Two is Company, N is a Crowd? Merchant Guilds and Social Capital*

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Abstract

We develop a theory of the emergence of merchant guilds as an efficient mechanism to foster cooperation between merchants and rulers, building on the natural complementarity between merchants' market trading and mutual monitoring. Unlike existing models, we focus on local merchant guilds, rather than alien guilds, accounting for the main observed features of their behavior, internal organization and relationship with rulers. Our model delivers novel predictions about guilds' size, membership restrictions, and their welfare implications. Moreover, it identifies the main channels through which the guilds' social capital influenced their ability to cooperate effectively with rulers. As we argue, the available historical evidence offers support for our theory. We also extend the model to analyze the key trade-offs faced by rulers in choosing whether to grant recognition to one or multiple guilds. This provides a rationale for the establishment of both *local* and *alien* merchant guilds, helping us to understand the observed distribution of guilds and their characteristics.

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1. Introduction

Since the pioneering work by Greif et al. (1994), merchant guilds have attracted considerable attention by economists, and for good reason. This celebrated historical institution dominated trade for several centuries, and its development was inextricably linked with the growth of medieval towns and the rise of the merchant class. The merchant guild has also been viewed by many as a shining example of *social capital* — see, e.g., Putnam et al., (1993) — bringing major economic and social benefits, thereby suggesting a very valuable potential role for such social capital even in modern economies — see, e.g., Bardhan (1996), Dasgupta (2000), Raiser (2001) and Stiglitz (1999).

Is this positive view of merchant guilds justified? And, if so, what role did the guilds' social capital play, and what were its welfare implications? We address these questions theoretically, and then argue that the predictions of our model are consistent with the available historical evidence on merchant guilds' behavior — i.e., on the privileges they obtained from rulers, on the transfers they made to rulers, and on their internal norms (reviewed in section 3). The objective is to shed new light on the reasons for the emergence, the organization and functioning of these ancestors of modern trade associations and corporations.

Our model presents a very different, although complementary, theory of the emergence and role of merchant guilds relative to the existing literature and in particular to Greif et al. (1994), who were the first to provide a formal model of merchant guilds. They developed a theory of *alien merchant guilds* — i.e., associations of alien merchants supported by the rulers of the polities in which they traded. Historically though most merchant guilds emerged as *local merchant guilds* — i.e., associations of local merchants that obtained recognition and privileges (including monopoly power over local trade) from their local rulers. Alien merchant guilds were typically formed by the members of local merchant guilds who were active in long-distance trade, and remained under the control and supervision of the guilds from the merchants' polities of origin. Moreover, only a subset of local merchant guilds went on to form such foreign 'branches', primarily in the main international trade centers. It is therefore of considerable interest to understand the economic rationale for the emergence of local merchant guilds, and the reasons why medieval rulers were willing to grant them recognition and privileges. This is all the more important as local merchants dominated medieval towns, many of which acquired considerable power and autonomy. Hence, studying the roots of merchants' organizations and their relationships with rulers is crucial in understanding the wider political economy forces that shaped the development of towns and states.

We develop a repeated game between the ruler of a medieval polity and a large number of (local) merchants to show that merchant guilds emerged as an efficient mechanism to foster cooperation between merchants and rulers thanks to the natural complementarity between merchants' market trading and mutual monitoring. Because of this complementarity, rulers seeking to extract surplus from trade found it advantageous to rely on merchant associations (guilds), able to monitor effectively the trading activities of members and non-members, rather than employing other parties to monitor and collect taxes from merchants. However, guilds could only generate sufficient surplus for rulers by sustaining non-competitive market outcomes. This, in turn, required that only guild members be allowed to trade. Moreover, it implied an upper bound on guild membership, which in some

circumstances involved membership restrictions and exclusion.

Besides offering an economic rationale for the observed historical development of (local) merchant guilds and their relationship with medieval rulers, our analysis also identifies two main channels through which guilds' social capital affected welfare. When applied to 'clubs' or networks, such as merchant guilds, the notion of social capital[1] typically refers to *cohesion* and *trust* among members, and to their resulting ability to enforce group norms and engage in effective collective action. Accordingly, in our model, social capital is captured by two key parameters: the guild's bargaining power *vis-à-vis* the ruler, which reflects the degree of cohesion among its members, and the extent to which they were able to overcome free-riding problems in monitoring trade, which instead reflects their mutual trust. This twofold interpretation of social capital allows us to derive two normative conclusions on the emergence of merchant guilds.

First, guilds' social capital is shown to adversely impact inequality within the merchant class. This effect is readily apparent. On the one hand, greater trust among guild members facilitated coordination on efficient internal and external monitoring, which made it possible to implement more easily non-competitive trade outcomes.[2] On the other hand, cohesion among guild members also increased their bargaining power in negotiating with rulers, and hence their ability to secure a share of the surplus from trade. Thus in some circumstances, high levels of social capital within the guild, combined with restrictions on membership, generated substantial inequality between guild members, who earned large rents, and all those who were excluded from membership. This suggests that guilds may have fostered inequality within the merchant class in medieval polities.

Second, in terms of efficiency, our results imply that guilds may have produced positive welfare effects on final customers relative to alternative taxation modes, such as those that required the recruitment of an external party to monitor trade and levy taxes. Indeed, even if in our repeated game non-competitive outcomes are a necessary premise for a guild to be recognized, in this regime prices may well drop below the monopoly level in order to prevent price wars among guild members. This suggests a potential bright side of merchant guilds.

