alien merchants could expect little military or political aid from their countrymen. Without something tangible to secure the ruler's pledge, alien merchants were not likely to frequent that trading center—an outcome that could be costly for both the ruler and the merchants. That rulers recognized the importance of this problem is well reflected in the words of the English king, Edward I, who noticed in 1283 that because alien merchants' property rights were not properly protected, "many merchants are put off from coming to this land with their merchandise to the detriment of merchants and of the whole kingdom" (*English Historical Documents*, 3:420).[2]

On the basis of the theory of repeated games, one might conjecture that since trade relationships between a specific merchant and ruler consist of a potentially long sequence of trading visits, the rulers' commitment problem could be overcome by either a *bilateral reputa-*

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[1] For an analysis of the institution that governed agency relations in twelfth-century Genoa, see Greif (1993*b*). For game-theoretical and comparative historical analysis of the evolution and functioning of various trading institutions among the twelfth-century Genoese and the eleventh-century Maghribi traders from the Muslim world, see Greif (1994).

[2] The recognition that unprotected alien merchants would not come to England is also expressed in the *Carta Mercatoria* of 1303 (*English Historical Documents*, 3:515).

tion mechanism, in which a merchant whose rights were abused ceased trading, or a *multilateral reputation mechanism,* in which the cheated merchant and his close associates ceased trading. Yet the historical records indicate that, by and large, the ruler-merchant relations were governed by neither bilateral nor informal multilateral arrangements. On the contrary, ruler-merchant relations were governed by administrative bodies rooted outside the territory of the ruler, which held certain regulatory powers over their member merchants in their own territory and supervised the operation of these merchants in foreign lands. What roles could these administrative bodies theoretically play in overcoming the ruler's commitment problem? What roles did they play in fact?

To investigate these questions, we utilize historical records to develop a series of game-theoretic models corresponding to different institutional arrangements. The theoretical analyses indicate that although some trade is possible even without supporting organizations, sustaining the efficient level of trade is more demanding. Without administrative bodies capable of coordinating and sometimes compelling merchants' responses to a ruler's transgressions, trade could not expand to its efficient level. The corresponding historical analysis then suggests that during the late medieval commercial revolution, a specific institution—the *merchant guild*—developed the necessary attributes to enforce agreements with rulers, thus overcoming the commitment problem and enabling trade expansion. Merchant guilds exhibited a range of administrative forms from subdivision of a city administration to an intercity organization. Yet these forms all shared the common function of ensuring the coordination and internal enforcement required to surmount the commitment problem by permitting effective collective action. We emphasize two points at the outset. First, our argument concerns merchant guilds and not craft guilds.[3] Second, we define merchant guilds according to their function rather than their "official," late medieval name. Hence, as we discuss below, our theory applies to a wider range of medieval merchant organizations than those labeled as merchant guilds.

The evaluation of merchant guilds as supporting efficient trade is complementary to the view more common among economic historians that merchant guilds emerged to reduce negotiation costs, to administer trade and taxation, to extract privileges from foreign cities, and to shift rent in their own city (see, e.g., Gross 1890; Thrupp 1965; North and Thomas 1973). While the existence of merchant

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[3] Economists have long associated the latter with the monopolization of a given craft within a specific town. For a recent economic analysis of craft guilds, see Hickson and Thompson (1991). See also Gustafsson (1987).

guilds could affect the distribution of rents besides enhancing the security of agreements, the unadorned theory of merchant guilds as cartels presents a puzzle: If the purpose of the guilds was to create monopoly power for the merchants and to increase their bargaining power with the rulers, why did *powerful* rulers during the late medieval period cooperate with alien merchants to establish guilds in the first place? What offsetting advantages did the rulers enjoy? The puzzle is resolved if the guild's power enabled trade to expand to the benefit of the merchants and rulers alike.[4]

While this paper emphasizes the function of the merchant guild in facilitating trade between political units during the late medieval period, it also sheds light on the changing nature of guilds over time and the complex nature of guilds at any point in time. Although certain features of the merchant guild enabled it to advance trade during the late medieval period, these same features were, in some cases, utilized during the premodern period to restrict trade. Furthermore, even during the late medieval period, some merchant guilds had quasi-monopoly rights in their own territories. These rights were part of the relations between rulers and local merchants. Since our paper concentrates on the relations between ruler and *alien* merchants, such rights are not considered here. It is interesting to note, however, that our theory suggests that a merchant guild's monopoly rights in its home locality may have been instrumental in advancing trade between different localities. This type of monopoly rights generated a stream of rents that depended on the support of other members and so served as a bond, allowing members to commit themselves to collective action in response to a ruler's transgressions.[5]

The paper proceeds as follows. Section I reports the relevant history. It describes the serious problems trading centers and merchants faced in providing security for merchants and their goods, demonstrates that the guild structure had the features required to resolve the problem, and recounts milestones in the evolution of the guild among German traders and the related expansion of trade. Section II formalizes the analysis. Its game-theoretic model allows us to explore the incentives of traders and cities and explain why a guild organization could sometimes successfully support an efficient level

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[4] De Roover (1965) asserts that the guild's role "was, of course, to provide collective protection in foreign lands, to secure trade privileges, if possible, and to watch over the strict observance of those already in effect" (p. 111). While his intuition carried him a long way, it did not explain how the guilds could provide protection and assure observance of rights by local rulers in foreign lands in which the ruler had a preponderance of military force.

[5] This is not to argue, however, that this function was necessarily the main reason for these local monopoly rights.

of trading activity when a simple reputation mechanism could not. Section III concludes the paper by considering the subsequent history—the transformation and decline of the merchant guild associated with the rise of the state—and suggests other applications of the theoretical framework.

I. The Commitment Problem and the Role of Merchant Guilds

Institutions and Commitment

Long-distance trade in late medieval Europe was based on the exchange of goods brought from different parts of the world to central cities or fairs located in geographically or politically favorable places. Yet the presence of gains from trade and locations suitable to conduct exchange does not imply that exchange could occur without an institutional environment in which the merchants and their property were secure. The concern that rulers felt to provide security, reflected in the words of Edward I quoted above, should be understood against the background of events such as the following one that occurred in Boston, England, in, or shortly before, 1241. A Flemish merchant accused an English trader of not repaying a commercial loan. This resulted in

> an uproar on all sides and the English merchants assembled to attack the Flemings, who retired to their lodging in the churchyard. . . . The English threw down the pailings, broke the doors and windows and dragged out Peter Balg [the lender] and five others, whom they foully beat and wounded and then set in the stocks. All the other Flemings they beat, ill-treated and robbed, and pierced their cloths with swords and knives. . . . Their silver cups were carried off as they sat at table, their purses cut and the money in them stolen, [and] their chests broken open and money and goods, to an unknown extent, taken away. [Curia Regis, 121, m. 6; published by Salzman (1928)]

Such disorders were not peculiar to England but mark the history of long-distance medieval trade. For example, the commercial relations between Byzantine and Italian city-states were often hindered by insecurity during the twelfth century. The Genoese quarter in Constantinople was attacked by the Pisans in 1162. At least one merchant was killed, and the other Genoese merchants had to escape to their ship leaving all their valuables behind them. In 1171 the Venetians attacked and destroyed the same Genoese quarter. About 10 years later

MERCHANT GUILD   a mob destroyed all the Italian quarters in Constantinople during the "Latin massacre" of 1182 (Day [1988]; for additional examples, see also De Roover [1965, p. 61]; Lane [1973, p. 34]; Kedar [1976, p. 26 ff.]).

In light of the theory of repeated games, one might conjecture that a ruler's commitment problem could be solved by a *bilateral reputation mechanism* in which individual merchants whose person and property were not protected by a local ruler would refuse to return with their goods in the future. The ruler, while perhaps reaping short-run gains from ignoring a merchant's rights, stood to lose the future stream of rents from the cheated merchant's trade.[6] As we demonstrate formally in Section II, this intuition is misleading. At the level of trade that maximizes the total net value of trade—that is, at the *efficient volume of trade*—a bilateral reputation mechanism cannot resolve the commitment problem. In our formal theory, the reason is that, at the efficient volume of trade, the value of the stream of future rents collected by the ruler from an individual marginal merchant is almost zero and is therefore smaller than the value of the goods that can be seized or the cost of the services that can be withheld. The same conclusion would hold even at lesser volumes of trade if the frequency of visits by an individual trader were low. As long as ruler-merchant relations are governed only by a bilateral reputation mechanism, our theory holds that trading volume cannot expand to its efficient level.

The preceding discussion and the formal model below allow only one kind of sanction for cheated merchants: the withdrawal of trade. 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.[7]

A possible means to increase the punishment is a multilateral response by all the merchants to transgressions against any subgroup of merchants. Indeed, the history of the relations between trade centers and alien merchants presents several examples of multilateral retaliations against rulers who had reneged on their contractual obli-

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[6] Clearly, there was a limit to the security a ruler could provide the merchants. Accordingly, we have detailed above instances in which rights were abused in major cities or trade centers in which the relevant ruler had a relatively high level of ability to secure rights.

[7] Parker (1988, p. 7) comments that "After the proliferation of stone-built castles in western Europe, which began in the eleventh century . . . in the military balance between defence and offense, the former had clearly become predominant." This situation changed only during the so-called Military Revolution of the fifteenth century.

gations. For example, circa 1050 the Muslim ruler of Sicily imposed a 10 percent tariff (instead of the 5 percent tariff specified in the Islamic law) on goods imported to Sicily by Jewish traders. The traders responded by imposing an embargo and sending their goods to the rival trade center, Tunisia. The embargo was effective, and after a year the Sicilian ruler relented and removed the tariff (David Kaufmann Collection, Hungarian Academy of Science, Budapest, document no. 22, pt. a, lines 29–31; pt. b, lines 3–5; Gil [1983, pp. 97–106]; Taylor-Schechter Collection, University Library, Cambridge, document no. 10 J 12, folio 26, p. a, lines 18–20; Michael [1965, 2:85]).

The examples above suggest that a *multilateral reputation mechanism* might be able to surmount the commitment problem without the aid of any formal organization. In each case, merchants imposed a collective punishment on the city that included participation by merchants who had not been directly injured. Several of the cited offenses were offenses *against an entire group of merchants*. In medieval trade, however, a city could also discriminate among merchants, abusing or not protecting them selectively. For example, a city could confiscate the belongings of some traders or withhold legal protection from them without directly harming other alien merchants. Indeed, the Sicilian rulers increased the tariff only to Jewish traders; and during two attacks on the Genoese quarter in Constantinople, other Italian merchants were not harmed. This suggests two interconnected reasons why, without a supporting organization, a multilateral reputation mechanism may be insufficient to surmount the commitment problem at the efficient level of trade. The first involves contract ambiguities and asymmetric information, whereas the second reflects the distinct incentives among different traders generated by a multilateral response.

Long-distance premodern trade took place in a highly complex and uncertain environment. Unanticipated events and multiple interpretations of existing agreements were always possible under these circumstances, implying that the definition of a "contract violation" was often ambiguous. Information asymmetry, slow communication, and different interpretations of facts among merchants imply that without an organization that coordinates responses, it was not likely that all the merchants would respond to the abuse of any group of merchants. As demonstrated formally in Section II, if the fraction of merchants who detect and react to an abuse against any group of merchants is only proportionate to the number abused, then a multilateral reputation mechanism is ineffective at the efficient volume of trade. It is ineffective for the same reason that a bilateral reputation mechanism is ineffective: a threat by a group of marginal traders to

withdraw their trade is barely significant once trade has expanded to its efficient level.

To permit an efficient expansion of trade in the medieval environment, there was a need for an organization that would supplement the operation of a multilateral reputation mechanism by *coordinating* the responses of a large fraction of the merchants. Only when a coordinating organization exists can the multilateral reputation mechanism potentially overcome the commitment problem. In our formal model, when a coordinating organization exists there is a Markov perfect equilibrium at which traders come to the city (at the efficient level of trade) as long as a boycott has never been announced; none of them comes to trade if a boycott has been announced. The ruler respects merchants' rights as long as a boycott has never been announced but abuses their rights otherwise. Thus, when a coordinating institution exists, trade may plausibly expand to its efficient level.

Although the behavior described forms a perfect equilibrium, the theory in this form remains unconvincing. According to the equilibrium strategies, when a coordinating institution organizes an embargo, merchants are deterred from disregarding it because they expect the ruler to abuse violators' trading rights. But are these expectations reasonable? Why would a city not *encourage* embargo breakers rather than punish them? As verified in Section II, this encouragement is potentially credible. During an effective embargo, the volume of trade shrinks and the value of the marginal trader increases; it is then possible for bilateral reputation mechanisms to become effective. That is, there may exist mutually profitable terms between the city and the traders that the city will credibly respect. This possibility limits the potential severity of an embargo and, correspondingly, potentially hinders the ability of any coordinating organization to support efficient trade. To support the efficient level of trade, a multilateral reputation mechanism may need to be supplemented by an organization with the ability both to *coordinate* embargo decisions and to *enforce* them by applying sanctions on its own members.

Evidence of the Role of Formal Organizations

The discussion so far has focused on two issues: a demonstration that guaranteeing the security of alien merchants and their goods was problematic in medieval Europe and that both historical evidence and theoretical reasoning suggest that a simple reputation mechanism could not completely resolve the problem. In this subsection, we identify more direct evidence that merchants and rulers recognized the need to provide believable assurances of security for traders and their

goods, that they negotiated trading arrangements that often included a role for formal organizations, that these organizations served an important coordination and enforcement role, and that trade expanded in cities that negotiated these agreements. Notice that this pattern of facts is inconsistent with at least the simplest cartel theories of guilds, which predict that guilds would form only after trade relations were already established and would limit entry and price competition, leading to the trading of *smaller* quantities.

That medieval rulers and merchants recognized the need to secure alien merchants' property rights before trade expansion could occur is borne out repeatedly in the historical record. Christians traders, for example, did not dare to trade in the Muslim world unless they received appropriate securities. Similarly, throughout Europe itself, merchants did not trade in locations in which they did not have security agreements. The Italians began traveling to other European cities and to the Champagne fairs, and the Germans began traveling to Flanders, England, and the Slavic East only after negotiating appropriate safety agreements (see, e.g., De Roover 1948, p. 13; De Roover 1965; Dollinger 1970).