The analysis is finally extended to study the trade-off faced by the ruler in choosing between recognizing one or multiple guilds. The historical evidence shows that, in some cases, rulers granted recognition and privileges to more than one guild — i.e., to a local merchant guild and to one or more alien merchant guilds. Existing theoretical models offer no explanation for this, our model instead provides clear predictions on the basic trade-offs that could have driven this choice. Two main effects are at stake. The first is the effect on monitoring efficiency: by allowing each guild to target its monitoring so as to exploit its informational comparative advantage, recognizing two guilds instead of one may generate 'economies of scale' in monitoring. This in turn relaxes the minimum size constraint for each guild, making it easier to provide the individual incentives required to sustain cooperation among merchants. The second effect works in the opposite direction: in the presence of multiple guilds, there is an additional incentive constraint that needs to be satisfied. Specifically, members of each guild should not have a collective incentive to deviate from a cooperative agreement

[1] For definitions see, among others, Bourdieu (1986), Coleman (1990), Spagnolo (1999), Dasgupta and Serageldin (2000), Glaeser, Laibson and Sacerdote (2002), Lin (2001), Putnam (2000), as well as Sobel (2002).

[2] Internal monitoring ensured that members who deviated from guild norms were detected, while external monitoring detected non-members attempting to undermine the guild's monopoly over local trade granted by the ruler.

with the competing guild. As we show, a key variable here is the probability that the two guilds recartelize following a deviation: the higher this probability, the harder it is to sustain collusion. We therefore find that rulers are more likely to grant recognition and privileges to multiple guilds when recartelization is less likely, and when each guild's social capital provides a monitoring advantage relative to a particular set of excluded merchants and potential unofficial trading activities. This result may help to explain why the establishment of a single guild of local merchants was the norm, while additional guilds of alien merchants were able to obtain recognition and privileges in a number of polities, and notably in important centers of international trade such as Constantinople or Bruges. Intuitively, in the latter cases, national and cultural homogeneity within each of the guilds helped to generate the required internal cohesion and social capital, while heterogeneity across guilds made it difficult for trust to be restored after a deviation, reducing the probability of recartelization.

The paper is organized as follows. Section 2 links our paper to the existing historical and economic literature. Section 3 reviews the historical evidence on merchant guilds that will motivate and support our theoretical analysis. Our baseline model is introduced in Section 4. We then study the choice between the tax-collector regime and the guild regime in Section 5. The trade-off between establishing one or two guilds is examined in Section 6. Our concluding remarks are contained in Section 7. All proofs are in the Appendix.

2. Related literature

Besides Greif et al. (1994) several other scholars have proposed informal theories about merchant guilds' emergence, economic role and organization — see, e.g., Richardson (2001) for a survey of this literature. The main question addressed by this body of work is whether these associations helped themselves at the public expense or whether they did generate some efficiency gains. The early wisdom was that guilds were simply a way to monopolize local trade at the expense of towns' populations — see, e.g., Gross (1890) and Brentano (1870) among many others. But, some other authors also highlighted the beneficial role of trade associations in promoting innovation, mutual help and cultural transmission — see, e.g., Smith (1902) and Westlake (1919) among many others. Leaving aside these latter types of arguments, which clearly favor a positive view of merchant guilds, our paper is the first to show that there are arguments supporting a negative view, but these are not so evident as one would imagine. Indeed, our results imply that, although fostering inequality within the merchant class, guilds did not necessarily lead to a *de facto* monopolization of trade. A novel trade-off therefore emerges between the *efficiency* and *equity* implications of guilds which may help to reconcile in a simple theoretical framework the earlier conflicting views of merchants' guilds[3].

At a broader level, the paper is related and contributes to three additional important economic literatures. First, it adds to the body of work on collusion in oligopolies. As in Rotemberg and Saloner (1986) and related papers, in modeling the dynamic interaction between merchants we allow

[3]Differences among historians' perceptions of the role of merchant guilds still abound. For example, Ogilvie (2011) presents a highly critical review of merchant guilds. Building on earlier work including Dessí and Ogilvie (2003, 2004), she documents the collusive relationship between medieval rulers and merchant guilds, the privileges granted by rulers to guilds and the transfers made by guilds to rulers. She then argues that guilds were inefficient institutions benefiting rulers and merchants at the expense of the wider economy. Our analysis suggests that the tradeoff between the equity and efficiency implications of merchant guilds may have been more subtle.

for the possibility of inefficient collusion. However, in our model, monitoring abilities, as reflected by the guild's social capital, play a crucial role in determining the (endogenous) monopolistic power of the cartel — i.e., the extent of inefficient collusion. This point was never made before and builds an interesting bridge between the notion of social capital and collusion. Moreover, the extended model where the probability of recartelization determines the choice between granting recognition and privileges to one or two cartels is also novel in the collusion literature, which usually considers the case where only one cartel is active on the market.

Second, our results also contribute to the debate on delegation, intermediation and team incentives — see, e.g., the pioneering work by Radner (1981) among many others. This literature has mainly taken a static view, our theory instead takes a dynamic perspective and, building on the notion of social capital, provides precise predictions on how to optimally organize a team of peers when their cooperation is undermined by (spot) unilateral deviations, but it may be fostered by policies that promote trust and cohesion among them**.**

Finally, the paper is related to the literature studying the link between trust and economic outcomes. Trust appears to be positively correlated, among other things, with economic growth (Keefer and Knack, 1997, Knack and Zack, 2001), with judicial efficiency (La Porta, Lopez-de-Silanes, Shleifer and Vishny, 1997) and with cross-country trading patterns (Guiso, Sapienza and Zingales, 2009). The determinants of trust (and trustworthiness) at the individual level have also been investigated (Alesina and La Ferrara, 2002, Glaeser, Laibson, Scheinkman and Soutter, 2000), as well as the determinants of participation in social activities in more or less heterogeneous communities (Alesina and La Ferrara, 2000). These studies have focused primarily on generalized trust and civic engagement, which correspond broadly to the notion of 'bridging' social capital used by sociologists. Our paper differs in this respect by focusing instead on an example of 'group' social capital, closer to the sociologists' notion of 'bonding' social capital. A key issue of interest is the relationship between these two forms of social capital. Indeed, some of the very positive views about merchant guilds' social capital might be interpreted as positing a substantial degree of complementarity between the two — see, e.g., Putnam, Leonardi and Nanetti (1993). Our analysis suggests the opposite.

3. Motivating evidence

This section reviews the historical evidence on merchant guilds, which will motivate our modeling approach and provide support for the model's implications[4].

3.1. Origins of merchant guilds: the importance of local guilds

Our model focuses mainly on local merchant guilds. Historically, most merchant guilds emerged as associations of *local* merchants. These *local merchant guilds* were ubiquitous in medieval Europe, and were supported by their local rulers, who granted them official recognition and a variety of important privileges, including monopolies over local trade.[5] Some of these local merchant guilds

[4]For a more detailed review of much of the evidence discussed in this section, see Dessí and Ogilvie (2003, 2004).

[5]See Bernard (1972), p.304, Dilcher (1984), pp. 72-76, Ehbrecht (1985), pp. 430, 449, Racine (1985), pp. 131-132, 134-138, Schulz (1985), p.411, Schütt (1980), p.79. The privileges granted to local merchant guilds are discussed below.

then established foreign branches ("colonies" and "consulates") in important trade centers[6], when a significant number of their members engaged in long-distance trade. However, while very many European towns had a local merchant guild (in England alone, for example, there were over one hundred towns with a local merchant guild[7]), only a small subset of these towns established colonies or consulates in the main international trade centers.[8] These *alien merchant guilds* were closely linked to the local merchant guilds of their polities of origin, on whom they depended for their internal rules and governance, as well as for external recognition.[9]

3.2. Recognition and privileges granted by rulers: monopolizing local trade

A key feature of our model will be the ability of guild members to exclude non-members from trade, which plays a crucial role in sustaining collusive outcomes. Here we review the evidence that medieval rulers granted exclusive rights to local merchant guilds.

The historical evidence shows that local merchant guilds throughout medieval Europe obtained from their rulers a variety of privileges enabling them to restrict competition and secure rents. These privileges were sometimes granted as part of charters given to towns, which also gave the towns a degree of political, administrative and financial autonomy. This was the case in England, where many such town charters contained "a clause similar to the following: We grant a Gild Merchant with a hanse and other customs belonging to the Gild, so that [or 'and that'] no one who is not of the Gild may merchandise in the said town, except with the consent of the burgesses..." (Gross, 1890, p.8). Thus English local merchant guilds were granted the right to *exclude any non-member from trade*. In continental Europe, the granting of monopoly privileges to local merchant guilds was not always linked to the granting of greater political autonomy to towns. A good example is the guild of the *mercatores aque* ("water merchants") in Paris: in 1170, the French king, Philip Augustus, "granted them a virtual monopoly of the Seine traffic between the bridges of Paris and Mantes" (Baldwin, 1986). Yet under Philip Augustus, "Unlike those of most towns in the royal domain, the bourgeois of Paris were permitted no semblance of autonomy" (Baldwin, 1986, p.349 and Luchaire, 1902, p.239).

The privileges granted to local merchant guilds in many medieval European cities meant that *alien* merchants could be either excluded from trade[10], or allowed to trade only subject to a number of restrictions clearly intended to favor local merchants. Among the most common of these restrictions were "staple" rights and brokerage rights. Local guilds' "*rights of staple*" meant that alien merchants had to bring their merchandise to municipal warehouses where members of the local merchant guild could buy them at favorable prices.[11] Local guilds' *brokerage rights* meant that alien merchants could

[6] See Planitz (1940), p.19, Racine (1985), pp.134-5, Schütt (1980), p.79, Woodward (2003), p.1.

[7] See Gross (1890), pp.9-20, for a list of all those for which there is explicit documentary evidence, many dating back at least to the eleventh and twelfth centuries. The actual number is likely to have been even greater, implying that by the thirteenth century, local merchant guilds were "one of the most prevalent and characteristic features of English municipalities." (p.22).

[8] On this see, among others, Bernard (1972), pp.299, 304-5, Epstein (2000), pp.27-9, Johanek (1999), pp.72, 76-7, Laiou (2000), pp.811-3, Prevenier (2000), pp.581-2.

[9] See Abulafia (1986), pp.530, 537-8; Abulafia (1997), pp. 54-5; Abulafia (2000), pp.660-1, Ashtor (1983), pp.13, 68-9, 78, 149, 411, Blom (1984), pp.20, 25, Choroskevic (1996), pp.71-2, 78, 86.

[10] See Hibbert (1963), pp.169-74, Irsigler (1985), p.59, Leguay (2000), p.121, Planitz (1940), p.25, Postan (1973), pp.189-91, Reyerson (2000), pp.59-60, Schultze (1908), pp.498-502, 506, 523, 526-7, Spufford (2000), p.177.

[11] Bernard (1972), p.302; Kuske (1939), Reyerson (2000), p.58; Schultze (1908), p.500, Volckart and Mangels (1999),

not trade directly with consumers or with other alien merchants: they had to use members of the local merchant guild as intermediaries (brokers).[12] Local merchant guilds often enjoyed several of these privileges: for example, the local merchant guilds in cities such as Bruges and Cologne enjoyed both staple rights and brokerage rights.[13] At the same time, local merchant guilds could also exclude from trade *local* individuals who were not members of the guild.[14]

3.3. Taxation and transfers

Our analysis will compare the "tax collector" regime, in which tax collectors are hired by rulers to engage in costly monitoring and taxation of trade, and the "guild" regime, in which guild members are exempted from tax by such tax officials, and use (part of) their collusive profits to make transfers to rulers.