Safety agreements allowing the merchants some measure of internal organization appear crucial to trade expansion. The Genoese trade with North Africa provides an instructive illustration. Prior to 1160, the Genoese trade with North Africa never exceeded 500 lire. In 1161, the Genoese legate, Otobonus d'Albericis, and the local ruler of North Africa, Abd alMumin, signed a 15-year agreement securing the property rights of the Genoese. Genoese trade more than doubled to 1,057 lire and remained at this higher level in later years. Moreover, the agreement focused on security issues. Though it specified a 2 percent reduction in the 10 percent custom, it was hardly concerned with the distribution of gains from trade. Given that the expected gains from goods that reached North Africa were, on average, more than 26 percent during this period, it is highly unlikely that the custom reduction accounts for the expansion of trade that followed (Krueger 1932, pp. 81–82; Krueger 1933, pp. 379–80).

Merchants from other trading cities had similar experiences. For example, the Catalan merchants' trade expanded "within only a few months" after they received, in 1286, privileges and the right to have a consul in Sicily (Abulafia 1985, pp. 226–27). The trade of the German merchants in Bruges expanded after they received privileges and the right to have a *Kontor* (establishment or office) (Dollinger 1970, p. 41). The Italians' trade with Flanders flourished only after they were allowed to establish local organizations, called *nations* (De Roover 1948, p. 13).

There also exists indirect evidence that the parties recognized the

importance of an *institutionalized commitment* to security rather than mere promises. Muslim rulers provided European traders with *aman,* a religious obligation to secure the merchants' rights. Some cities in England went so far as to elect an alien merchant as mayor. Yet it seems that a specific institution—the *merchant guild*—was the most common successful institution. 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 and usually had representation in the trade centers in which its members traded. On the European continent, many towns were controlled by the mercantile elite who organized a merchant guild to advance their interests. 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 (Gross 1890; Rashdall 1936, pp. 150–53; Rorig 1967).[8]

Guilds provided merchants with the leadership and the information transmission mechanisms required for coordinated action. In the examples we have studied, it was the guild that decided when to impose a trade embargo and when to cancel it.[9] The trade center usually provided the guild with the right to obtain information about disputes between its members and that center's authorities or between its members and other traders. The guild's regulations facilitated the collection and transmission of information among its members.[10]

Though the term "merchant guild" was not used in Italy, the Italian cities served the same functions on behalf of their resident merchants. The city's role in coordinating embargo decisions is well reflected in the relationships between Genoa and Tabriz, a vital city on the trade route to the Persian Gulf and the Far East. In 1340 Tabriz's ruler confiscated the goods of many Genoese traders. Genoa responded by declaring a *devetum* (a commercial embargo) against Tabriz. In 1344, however, Tabriz's ruler sent ambassadors to Genoa promising an indemnity for everything that had been taken from the Genoese and

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[8] For a general discussion of the concept of corporation in medieval English law, see Pollock and Maitland (1968, 1:486 ff.).

[9] An exception is the case of the Maghribi traders. That case, however, seems to reflect the situation in the Muslim world rather than in Europe (see Greif 1994).

[10] Guild members were required to travel together, to live and store their goods throughout their stay in quarters that belonged to the guild, to examine the quality of each other's goods, and to witness each other's sales (see, e.g., Moore 1985, p. 63 ff.). As De Roover (1948, p. 20) noted, the "main purpose of the consular organization [of the Italians in Bruges] was . . . to facilitate the exchange of information."

favorable treatment in the future. As a consequence, the *devetum* was removed and the Genoese traders flocked to Persia. However, the ruler of Tabriz did not keep his promise to protect their rights, and the Genoese traders were robbed and many of them were killed. The material damage reached 200,000 lire, an immense sum. When the ruler later invited the Venetians and Genoese to trade, he "could not give them the guarantees they required. . . . [Hence] the Italian merchants, eager as they were to recover their prosperous trade in Persia and to reopen the routes to India and China, felt it was unsafe to trust a mere promise" (Lopez 1943, pp. 181–84). As discussed below, however, it was the Genoese traders as a whole who could not trust a "mere promise"; an individual Genoese trader might still be able to trust the ruler of Tabriz while the *devetum* was in force.

An incident that occurred during the Genoese embargo of Tabriz confirms the historical importance of enforcement within the merchant group and confirms that merchant guilds assumed this enforcement role. In 1343, during the *devetum* against Tabriz, a Genoese merchant named Tommaso Gentile was on his way from Hormuz to China. Somewhere in the Pamir plateau he became sick and had to entrust his goods with his companions and head back to Genoa the shortest way. That way, however, passed through Tabriz. When knowledge concerning his journey through Tabriz reached Genoa, Tommaso's father had to justify this transgression with the "Eight Wisemen of Navigation and the Major [Black] Sea," that is, the superior colonial board of Genoa. These officers accepted the thesis of an act of God and acquitted Tommaso from every penalty, inasmuch as he had gone through Tabriz without merchandise (Lopez 1943, pp. 181–83).

The merchant guild's strategy of conditioning future trade on adequate past protection, the use of ostracism to achieve security (rather than privileges or low prices), and the relationship between acquiring information, coordination, and the ability to boycott are reflected again in the agreement made in 1261 between the Flemish merchants from Ghent, Ypres, Douai, Cambray, and Dixmude who purchased English wool. "For the good of the trade," they decided that "if it should happen that any cleric or any other merchant anywhere in England who deals with sales of wool deals falsely with any merchant in this alliance . . . , by giving false weight or false dressing of the wool or a false product, . . . and if they do not wish to make amends, we have decided that no present or future member of this alliance will be so bold as to trade with them" (Moore 1985, p. 301). To make this threat of boycott functional, they "decided that there will be in each of these cities one man to view and judge the grievances, and to persuade the wrongdoers to make amends" (p. 301).

The credibility and force of a coordinating organization's threat to embargo depended crucially on the ruler's ability to undermine an embargo by offering special terms to embargo violators. In theory, the marginal gains from additional trade rise during an embargo. Both this theoretical observation and the observation that guilds needed to take special measures to prevent shipments to the embargoed city are confirmed by the historical evidence. For example, in 1284, a German trading ship was attacked and pillaged by the Norwegians. The German towns responded by imposing an embargo on Norway. The export of grain, flour, vegetables, and beer was prohibited. According to the chronicler Detmar, "there broke out a famine so great that [the Norwegians] were forced to make atonement" (Dollinger 1970, p. 49). The temptation for an individual merchant to smuggle food to Norway in this situation is clear. To sustain the embargo, the German towns had to post ships in the Danish Straits.[11] The fact that the success of a trade embargo depended crucially on obtaining the support of virtually all the merchants involved was also clear to the cities on which an embargo was inflicted. When, in 1358, the German towns imposed an embargo on Bruges, the city attempted to defeat the embargo by offering merchants from Cologne extensive trade privileges (pp. 65–66).

Placing ships in a strait and imposing fines are specific ways to overcome the distinct incentives problem. The evidence, however, suggests that the credibility of the threat to carry out an embargo was, in many cases, sustained by a different means. Credibility was established by endowing guilds with the ability to impose commercial sanctions on their member merchants. In England and other regions in Europe a local guild usually had exclusive trade privileges in its own town, typically including monopoly rights over retail trade within the town, exclusive exemption from tolls, and so forth, as well as the right to exclude, under certain circumstances, members from the guild (Gross 1890, pp. 19–20, 38 ff., 65; De Roover 1948, pp. 18–19).[12] These guilds, therefore, were able to provide their members with streams of rents in their hometowns. Receiving these rents, how-

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[11] See also Dollinger's description of the embargo on Novgorod (p. 48). Anyone who broke the embargo was to suffer the death penalty and the confiscation of his goods.