The historical evidence shows that local merchant guilds were granted exemptions from a variety of tolls and other taxes, and made regular direct transfers to their rulers.[15] Moreover, the transfers did not vary systematically with the profitability of trade, which is consistent with the model we develop in Section 4. In England, for example, the same town charters that granted legal recognition and monopoly privileges to the local merchant guild generally granted exemptions from all tolls and other taxes, in exchange for a fixed sum or farm (*firma burgi*) to be paid annually by the town to the ruler (Gross, 1890). Membership of the local merchant guild carried corresponding duties and benefits: chief among the obligations was participation in the town's assessments and payment of pecuniary charges — which ensured that the *firma burgi* was duly paid and the privileges granted in the charter maintained. On the benefit side, local guild members enjoyed the right to trade freely and were generally exempt from all tolls, "unfranchised merchants, when allowed to practise their vocation, were hemmed in on every side by onerous restrictions. Of these the most irksome was probably the payment of toll on all wares that they were permitted to buy or sell", Gross (1890).

Lyon and Verhulst (1967) argued that a similar pattern can be observed in France: one of the earliest examples is the town of St. Omer, which obtained freedom from all tolls and other taxes in 1128 in return for a fixed annual sum or farm. The local merchant guild in St. Omer enjoyed a variety of monopolistic privileges and contributed to the provision of local public goods. In Spain, local merchant guilds made regular payments to the ruler in return for their privileges, obtained exemptions from tolls, and collaborated in the collection and administration of taxes on trade.[16]

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p.444.

[12] Bernard (1972), p.302, Choroskevic (1996), pp.84-6, Hibbert (1963), p.170, Schultze (1908), pp.498-502, 506, 523, 526-7, Spufford (2000), p.177.

[13] Bahr (1911), pp.21-2, Daenell (1905), p.14, Kuske (1939), pp.40-1, Prevenier (2000), p.593.

[14] Postan (1973), pp.189-91; Schütt (1980), p.121. For some detailed examples, see Planitz (1940), pp.25-8, on the Flemish local merchant guild in Ghent and the French local merchant guild in Valenciennes. Schulze (1985), pp.379-81, on the German local merchant guild of Stendal. Schütt (1980), pp.398-9, on the German merchant guild of Halberstadt. Woodward (2003), p.3, on Catalan and Aragonian local merchant guilds.

[15] For examples see, among others, Ehbrecht (1985), pp.425-6, on Germany; Freshfield (1938), p.17 and Racine (1985), p.139, on Constantinople, Hoffmann (1980), p.49, on Denmark, Racine (1985), pp.135-6, on Italy, Schütt (1980), pp.112-21, on Sweden.

[16] Smith (1940), pp.48, 61-5, 86, and Woodward (2003), pp.3-4.

3.4. Social capital and monitoring

We view cohesion and trust among guild members as affecting two key parameters of our model. First, the guild's bargaining power relative to the ruler - which has implications for distributional outcomes. Second, the extent to which guild members are able to overcome free-rider problems among themselves, so as to monitor effectively, punish and hence deter deviations from collusive outcomes. Here we review the historical evidence on cohesion and trust within merchant guilds, and the role of monitoring.

Cohesion and trust among members of the same guild were fostered by repeated and close interaction in a range of different domains — i.e., economic, social and religious. Regular social gatherings, including assemblies and feasts, were very common, and often even compulsory, with members being fined for missing them.[17] When abroad, merchants typically lived and interacted closely with other merchants from the same polity of origin. For example, Italian merchants in the Byzantine Empire, the Levant and Africa obtained "special quarters where they could live according to their laws and beliefs" (Lopez, 1971, p.64). Close and repeated interaction helped to generate social capital; this in turn enabled merchant guilds to enforce the privileges granted to them by rulers, and establish collective norms to restrict competition and secure rents.[18]

Enforcement of their monopoly over local trade required monitoring to detect possible deviations — e.g., by alien merchants, with the possible help of some local guild members. Thus, alien merchants coming to trade in English towns "were carefully watched, lest they should sell or buy under colour or cover of a faithless gild-brother's freedom, the latter being expelled from the fraternity or otherwise severely punished, if found guilty of this offence" (Gross, 1890, p.48). Guild members not only sanctioned 'deviant' members who breached guild rules; they also intervened directly against non-members who undermined their monopoly over local trade. Gross (1890) also describes one such instance in detail: when Richard the Baker from Stafford bought some wool in Newcastle-under-Lyme, local guild members seized the wool, and then defended their action arguing that the purchase had been in breach of the guild's privileges.

Internal and external monitoring, and the resulting ability of guild members to secure rents, were greatly facilitated by a variety of rules and restrictions. Here are just a few examples. In tenth-century Constantinople, local guild members were required to pool their resources and make purchases as a cartel. Alien merchants were not allowed to spend more than three months in Constantinople.[19] The guild of raw-silk dealers[20] required its members not to "sell unworked silk in their homes but in the market", where mutual monitoring was easier. Members were also required not to sell to other merchants for resale outside the city. The widespread use of staple and brokerage rights throughout medieval Europe also greatly facilitated monitoring of alien merchants, since the latter had to bring their merchandise to a specific place where it could be easily inspected by local guild members, and could not trade directly with other alien merchants or consumers.

[17] See Dilcher (1984), p.70; Kohn (2003), pp. 42-43, Pertz (1925), pp.118-119, Schulze (1985), pp.379-380.

[18] On this see, for example, Bateson (1899), pp.205-7; Bernard (1972), p.320; Dilcher (1984), p.70; Freshfield (1938), pp.16-17, 19-22, 28-9; Irsigler (1985), pp.57-8; Planitz (1940), p.21; Racine (1985), p.139; Schulze (1985), pp.379-80.

[19] Lopez and Raymond (2001), pp.21-23.

[20] Constantinople was unusual in having more than one local guild, but the local guilds specialized in trading different commodities and were not in competition with each other, which is consistent with the model we develop below.

Monitoring played a key role in enforcing compliance with guild norms both at home and in other polities. For example, the statutes of the merchant guild of the Italian town of Piacenza describe the duties of the consuls of the colony of merchants from Piacenza in Genoa: these include monitoring and collecting fines imposed by the merchant guild in Piacenza; the same statutes also specify that in any colony where there are at least three merchants from Piacenza, two consuls must be elected (Racine, 1979, p. 307).