[12] Exclusive commercial rights for the guild should not be confused with monopoly rights. Entry into the guild was permitted during the period under consideration. The German *Kontore* were established by the merchants who actually traveled abroad to trade. In England, e.g., even individuals who did not live in a specific town could join its merchant guild, and each member had to pay an entry fee (see, e.g., Gross 1890; Dollinger 1970). Note that by creating barriers and consequent rents, such a system also motivates each merchant to adhere to the guild rules, including honoring guild-sponsored embargoes. As shown below, this in turn permits a higher volume of trade than would be possible without the entry restrictions.

ever, could have been made conditional on following the recommen-
dations, 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.[13]

The Flemish regulations of 1240 illustrate the role of the stream
of rents in providing the appropriate incentives: A merchant who
ignored the ban imposed by the guild on another town was expelled,
losing his rent stream: "If any man of Ypres or Daouai shall go against
those decisions [made by the guild] . . . for the common good, regard-
ing fines or anything else, that man shall be excluded from selling,
lodging, eating, or depositing his wool or cloth in ships with the rest
of the merchants. . . . And if anyone violates this ostracism, he shall
be fined 5s" (Moore 1985, p. 298).

Evolution of Guild Organizations

Perhaps the best example of the guild's contribution to fostering the
growth of trade is the evolution and operation of the institution that
governed the relations among the German merchants, their towns,
and the foreign towns with which they traded. To achieve the coordi-
nation and enforcement that was required for the reputation mecha-
nism to operate effectively, a means was needed to influence the
behavior of merchants from *different* towns. This fact led to the rise of
an interesting form of guild—the German Hansa.[14] Several extensive
studies have mined the abundant historical records of the Hansa and
enable us to examine its evolution in light of our theoretical analysis.

Our analysis of the evolution of the guild in northern Europe em-
phasizes episodes in which conflict occurred and trade was affected.
In purely theoretical terms, conflict can be explained as an equilib-
rium phenomenon when information about the behavior of the par-
ties is imperfect,[15] as it surely was in the periods we are studying.
Moreover, in the episodes we study, conflict was followed by institu-
tional change, and it seems implausible to model them as equilibrium
outcomes. Instead, we shall regard the episodes themselves as disequi-
librium outcomes and the resulting changes as adaptations to chang-

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[13] This is not to claim that this was the chief role of these rents. Our analysis examines
the role of the merchant guild in the expansion of trade between political units and
not within political units.

[14] Clearly, we do not claim that the efficiency attributes of the Hansa that we discuss
below were sufficient for its emergence. For a general discussion of the relationships
between social and political institutions, gains from trade, and the emergence of institu-
tions that facilitate trade, see Greif (1992, in press).

[15] For the imperfect monitoring approach, see the pioneering work by Green and
Porter (1984). For refinements of this approach, see Abreu, Pearce, and Stacchetti
(1986) and Abreu, Milgrom, and Pearce (1991).

ing circumstances or as improvements based on accumulated expe-
rience.

Specifically, we focus on the development of the German Hansa.
For historical reasons, membership in the basic organizational unit
that coordinated the activities of German merchants abroad—the
Kontor—was not conditional on residency in one particular town. Any
German merchant who arrived in a non-German city could join the
local *Kontor*. A *Kontor* had the same function as the guild in coordinat-
ing the responses of the German merchants in disputes with the town;
however, it lacked the ability to punish merchants in the towns in
which they resided, weakening its ability to enforce sanctions against
its members. If our theory is correct, the difference between the
German *Kontore* and other guilds should have made the *Kontore* less
effective and should have led to changes in or the dissolution of
that form of merchant organization. The history of the contractual
relations among the city of Bruges, the local *Kontor*, and the German
towns provides a clear illustration of the evolution of merchant orga-
nization.

In 1252, a *Kontor* of German merchants obtained extensive trad-
ing privileges from Bruges, and a permanent settlement followed
(Weiner 1932, p. 218). The *Kontor* was led by six aldermen elected
by the German merchants present in the town. Two of the aldermen
were from Rhenish towns, two from Westphalian-Wendish towns,
and two from Prussian-Baltic towns, reflecting the range of origins
of the participating German merchants (De Roover 1965, p. 114;
Dollinger 1970, p. 86). The trading privileges given to the alien mer-
chants in Bruges were continually abused, and eventually riots broke
out, endangering both people and property. The situation is de-
scribed in a document dated 1280 reporting that "it is unfortunately
only too well known that merchants travelling in Flanders have been
the objects of all kinds of maltreatment in the town of Bruges and
have not been able to protect themselves from this" (Urkundenbuch
der Stadt Lubeck, vol. 1, no. 156, p. 371; translated by Dollinger
[1970, p. 383]). Along with most of the other alien traders who oper-
ated in Bruges, the German merchants retaliated in 1280 by transfer-
ring their trade to Aardenburg. After 2 years of negotiation, a new
agreement was reached and the *Kontor* returned to Bruges.

Seemingly successful, the embargo failed to guarantee the property
rights of the German merchants, since Bruges simply ignored its
agreement with them (Dollinger 1970, pp. 48–51). It should be
noted, however, that Bruges did respect the rights of other alien
merchants who frequented the city. Our analysis points to the reason
for that discrimination. The embargo was not imposed by the Ger-
man merchants alone but by all alien merchants in Bruges, including

the important and well-organized Italian and Spanish *nations*. While the lesson for Bruges from that episode was to respect the rights of those well-organized groups, it became clear to the city that the German merchant organizations were different. The *Kontor* proved incapable of enforcing its decisions on its members. Because the *Kontor* encompassed only the German merchants actually present in Bruges—rather than all the potential German traders who might want to trade during a boycott—its threat of sanctions was not credible. For a time, German merchants had to accept inferior treatment.

Another embargo, from 1307 to 1309, was thus required to force Bruges to respect its contractual agreements with the Germans, and in this embargo, only they participated. What had changed between 1280 and 1307 was the ability of the German traders from different towns to coordinate their responses and enforce their embargo. A milestone occurred in 1284 when the Wendish German towns imposed an embargo on Norway. Merchants from the city of Bremen refused to cooperate in the embargo, and the other German towns excluded Bremen's merchants from all German *Kontore*. The German towns had achieved the coordination needed to expel one of their members. The importance of the achievement is indicated by the fact that the act of expelling a city came to be referred to by a special word, *Verhansung* (Weiner 1932, p. 219; Dollinger 1970, p. 49).

After 1307, the ability of the German merchants to commit themselves to coordinate their actions and to enforce their decisions on individual merchants and towns was rather advanced, thus guaranteeing Bruges's adherence to its contractual obligations. Bruges respected the charters agreed on in 1307 and 1309, and consequently Flanders's trade flourished and expanded for the next 50 years (Dollinger 1970, p. 51). As our theoretical analysis indicates, once the ability of the German *Kontor* to coordinate and enforce its decisions on its members was well developed, the contract enforcement problem could be resolved and trade expanded.

It was not until the middle of the century, when the cost of providing security around Bruges rose drastically, that a new level of cooperation among the German towns was required to force Bruges to provide the security required to support efficient trade. The Hansa relations with Bruges deteriorated around 1350, mainly because Bruges was not ready to compensate the Germans for their damages in Flanders from the war between England and France. The Hansa responded by strengthening its internal organization. In 1356 the German Hansa held its first *diet*. It was decided that the *Kontor* of Bruges should be operated according to the decisions of the diet. Apparently recognizing the need for coordination among towns, the *Kontor* accepted this decision. The prominent historian of the Hansa,

Dollinger, has emphasized the importance of this change: "In law, and not only in fact, the towns, acting through the general diet were establishing their authority over their merchants in foreign ports" (Dollinger 1970, p. 63).