Merchant guilds throughout medieval Europe employed a variety of sanctions against members who violated guild norms, ranging from fines to exclusion from the guild, confiscation of property and imprisonment.[21] Exclusion typically represented a very important punishment. For example, "For very serious offences the gildsmen of Andover fulminated a decree of excommunication against the erring brother - commanding 'that no one receive him, nor buy and sell with him, nor give him fire or water, nor hold communication with him, under penalty of the loss of one's freedom'..." (Gross, 1890, p.32).

3.5. Exclusive membership

In our model, the negative implications of guilds for equality among (potential) merchants arise when the benefits of collusion require restrictions on guild size, and hence exclusion of some who would have preferred to become members. Did local merchant guilds restrict membership? The answer is yes: membership was often contingent on having "citizenship" or "burgess" or "free" status, from which many were excluded.[22] As towns grew, attracting large numbers of rural immigrants, this exclusion affected an increasing number of urban inhabitants. In England for instance, "big towns had populations most of whose members were not 'free' — e.g., two thirds in late-thirteenth-century in London, a half in Oxford and more than three quarters in Exeter" (Hilton, 1992, p. 92).

A key requirement for membership of local merchant guilds was the payment of entry fees and a variety of dues[23], which is consistent with the model we develop in Section 4. This implied the exclusion of those who could not afford to pay the, often substantial, entry fees, or who were unable to provide the required guarantees: "To become a gildsman...it was necessary to pay certain initiation-fees...The new comer was also required to produce sureties, who were responsible for the fulfilment of his obligations to the Gild - answering for his good conduct and for the payment of his dues" (Gross, 1890, p.28). The historical evidence makes it clear that many of the towns' inhabitants could not meet these requirements.[24] Moreover, admission to local merchant guilds was sometimes controlled by requiring that the potential new member be approved by a majority of existing members, and this requirement appears to have been used to restrict membership.[25]

[21] See Ashtor (1983), p.415; Bateson (1899), pp.205-7; Choroskevic (1996), pp.74, 84-6; Freshfield (1938), pp. 16-7, 19-22, 28-9; Moore (1985), p.298; Racine (1985), p.139; Schulze (1985), pp.379-80; Schütt (1980), pp.112-21; Volckart and Mangels (1999), p.440.

[22] See Dilcher (1985), pp.88-9, Epstein (2000), pp.35-6, Leguay (2000), pp.110-1, 121-2, Schultze (1908), 475, 490-3, and Schütt (1980), p.131.

[23] For examples see Ehbrecht (1985), p.445, on entry fees for the German merchant guild of Goslar; Dilcher (1984), p.69, and Volckart and Mangels (1999), pp.437-8, on dues levied by the Flemish merchant guild of Tiel; Schütt (1980), pp.112-21, on the dues levied by the Swedish merchant guild of Flensburg; Störmer (1985), pp.366-7, on entry fees for the Austrian merchant guild of Laufen; Origo (1986), p.44, on entry fees for the Italian merchant guild of Prato.

[24] See Hilton (1992), p.92, and Schultze (1985), pp.379-81.

[25] See Smith (1940), p.38.

In sum, local merchant guilds excluded an increasing proportion of the urban population, notably the least wealthy.

4. The model

This section introduces the model. Consider a medieval polity with three types of risk-neutral players[26]: a ruler, merchants, and a tax-collector.

Merchants. There is a large number N of identical merchants who sell a homogeneous good. They play an infinite horizon game. In each trading period, throughout denoted by $\tau \in [1, .., +\infty)$, a collusive, deviation or punishment phase takes place. The static (market) game is a reduced form of Bertrand competition: in each period $\tau \geq 1$ merchants set prices simultaneously and, given the realized demand, sell at constant marginal costs.

In an 'efficient' collusive phase (full collusion) — i.e., when all merchants charge the monopoly price — each earns a per-period profit equal to π^τ/N, while each earns 0 in static Nash — i.e., if all price at marginal cost. The profit that a merchant makes by deviating from an efficient collusive agreement is equal to π^τ, so that unilateral deviations from a cartel are profitable in a static sense. For simplicity, we assume that deviations are perfectly detected — i.e., the game is one of perfect monitoring. As in Rotemberg and Saloner (1986), we allow for inefficient collusion: given any realization of the market size π^τ, merchants may set prices above marginal cost but below the monopoly level so as to obtain any intermediate profit $\beta\pi^\tau$, with $\beta \in [0, 1)$. This 'reduced form' approach is standard in the literature — see, e.g., Chang and Harrington (2007) and Chen and Rey (2007).

The parameter π^τ measures the total market size. In each period it is determined by the realization of a random variable drawn from a uniform distribution with support $[0, 1]$, which is identically and independently distributed over time (iid).

The ruler. The ruler governs the polity: he provides certain public goods, such as law enforcement and defence, and finances these with various sources of revenue, including the taxation of trade. He also spends on activities that provide him with private benefits, such as military campaigns and court display.[27] For our purposes it is sufficient to treat his expenditures and his other sources of revenue as given exogenously, and to focus on the revenue he can raise from the taxation of trade. The ruler is assumed to maximize this revenue. This is a reasonable assumption for the historical period under consideration, when rulers typically attached a low weight to the well-being of ordinary consumers.

Bargaining power. The ruler has all the bargaining power relative to individual agents (tax-collector, individual merchants), whose reservation utilities are normalized to zero. On the other hand, an association of merchants could have some bargaining power. The idea is that merchants, once organized in a guild and used to acting together in their common interest, may acquire some bargaining power relative to the ruler, particularly in the absence of an easy replacement. This

[26] We explicitly focus on risk-neutral parties in order not to relay on risk-sharing mechanisms that have been already analyzed in the network literature applied to economic history — see, e.g., Abramitzky (2008).

[27] For historical evidence on the importance of these, see Brewer (1989).

possibility is formalized by assuming that the merchant guild receives a share $1-\alpha$ of any 'surplus' accruing from an agreement with the ruler ($\alpha \leqslant 1$).

Commitment. The ruler can make credible commitments. As we show, our theory provides a rationale for the emergence of merchant guilds which does not require imperfect commitment by the ruler. In particular, under full commitment, our objective is to disentangle in the clearest possible way the basic cost-benefit trade-offs associated with the establishment of merchant guilds even in the absence of frictions, such as those due to imperfect commitment, capital constraints, etc. Allowing for imperfect commitment by the ruler would entail less reliance on ex-ante fees and greater reliance on ex-post transfers to the ruler. While this would obviously complicate the analysis, it would not in general make either the guild regime or the tax collector regime decisively more attractive to the ruler. This is because the need for ex-post transfers would make it harder to sustain collusion in the guild regime, by reducing each guild member's expected future collusive profits; but it would also make it harder to induce efficient monitoring and surplus extraction in the tax collector regime. Hence, to rule out such additional source of ambiguity in the ruler's choice, we focus on the case of full commitment.

The guild regime. At time $\tau = 0$, the ruler may choose to grant recognition to a merchant guild, and endow it with privileges, notably the power to exclude individual merchants from trade (as discussed in Section 3, this power may be applied to individuals who are not members of the guild, and also to members who break guild rules). Hence, a guild can punish members who deviate from a collusive agreement by excluding them from future trade. The merchants remaining in the guild then recartelize with probability 1 as long as this continues to be profitable.[28] As it will become clear, our main results will continue to hold if we allow for additional punishments — e.g., fines, jail, confiscation of property — and imperfect detection, as long as there is a positive (expected) gain from deviation.[29]

When the ruler grants recognition and privileges to a merchant guild, he requires an ex ante fee R^G, which is shared equally among the guild's members.[30] This fee is set at the level which solves a standard Nash-bargaining problem between the ruler and the guild with weights α and $1-\alpha$, respectively.

The tax-collector regime. In the absence of merchant organizations, the ruler delegates trade taxation to an agent: the tax-collector. In order to make the case for the tax-collector regime as favorable as possible, we assume that the agent is not capital-constrained. This means that it is optimal for the ruler to choose a very simple form of delegation: he endows the agent with the right to collect taxes on trade in the polity, in return for an ex ante royalty fee R^T. This is essentially "tax farming", a very widespread practice in medieval Europe — see, e.g., Lyon and Verhulst (1967) and Webber and Wildavsky (1986).

[28] Note that it will never be in the remaining members' interest to welcome an excluded member back into the guild. Obviously exclusion does not apply if *all* guild members deviate at the same time. In that case, it seems reasonable to assume that there is no exclusion, and that members subsequently recartelize.

[29] On the other hand, rulers would not have allowed extreme punishments, reserved for greater offences.

[30] As discussed in Section 3, guild members tpically paid some entry fees, as well as a variety of other dues. The guild then made transfers to the ruler.

Hence, the tax-collector imposes and collects, at the end of each period, a per-merchant lump-sum tax on trade $T^\tau(.)$. Abusing notation, this tax is a function of each merchant realized profit $\hat{\pi}^\tau$, which in period τ depends on his actual market strategy (pricing decision) as well as the realization of the market size π^τ — i.e., $\hat{\pi}^\tau = \pi^\tau/N$ in an efficient collusive phase, $\hat{\pi}^\tau = \pi^\tau$ if the merchant deviates in period τ given that his rivals are pricing at the monopoly level, and $\hat{\pi}^\tau = 0$ in a punishment phase. Unlike the ruler, the agent in each period can observe the aggregate state π^τ as well as each individual state $\hat{\pi}^\tau$ by paying a monitoring cost $c > 0$.

The key assumption here is that the ruler did not have direct access to detailed information about these realizations. This was generally the case for medieval rulers, who could not rely on a civil service to provide them with such information. Indeed, medieval rulers had to rely on a variety of agents to collect taxes, and struggled to limit the extent to which these agents exploited their informational advantage for their own benefit — see, e.g., Bisson (1984) and Spruyt (1994). Local tax-collectors, on the other hand, had greater access to local information. For simplicity, we capture this by positing that they could observe the relevant information by incurring the per-period monitoring cost c. Essentially, to enforce taxation, these agents had to physically go to the market and observe actual trades before collecting taxes. The cost c may be thought of as capturing both the cost of observing trade and the cost of collecting taxes.

Timing and strategies. At time $\tau = 0$ the ruler decides whether to grant recognition to a merchant guild or hire an agent as tax-collector. Accordingly, he collects the associated royalty fees. In each period $\tau \geq 1$ the sequence of events is as follows:

- Merchants observe the public history of the game up to $\tau - 1$ and the current state π^τ.
- They post prices, demand materializes and trade takes place.
- Taxes are levied in case an agent has been hired by the ruler.

The public history of the game a τ is the sequence of prices and trades observed by all merchants up to that stage, as well as by the tax collector, if any, provided he monitors. We assume that, if a deviation occurs in any period, other merchants observe the identity of the deviating merchant by the end of the period. This assumption seems realistic in the case of medieval polities. Indeed, most of the trading activities at that time were taking place in markets where merchants could easily monitor each other's pricing strategy.[31]

All agents have a common discount factor $\delta \in [0, 1)$ which, as standard in repeated Bertrand games, is assumed to be greater than $1/2$. We shall look for the (pure strategy) subgame perfect Nash equilibria (SPNE) of this game.

Assumptions. For expositional purposes, we will make the following assumptions:

(A1) *All agents in the polity are capital unconstrained.*

[31] Probably the most famous example is that of the Champagne fairs, but of course there were very many other markets, including numerous local ones accommodating primarily local trade.

A1 guarantees that our results do not hinge on *ad hoc* binding capital constraints, neither on the tax-collector's nor on the guild's side.[32]

(A2) *The monitoring cost c is lower than the expected market value* $\mathrm{E}[\pi] = 1/2$.