A Hanseatic embargo of Bruges followed in 1358. It was announced that any disobedience, whether by a town or an individual, was to be punished by perpetual exclusion from the Hansa. Bruges attempted to defeat the embargo by offering trade privileges to individual cities, including both non-Hanseatic ones such as Kampen and a Hanseatic one, Cologne. Our theory suggests that by offering these privileges it hoped to undermine the effectiveness of the new leadership. While the non-Hanseatic cities accepted Bruges's terms, Cologne refused to cooperate. The embargo proved a success, and in 1360, Bruges came to terms with the Hansa. This time, reflecting the parties' more complete understanding of the range of circumstances in which the city would have to provide services, the privileges were written "in much detail as to prevent any one-sided interpretations" (Dollinger 1970, p. 66).[16]

The institution of the German Hansa was now crystallized. It was a nexus of contracts among merchants, their towns, and foreign cities that advanced exchange. The Hansa's leadership served to coordinate and enforce cooperation between German merchants and towns—a cooperation that served the interests of all sides. The trade of northern Europe prospered for generations under the supremacy of the Hansa. Although the trade embargo of 1360 was not the last, later trade disputes seemed to center around distributive issues such as the provision of trade privileges. Commitment for security was no longer an issue.

It is illuminating to contrast the development of the Hansa among German towns with the rather different organization among the Italian merchants. The solid internal political and commercial organization of the Italian cities and their prominence in trade enabled them to overcome the coordination and internal enforcement problems. Collective action among the merchants from Italian cities was ensured. And, because none of the cities was a "marginal player" in the ports in which they traded, coordination among the cities was unnecessary.[17] In contrast, the German *Kontor* was a local organization in a trading center that lacked the ability to enforce its decisions on its members, who came from various German towns. As noted,

[16] For further details of this embargo, see Weiner (1932, p. 220) and Dollinger (1970, pp. 63–66).

[17] For the relative size of Italian and German cities, see Bairoch, Batou, and Chèvre (1988). Some intercity cooperation was also practiced among the Italians when smaller cities "affiliated" themselves with larger ones. See the discussion below.

the German towns were small, and before the establishment of the Hansa, most were relatively insignificant in large trading centers such as Bruges.

The historical analysis presented in this section supports our hypothesis that the medieval merchant guild was an institution that overcame the ruler's commitment problem and facilitated trade expansion. Although the merchant guilds exhibited a range of administrative forms—from subdivision of a city administration (such as that of the Italian city-states) to the intercity organization (of the Hansa)—their functions were the same: to ensure the coordination and internal enforcement required to surmount the commitment problem by permitting effective collective action. The actions taken by rulers and traders, their strategies as reflected in their regulations, and the expansion of trade that followed the establishment of guilds all confirm the importance of this role of the guild organization.

II. The Formal Model

The theoretical modeling is kept intentionally simple and is directed to analyzing the potential of various plausible mechanisms for overcoming the ruler's commitment problem. Each of the mechanisms we consider might feasibly permit commitment by the ruler at some levels of trade; we focus on the growing need for more sophisticated mechanisms as the level of trade rises and approaches the efficient level.

We model the basic environment in which trade took place as having two kinds of players: a city and individual merchants. The merchants, identical and large in number, are identified with the points on the interval $[0, \bar{x}]$. The city—a potential trading center—has the following trading technology: If the number of traders passing through the city in a single period is x, the gross value of trade in that period is $f(x)$. In addition, we suppose that there is a cost of $c >$ 0 per unit of value traded incurred by the city for the services it provides and a cost $\kappa > 0$ per unit of value incurred by each trader, so that the net value of trade is $f(x)(1 - c - \kappa)$. We assume that trade is profitable, that is, $c + \kappa < 1$. We also assume that f is nonnegative and differentiable, that $f(0) = 0$, and that f achieves a maximum at some unique value $x^* > 0$, which we call the *efficient volume of trade*. In our model, the city funds its services and earns additional revenues by charging a toll or tax of $\tau \geq c$ per unit of value passing through its ports, so that its total tax revenues are $\tau f(x)$. If it provides the services contracted for, then its net revenue for the period is $f(x)(\tau - c)$. If the city breaches its contract by failing to provide services to a fraction ϵ of the traders, it saves costs of $\epsilon c f(x)$, so its payoff for the

trading period is $f(x)[\tau - c(1 - \epsilon)]$.[18] Traders who are not cheated each earn profits—net of costs, tolls, and taxes—of $(1 - \tau - \kappa)f(x)/x$. Traders who are cheated pay taxes and incur costs κ but receive no revenues; they each earn $-(\tau + \kappa)f(x)/x$.

All of this is repeated period after period, and the players' payoffs from the whole repeated game are the discounted sum of the periodic payoffs using discount factor δ. Thus the city's payoff when the trading volume is x_t in period t is given by

$$\sum_{t=0}^{\infty} \delta^t f(x_t)[\tau - c(1 - \epsilon_t)], \tag{1}$$

and the payoffs of the individual traders are determined similarly as the discounted sum of their periodic payoffs.

The specification of the model captures the idea that merchants are substitutes as far as the ruler is concerned and each of them is relatively "small." The historical observation that rulers could discriminate between traders is captured through the specification of the ruler's strategy. We abstract away from the issue of competition among alternative trade centers since an essence of medieval trade was that it was based on exchange of goods brought by traders from several regions to a specific trading place. Thus, by and large, the threat of a group of traders from a specific region to permanently switch to an alternative potential trade center, without the cooperation of traders from other regions, was not credible.

The historical records also indicate, as discussed above, that merchants were most likely to trade abroad when they perceived their rights to be secure. The specification of the merchants' payoffs is based on this observation. The specification of the ruler's payoff reflects the fact that a ruler could gain from abusing rights or from allowing his subjects to do so. While the model equates the gains from abusing rights with the protection costs saved, one can alternatively think of gains from abuse as reflecting gains from the ruler's confiscation of merchants' goods. This specification of the ruler's and the merchants' payoffs also allows us to distinguish between issues of distribution and efficiency. We treat the tax rate as given and hence abstract away from examining the process through which the gains from trade are allocated. Any losses to the merchants above the agreed-on rate of taxation, however, are defined to be an abuse. Analytically, this specification implies that any first-best arrangement is characterized by the level of trade x^* in every period and no cheating

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[18] Note that this formulation captures the gains to the ruler from either abusing rights directly or neglecting to provide merchants with costly protection.

by the city. Different first-best utility allocations are achieved by setting different tax rates τ. Technically, this conclusion reflects our assumption that some value is being lost when the ruler fails to provide protection, which reflects events such as those that took place in Boston, as described earlier: Failure to provide protection led to a destruction of goods and loss of value. Whatever the merchants were willing to pay the ruler—namely all issues of transfer—is modeled here as part of the tax.

Game 1: Informationally Isolated Traders: Bilateral Reputation Mechanism

Our first model represents the situation of traders who travel alone or in small groups with no social or economic organization, so that they remain unaware of how the city has treated other merchants. Although this model is surely too extreme to be fully descriptive, it highlights the difficulties faced by individual traders negotiating with the city on their own.