A2 implies that if the tax-collector expects merchants to collude, he will always find it optimal to monitor. This renders the tax-collector regime non-trivial.

Let $n \leq N$ be the guild's density — i.e., the number of its active members:

(A3) *A guild can operate only if its density exceeds a minimal size m (with $m \geq 2$).*

A3 rules out the uninteresting possibility of a 'single member' guild and captures in the simplest possible way the idea that guilds with small density were more likely to be exposed to competition by excluded merchants — i.e., those who were not officially authorized to trade. Hence, m can be interpreted as the minimum number of members needed to detect attempts by outsiders to undermine the guild's monopoly over local trade (by engaging in unofficial and forbidden trading activities). It reflects the outcome of an un-modeled moral hazard in teams problem: preventing unofficial trade required a minimal amount of (aggregate) monitoring effort.

Therefore, greater trust among guild members (and thus greater social capital) would reduce m by making it easier for them to overcome free-riding incentives and coordinate on efficient monitoring. One way in which this reduction was achieved in practice was, for instance, through agreement on guild rules that simply made monitoring easier — e.g., by requiring alien merchants to bring their merchandise to a specific place, and trade only via intermediaries who were themselves members of the local merchant guild.

Finally, as a tie breaking condition, we assume that:

(A4) *When indifferent between colluding and deviating, merchants collude — i.e., they act in the ruler's best interest.*

This is an equilibrium refinement that simply makes the regime with a tax collector non-trivial.

5. Trade, taxation and collusion with a single guild

We begin by considering what the ruler can achieve when merchants are not organized in a guild, then proceed to examine the role of guilds.

[32] Dessi and Ogilvie (2003), in never published work, developed a simple model of merchant guilds in which local rulers grant recognition and privileges to associations of local merchants in order to maximize their fiscal revenue from trade. In their model, giving monopoly power over local trade to a guild, in return for an appropriate transfer, yields a higher revenue for the ruler than hiring a local agent to collect taxes on trade. Their main argument hinges on tax-collectors being capital-constrained while guilds are assumed to be 'deep pocket' organizations. Our model, in contrast, provides a rationale for the emergence of merchant guilds that does not necessarily hinge on tax-collectors to be capital-constrained: the key is the complementarity between trading and monitoring trade.

5.1. Trade and taxation in the absence of merchant guilds

Suppose that the ruler hires a tax-collector who can observe in each period τ the realized market value π^τ as well as each merchant's individual profit $\hat{\pi}^\tau$ upon paying the per-period monitoring cost c.[33] Taxes are lump-sum and can be made contingent on each merchant realized profit — i.e., a merchant pays $T^\tau(\hat{\pi}^\tau)$ when making a profit of $\hat{\pi}^\tau$.

We solve the model backward and, to make the case for the tax-collector regime as strong as possible, focus on a class of simple and intuitive SPNE where the tax-collector always monitors and sets a tax rate which leaves merchants with no surplus in each period, while merchants collude at a price which guarantees an expected profit at least equal to c in each period.[34]

Indeed, under **A4** it immediately follows that this type of equilibria exist, and full collusion is self-enforcing for every number of active merchants (N) and for any discount factor (δ). The reason is that taxation reduces the merchants' post-tax profits to zero when they deviate as well as when they cheat, thereby eliminating any incentive to deviate. Essentially, although merchants are assumed to be capital unconstrained, the tax-collector can never extract more than $\hat{\pi}^\tau$ at the market stage. Indeed, a merchant would have no incentive to bring extra wealth to the market, knowing that in this case the tax rate would exceed his trade revenue $\hat{\pi}^\tau$.

Proposition 1. *With a tax-collector, there exists a SPNE with full collusion where merchants and the tax collector are left with no rents. The ruler appropriates the whole (expected) surplus from trade net of the monitoring cost — i.e., his utility V^T equals to R^T, with*

$$R^T = \frac{\mathrm{E}[\pi] - c}{1 - \delta}.$$

Clearly, the ruler has a stronger incentive to hire the tax-collector the larger the difference between the expected market size and the monitoring cost is, and the larger the discount factor is.

5.2. Merchant guilds: trade, taxation and privileges

Suppose now that a subset of merchants organize themselves as a group, able to act in the members' collective interest: call this group 'the guild'. The ruler grants privileges to the guild, and, in particular, monopoly power over trade — i.e., only members of the guild are authorized to trade.

Under what conditions can the guild implement a better outcome than the tax collector, from the ruler's point of view? To answer this question, we first need to understand what are the incentives of each guild member to follow a collusive trade agreement enforced through the treat of exclusion.

Let $n \leq N$ be the subset of active merchants belonging to the guild. A collusive outcome is sustainable as long as it is in each merchant's best interest not to break the agreement. Formally,

[33] It seems reasonable to assume that if the ruler hired a merchant to collect taxes, this merchant would not be able to engage in trade at the same time. Hence, the cost c would still need to be incurred.

[34] When N is small there may exist other SPNE of the game between merchants and the tax-collector, in which the tax-collector never monitors and merchants collude by setting a price such that total profits are equal to $c - \varepsilon$, with ε small enough. Clearly, in this case, there is no scope for hiring a tax-collector, thereby making the ruler's decision at $\tau = 0$ trivial. We therefore abstract from such equilibria in the remainder of the paper.

this requires

$$\pi + \frac{\delta \mathrm{E}[\pi]}{1-\delta} \geq n\pi, \tag{5.1}$$

in any given state π. The left-hand side of this condition can be interpreted as the (discounted) gain from cooperation, while the right-hand side is the spot gain from deviation. Notice that the continuation payoff after deviation is equal to zero since the deviant is excluded from trade starting from the next period.