In this game, a trader must decide whether to bring his goods to the city in each period, knowing only the history of his own decisions and his own past treatment by the city. A strategy for the trader is a sequence of functions mapping the trader's personal history into decisions about whether to offer his goods for trade in that period. Similarly, the city must decide whom to cheat under various conditions. A strategy for the city is a sequence of functions identifying a (measurable) subset of the current traders for the city to cheat as a function of who shows up to trade currently and the full past history of the game.

Readers familiar with either the economics of reputations or the theory of repeated games will recognize that the repetition of the interactions between the city and the individual traders creates the possibility for reputations to be created that enforce good behavior by the city. The idea is that a trader who is once cheated might refuse to return to the city in future periods, leading to a loss of profits for the city. The effectiveness of this threat depends on both the frequency of trade and the periodic value of the individual merchant's trade to the city. If the frequency of trade is sufficiently high and the volume sufficiently low, so that the value of the repeat business of any individual trader to the city is high, the simple reputation mechanism can be effective for providing incentives to the city to protect individual rights. In our model, however, when the volume of trade rises to the efficient level, the value of repeat business to the city falls to zero, so the usual conclusions of the Folk theorem of repeated games do not apply.

PROPOSITION 1. No Nash equilibrium of game 1 can support honest trade ($\epsilon_t \equiv 0$) at the efficient level ($x_t \equiv x^*$), regardless of the levels of c, τ, κ, or δ.

Proof. Suppose that there was such an equilibrium, and consider the payoff to the city if it deviates from the equilibrium strategy and cheats a fraction ϵ of the first-period traders. In the initial period, its payoff is $f(x^*)[\tau - c(1 - \epsilon)]$. In subsequent periods, the informational assumptions of the model imply that the play of at most ϵ traders is affected. Consequently, at least $1 - \epsilon$ traders come to the city in each future period, and the city's payoff from treating them honestly is, in present value terms, at least $\gamma(\tau - c)f(x(1 - \epsilon))$, where, for convenience, we define $\gamma = \delta/(1 - \delta)$. So the city's total payoff from cheating a fraction ϵ of the traders in the first period and adhering to the purported equilibrium thereafter is at least

$$f(x)[\tau - c(1 - \epsilon)] + \gamma(\tau - c)f(x(1 - \epsilon)), \qquad (2)$$

and this expression coincides exactly with the actual payoff when $\epsilon = 0$, that is, when the city adheres to the purported equilibrium. The derivative of expression (2) with respect to ϵ at $\epsilon = 0$ and $x = x^*$ is

$$cf(x^*) - \gamma(\tau - c)x^*f'(x^*) = cf(x^*) > 0, \qquad (3)$$

because $f'(x^*) = 0$. This establishes that the city has a profitable deviation; that is, the specified behavior is not consistent with Nash equilibrium. Q.E.D.

No mechanism based only on sanctions by those who are cheated can support honest trading at the efficient level, x^*, because when trading is conducted at that level, the marginal trader has zero net value to the city. By cheating a few marginal traders, the city loses nothing in terms of future profits but saves a positive expense in the present period. To support the efficient level of trading, some kind of collective action among merchants is needed.[19]

We have stated the proposition in terms of a Nash equilibrium because it is a negative result and we want to emphasize that, even with the most inclusive of noncooperative equilibrium concepts, there is no way to support the efficient volume of trade. For our later

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[19] This result is not an artifact of our specification of costs. For example, if we had specified that the costs borne by the city include some fixed costs per trader (possibly in addition to the proportional costs), the city would have an even stronger incentive to reduce the number of traders, because it bears only a fraction τ of the resulting loss of value but saves all the service costs. Making costs proportional to value minimizes the distortion in the city's incentives but still leaves it tempted to seek short-term gains by cutting services at the expense of individual traders when only the bilateral reputation mechanism is at work.

positive results, we shall utilize stronger, more convincing equilibrium concepts.

Game 2: Informationally Isolated Small Groups of
Traders: An Uncoordinated Multilateral
Reputation Mechanism

While information in medieval times was slow to diffuse by modern standards, it was nevertheless available. In particular, if a specific merchant was ever abused, even in the absence of any organization for information diffusion, some of his peers were likely to learn of it. For example, the traders cheated in Bruges might become known to some others from the same hometown or to their traveling companions. Can this process of limited, uncoordinated information diffusion enable the ruler to commit himself at the efficient level of trade?

To examine this issue, suppose that an incident in which the city cheats a group of traders always becomes known to a larger group of traders. Formally, whenever a set T of traders is cheated, there is a set of traders $\hat{T} \supset T$, each of whom learns of the event. We assume that there is some constant K ($1 \leq K < \infty$) such that if the number of traders cheated is $\mu(T)$, then the number of those who learn about the event, $\mu(\hat{T})$, is no more than $K\mu(T)$: If few traders are cheated, then proportionately few discover that the event has occurred. In game 2, traders make their decisions to bring goods on the basis of what they know of their own past behavior and the city's, including whatever they may know about how the city has cheated others. Potentially, an incident of cheating may then lead to a withdrawal of trade by a group that is many times larger than the group that was cheated. Even if this potentiality could be realized, however, it would not be sufficient to support an efficient volume of trade.

PROPOSITION 2. No Nash equilibrium of game 2 can support honest trade ($\epsilon_t \equiv 0$) at the efficient level ($x_t \equiv x^*$), regardless of the levels of c, τ, κ, or δ.

The proof is essentially the same as for proposition 1, except that the bound on the number who decline to trade in the future is multiplied by K. In particular, (3) is replaced by $cf(x^*) - \gamma K(\tau - c)x^*f'(x^*) = cf(x^*) > 0$.

Violations against a few merchants that are noticed by proportionately few cannot be deterred by a threat of retaliation by just those with firsthand knowledge.

The real situation faced by the traders is considerably more complicated than what we have modeled in games 1 and 2. One important missing element concerns informal and word-of-mouth communica-

tion. Although we allowed that some traders were informed when the city cheated another trader, we also assumed that traders knew nothing about who else was currently trading. This assumption was a device to rule out endogenous communication among the traders in the game, by which one trader may infer that another was cheated because someone did not show up to trade. In theory, this kind of communication can be significant (Kandori 1992). No doubt, both word of mouth and some inferences of this kind could take place, but we have built our formal model to disallow them on the assumption that they were of minor importance for enforcing contract compliance. To the extent that informal communications and indirect inferences could provide effective information, the need for organized communication and coordination is reduced.

Game 3: Guild with Coordinating Ability

We have now seen that it is impossible for the city and the traders to sustain an efficient level of trade based only on sanctions applied by small groups. Given the historical evidence of the existence of organizations that governed the relationships between the traders and the city, it is natural to examine whether these relationships could contribute to trade expansion.

There is a serious issue of how the guild ought to be modeled. In our view, a crucial characteristic that separates formal institutions such as guilds from informal codes of behavior is the creation of specialized roles such as those of the guild's aldermen. Determining how the guild selects its aldermen, what private interests those merchants may have, and how the guild manages the principal-agent problem of controlling the aldermen is a serious and complex issue that merits close analysis. Nonetheless, including such a model here would only obscure the main point of this paper. So we set these issues aside for future research and model the guild here as a mere automaton. By assigning different information and behavioral rules to the guild, we can evaluate its contribution to trade expansion.

In this subsection, we examine the role of the guild as an *organization* for communication and coordination. In our formal model, if the city cheats a set of traders, T, then the guild is assumed to discover the event and announce a boycott with probability $\alpha(T) \geq \mu(T)$. This specification entails that the more merchants were abused, the more likely the guild is to conclude that some abuse has occurred. On the other hand, it does not imply that the guild has information superior to that available to the merchants under the uncoordinated reputation mechanism examined in game 2.

In this game, the guild makes boycott announcements mechanically

and without any means of enforcement. Traders learn the guild's announcement in each period, but they are not forced to heed it. It simply becomes part of the information that is available to them and to the city. Otherwise, the game is the same as game 1. Despite the guild's lack of enforcement ability, the mere change in information alters the set of equilibria.

PROPOSITION 3. Suppose that $\tau + \kappa \leq 1$ and

$$c \leq \gamma(\tau - c). \tag{4}$$

Then the following strategies form a Markov perfect equilibrium of game 3:[20] The city does not cheat unless a boycott is announced by the guild leader; after a boycott is announced, it cheats any trader who offers to trade. Traders offer to trade in a given period if and only if no boycott has been announced.

The proposition is formally proved by direct verification. The condition (4) is just the condition that what the city stands to gain by cheating a trader, which is proportional to $cf(x^*)$, be less than the average future profits from each trader, which are $\gamma(\tau - c)f(x^*)$. With group enforcement, it is *average* trading profits rather than marginal profits that determine the city's incentives. It is that fact that accounts for the continued effectiveness of group sanctions even at the efficient level of trade.

As remarked earlier, the equilibrium strategies contain a counterintuitive element: that the city cheats any trader who offers to trade during a boycott. It is the traders' unanimous expectations that the city will behave that way that cause them all to honor the boycott. But why should the city not welcome traders during the boycott rather than cheat them? Since we are looking at a Markov perfect equilibrium, the city can be expected to cheat embargo-breaking traders only if it is actually in the city's interest to do so once the embargo has been announced. Given the specified strategies, if y traders violate the boycott and offer their goods, the city expects a payoff of $(\tau - c)f(y)$ in the current period and zero in future periods, if it acts honestly. If it cheats, it expects $\tau f(y)$ in the current period and zero in the future, so cheating is, indeed, optimal.

Although the strategies described in proposition 3 do constitute an equilibrium, the expectations and behavior that they entail seem implausible. The equilibrium requires, for example, that no matter how desperate the city may be for renewed trade relationships once

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[20] This is a Nash equilibrium of the game with the properties that (1) the player's strategies at any date depend only on whether a boycott has been announced and (2) each player's strategy at each date maximizes his payoff from that date onward, given the equilibrium strategies of the other players.

a boycott has been announced, the city must nevertheless cheat any-
one who ventures to trade with it. In addition, the traders must expect
that behavior. By the equilibrium logic, the city does this because it
expects the boycott to take full hold in the next round anyway, so it
anticipates that any cooperation it may offer would be fruitless.

This equilibrium behavior does not match the historical facts very
well, and it is of doubtful import even as theory, because it supposes
that the city and potential embargo breakers play the equilibrium
with the lowest possible value for themselves. Similar criticisms have
been leveled at the equilibria of other repeated-game models, notably
by Pearce (1987), Bernheim and Ray (1989), Farrell and Maskin
(1989), and Abreu and Pearce (1991). None of the alternative solution
concepts that these authors suggest applies directly to our model, but
all suggest that it is more reasonable to suppose that some cooperation
may be achieved between traders and the city even after a boycott is
announced. As an example, we emphasize the possibility that mutu-
ally profitable *bilateral* agreements between the city and individual
traders may be reached even during a boycott. It will be apparent
from the logic of the arguments that any other kind of cooperation
would lead to qualitatively similar conclusions.

Let us therefore suppose that if some traders agree to trade with
the city despite the embargo, they cannot rely on the threat of a
group boycott to enforce their own claims against the city. What,
then, can enforce honest behavior by the city during the boycott? We
consider that it is the threat by a cheated trader to withdraw his own
future trade. Proposition 1 established that the efficient level of trade
x^* could not be supported by such an equilibrium, but it leaves open
the possibility that some inefficiently low level of trade can be sup-
ported. We are therefore led to ask, What is the highest level of
exchange, x', that can be supported in this way?

PROPOSITION 4. Assume that f is concave. Consider the strategies
in which the city cooperates in each period with just those traders
that it has never before cheated and each trader offers to trade in
each period if and only if he has not been cheated before. These
strategies constitute a subgame perfect equilibrium of game 1 when
the volume of traders is x and the taxes are τ if and only if, for all y
$\leq x$,

$$0 \geq cf(y) - \gamma(\tau - c)yf'(y). \tag{5}$$

A sufficient condition is that (i) $0 \geq cf(x) - \gamma(\tau - c)xf'(x)$ and (ii) the
elasticity $e(x) = [d \ln f(x)]/[d \ln(x)]$ be a decreasing function of x.

Proof. It is obvious that the traders' strategies are best replies from
any point in the history of the game to the strategy of the city, so we
need consider only the optimality of the city's strategy.

Beginning with x current traders, consider the subgame achieved after $x - y$ traders depart, when there are $y \leq x$ traders remaining. By cheating a fraction ϵ of the y current traders, the city's payoff will be $g(\epsilon; y) = [\tau - (1 - \epsilon)c]f(y) + \gamma f(y(1 - \epsilon))(\tau - c)$. A necessary condition for the optimality of $\epsilon = 0$ is $\partial g(\epsilon; y)/\partial \epsilon \leq 0$ at $\epsilon = 0$. An easy calculation verifies that this is just the same as condition (5), so the latter condition is necessary for all y.

By the optimality principle of dynamic programming, it is sufficient to show that there is no subgame in which the city would do strictly better by setting $\epsilon > 0$ in the initial period and then adhering to its equilibrium strategy thereafter, given the strategies of the others. If f is concave, then, for all y, $g(\epsilon; y)$ is concave in ϵ, so a sufficient condition is that, for all y, $\partial g(\epsilon; y)/\partial \epsilon \leq 0$ at $\epsilon = 0$, which is again equivalent to (5), proving sufficiency.

The elasticity can be rewritten as $e(x) = xf'(x)/f(x)$. The condition (5) is that $e(y) \geq c/[\gamma(\tau - c)]$ for all $y \leq x$, which follows from $e(x) \geq c/[\gamma(\tau - c)]$ and the hypothesis that $e(\cdot)$ is decreasing. Q.E.D.

Let x' be the largest solution of (5). The equilibrium described by proposition 4 suggests an interesting interpretation of the levels of trade x' observed during boycotts and explains why some merchants continued to trade but others did not. According to the theory, additional traders, beyond the number x', would be cheated by the city and would be unable to exact retribution for their losses. Alternatively, if we think of the level of trade $x < x^*$ during the boycott as being determined by factors outside the model (such as existing alliances or other interests), then condition (5) implies that the minimum tax rate necessary to deter cheating is less the lower x is. This confirms the intuition that an embargo breaker may be able to negotiate an unusually attractive deal, both because the value of trade per trader $(f(x)/x)$ is higher when x is small and because the minimum tax rate τ necessary to prevent cheating is lower for small x.

Proposition 4 implies that in the absence of a strong guild—one that can enforce the boycott on its members—the guild cannot credibly threaten to reduce the city's income to less than $f(x')$. This threat may or may not be sufficient to support honest trade, depending on the parameters γ, τ, and c. That is, a boycott with leaks may or may not be enough to deter the city from violating its agreement. If this kind of boycott is not enough, then there may be mutual gains to be had by strengthening the guild and enabling it to make a more powerful threat. In particular, a guild with ability to enforce its boycott decision on all the merchants may be able to assure trade expansion.

The force of any potential boycott depends not only on $f(x')$ and $f(x^*)$ but also on the net rate of profit, $\tau - c$, earned by the city. Incentives for honest behavior by the city are stronger when the taxes

and tolls are high, because the city then has more to lose from a boycott. A strong guild can make it feasible to offer lower taxes and tolls while still promoting honest behavior by the city, which, in a richer model, could lead to additional advantages in terms of an increased value of trade.

Game 4: The Guild with Coordination and Enforcement Abilities

The final variant is a game in which the guild has the ability to enforce compliance from the individual traders. We offer no formal analysis of this case. It is obvious that the only role of enforcement by the guild against member merchants in our formal model is to prevent trade during boycotts. Accordingly, the results are the same as in proposition 3, but now the traders participate in the boycott because they are required to do so rather than because they expect participation to serve their individual interests.

III. Discussion

All models in economics are stylized to highlight particular points, and ours are no exception. Our game models treat all merchants as small and perfect substitutes for one another; they abstract from the costs of running a guild and the problems of enforcing good behavior on the part of guild leaders; they omit the issues of competition among different trading centers and do not delve into how organized merchants actually enforce sanctions against their own members. Although the models' narrow focus highlights the need for cohesiveness among merchants and gives what we think is a convincing account of many details of the historical record, the omitted features are also important for understanding the history of merchant guilds. Merchant guilds were primarily an urban rather than rural phenomenon. That may be accounted for by the costs of organizing merchants over large geographic areas. Guild membership also extended gradually. In Germany, large cities took the lead in forming intercity guilds. This pattern, too, seems to reflect the costs and other barriers to forming large organizations, and the potential for success for small guilds is surely an important part of the dynamics of guild development.

Although our models treat merchants as homogeneous in their commercial affairs with the city, their geographic diversity was the very basis for the trade. There were exports of timber and Senegalese gold from North Africa; silk, spices, drugs, flax, and wine from the Middle East and Byzantium; luxury furs, cheese, butter, fish, and

iron from Scandinavia and Russia; grains from Germany; wine from
France and Spain; textiles from Flanders; wool, copper, dried fish,
and goat- and sheepskins from England; and so on.

When groups of merchants are close substitutes for one another,
competition among them can undermine the joint action needed to
enforce rights obtained from rulers of trading centers. The patterns
of guild membership along product lines that the theory implies are
nearly identical to the patterns implied by a theory of the merchant
guild as an instrument of monopoly, so it is important to emphasize
how the other predictions of the theories differ.

Our theory predicts that rulers will *encourage* the establishment of
merchant guilds with specific rights and an effective organization.
Such encouragement would not be expected if the sole purpose of
guilds was to shift some of the fixed gains from trade from rulers to
merchants unless the encouragement itself reflects the merchants'
ability to coerce the rulers to shift rent in merchants' favor. The
evidence reveals that, even when merchants could not coerce rulers
by the threat of embargo and even when the privileges provided to
the merchants did not entail any shift in the rent, rulers did grant
merchants various rights,[21] including the rights to organize, to hold
courts and assemblies, to elect their own consuls, and to participate
on juries when merchants were being tried. Our theory predicts that
establishment of these guild rights would lead to trade *expansion*, but
a cartel theory of guilds would suggest that guilds would form to
reduce trade in goods in order to drive up relative prices. The evi-
dence cited earlier supports the conclusion that, at least during the
late medieval period, guilds led to trade expansion. While it is likely
that the merchant guilds sought to advance the merchants' interests
in many ways, including negotiating for rights to control prices, these
rent-seeking activities cannot account for the patterns we have iden-
tified.

Of special interest for our theory are the richness and complexity
of the guild system. The guild functioned as a nexus of contracts,
weaving separate agreements with the individual merchants and the
cities in which its members traded into a system whose parts were
mutually supporting. Exclusive (but not necessarily monopolistic!)
trading arrangements with the city allowed the guild to organize mer-
chants, and other rights helped it to keep informed about disputes
and to help the city enforce good behavior by merchants. The guild's

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[21] In addition to the evidence mentioned above, see Carus-Wilson (1967, p. xviii)
and *English Historical Documents*, 3:515–16. The role of the guild in securing rights
rather than in achieving privileges in Bruges is suggested by the city policy to provide
all *nations* with the same rights (see De Roover 1948, p. 15).

contracts with the merchants were fundamental to allow it to enforce its agreements with the city and with other merchants, including those from towns that tried to smuggle goods past its embargoes. The Hansa, effectively involving intercity contracts, further strengthened the merchants' hands in enforcement.

As centuries passed and trade gave impetus to political integration, larger political units emerged, taking on themselves the functions that the merchant guild previously had performed. The political, commercial, and military relations among rulers enabled each to commit to the safety of the alien merchants frequenting his realm. Illustrative are such acts as those of the English kings, who made agreements and enforced embargoes to provide the English Merchants of the Staple and the Merchant Adventurers with security in their dealings with the Hanseatic league. As the state system evolved, the need for the merchant guilds to secure merchants' rights declined.[22]

Merchant guilds, however, did not necessarily disappear, and some guilds became fiscal instruments that hindered trade expansion in the emerging states. Other guilds consolidated their political power and, after securing their members' rights, turned to limit the rights of their competitors. For example, the German Hansa of the late medieval period was a new political entity aimed at preserving the property rights of German merchants. Although its establishment enabled northern European trade to flourish, once organized, the Hansa's concern was not efficiency but profitability. In its constant efforts to preserve trade rights and supremacy, the Hansa crushed the advance of other traders' groups without consideration of their comparative efficiencies. Thus a merchant guild that had facilitated trade in the late medieval period was transformed into a monopolistic organization that hindered trade expansion during the premodern period.[23]

Up to this point, we have focused exclusively on the role of the merchant guild in a particular time and place, but we believe that the principles that applied then help to explain the emergence of other organizations in other places and times. Our analysis explains why a powerful party might find it advantageous to help weaker powers organize themselves into entities that can exert countervailing power, in order to allow itself to commit to certain mutually beneficial arrangements. For example, prior to the Revolution, the French kings developed an elaborate system to help secure their borrowing and

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[22] For the relations between the Hansa and England during this later period, see Colvin (1971) and Postan (1973).

[23] See the discussion above regarding the Hansa embargoes during the late fourteenth century. Regarding the English traders, see Dollinger (1970) and Lloyd (1991). For a general discussion, see Greif (in press).

thereby enhance their ability to borrow (see Bien 1987; Root 1989; Hoffman 1994). The ingredients of this system—using the officer corps both to aggregate loans and to help borrowers coordinate and relying on the *parlements* to authorize the legality of royal edicts— suggest an attempt by the kings to create organizations capable of collective action to enforce the king's fiscal promises. Similarly, part of Britain's financial and military success following the Glorious Revolution in 1688 involved creating the Bank of England. This organization seems to have had the necessary attributes identified by our theory, for instance, the ability to announce the initiation of a credit boycott and to punish lenders who attempted to lend to the government.[24] The theoretical ideas introduced in this paper provide a promising new framework for analyzing these events and institutions.

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[24] This argument is developed at length in Weingast (1992).

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