Rearranging equation (5.1), collusion can be sustained in state π if and only if

$$\pi \leq \frac{\delta \mathrm{E}[\pi]}{(n-1)(1-\delta)}. \tag{5.2}$$

Intuitively, collusion is more difficult to sustain when the guild's density increases. This is because, a larger number of members implies a lower individual return from collusion. Conversely, holding fixed the guild's density, collusion is easier to sustain when the expected market value $\mathrm{E}[\pi]$ is high.

However, for sufficiently large realizations of π, it may not be possible to sustain full collusion — i.e., the potential gain from deviation gets too large. In this case, the collusive agreement requires merchants to set the highest possible price level compatible with the 'no cheating' condition (5.2) so as to mitigate the temptation to undercut rivals. More precisely, there exists a threshold $\pi^* \leq 1$ such that: for all $\pi \leq \pi^*$ full collusion is viable and each merchant obtains earns π/n, while for $\pi > \pi^*$ full collusion is not sustainable and the maximal profit that a guild member can obtain is π^*/n.[35] The threshold π^* is endogenously defined by (5.2) taken as equality — i.e.,

$$\pi^* = \frac{\delta \mathrm{E}[\pi]}{(n-1)(1-\delta)}, \tag{5.3}$$

where,

$$\mathrm{E}[\pi] = \int_0^{\pi^*} \pi d\pi + (1-\pi^*)\pi^*. \tag{5.4}$$

Hence, when the market value is high, the guild will obtain an aggregate profit (π^*) which is lower than the monopoly level. Substituting (5.4) into (5.3) we have

$$\pi^* = \frac{\delta}{(n-1)(1-\delta)} \left[\int_0^{\pi^*} \pi d\pi + (1-\pi^*)\pi^* \right] = \frac{2(1-n(1-\delta))}{\delta}.$$

This cut-off is increasing in δ — i.e., ceteris paribus, more patient merchants are less attracted by deviations. Moreover, the larger is the guild density — i.e., the larger is n — the lower is π^* since each merchant is tempted to deviate more often when the gain from collusion has to be shared among many. Hence, a non-competitive outcome can obtain as long as the guild density does not exceed

[35] The case where $\pi^* < 1$ corresponds to instances where in order to support collusion in states higher than π^* merchants must charge prices lower than the monopoly one. Formally, this implies that the guild total profit in each of these states is $\beta\pi$ with $\beta = \pi^*/\pi \leq 1$.

the endogenous upper-bound $\overline{n}$ above which $\pi^* = 0$ — i.e.,

$$\pi^* > 0 \quad \Leftrightarrow \quad n < \overline{n} \equiv \frac{1}{1-\delta},$$

with $\overline{n}$ being the solution with respect to n of $\pi^* = 0$. As a result, when N is large enough some merchants will be excluded from trade. Moreover, $\overline{n}$ increases with δ: there is less need to exclude merchants if they are more patient.

Lemma 1. *With a guild, the ruler's profit is positive only if $m < \overline{n}$, and it is zero otherwise.*

The need for the upper-bound $\overline{n}$, together with the minimum density constraint imposed by **A3**, leads to a necessary condition for a guild to represent a feasible option for the ruler. Intuitively, the ruler may have an interest in granting recognition to a guild only when merchants can better protect their trading 'territory' from excluded (local or alien) rivals: that is, if there sufficient social capital among them. Moreover, this requirement becomes less severe when the guild members are more patient (i.e., when δ gets larger).

Let,

$$\underline{n} \equiv \frac{2-\delta}{2(1-\delta)} < \overline{n},$$

denote the solution of $\pi^* = 1$ with respect to n. Hence, if $n \leq \underline{n}$ full collusion can be achieved under the guild regime, and this outcome is more likely, the more patient merchants are. Of course, this is possible only if $m \leq \underline{n}$. Notice that $\overline{n}$ is decreasing in δ, that is, the more patient merchants are, the less a guild needs to rely on social capital to enforce the monopoly outcome.

Lemma 2. *With a guild, the following properties hold:*

- *If $m \leq \underline{n}$, there is full collusion — i.e., merchants extract the monopoly profit π in every period. The guild density is indeterminate and lies within the range $[m, \overline{n}]$.*
- *If $m \in (\underline{n}, \overline{n}]$, there cannot be full collusion — i.e., for $\pi > \pi^*$ merchants can only extract π^*. The profit maximizing guild density is m.*

Hence, the guild regime secures the monopoly outcome only if merchants' ability to prevent unauthorized trade is strong enough. Otherwise, full collusion cannot be enforced, and the guild's density has to be reduced to its lower bound m to maximize the set of contingencies in which merchants can (safely) charge the monopoly price. In this case, even if organized in a corporation, merchants will not be able to extract all the potential surplus from trade.

Building on this characterization we can now turn to solve the bargaining problem between the ruler and the guild. Since π is iid, one can verify that the guild's expected intertemporal profit (W) is

$$W = \frac{\max\limits_{n \in [m, \overline{n})} \left\{ \int_0^{\pi^*} \pi d\pi + (1-\pi^*)\,\pi^* \right\}}{1-\delta} = \begin{cases} \frac{1}{2(1-\delta)} & \Leftrightarrow \quad \pi^*|_{n=m} \geq 1 \\ \frac{2(1-m(1-\delta))(n-1)}{\delta^2} & \Leftrightarrow \quad \pi^*|_{n=m} < 1 \end{cases}.$$

Now, let

$$U = W - R^G,$$

be the guild's payoff — i.e., the intertemporal profit from trade net of the royalty fee. The royalty fee R^G is chosen so as to solve the following Nash bargaining program:

$$\mathcal{P} : \max_{R^G \in \Re_+} (R^G - V^T)^\alpha U^{1-\alpha}.$$

Where V^T is the ruler's outside option, which is the expected payoff he would obtain by hiring a tax-collector. On the other hand, the outside option of the guild is zero since single merchants would make zero profits if a tax-collector is hired. It is then immediate to check that the solution of $\mathcal{P}$ entails:

$$R^G = V^T + \alpha \left[W - V^T \right],$$

which also defines the ruler's profit from granting recognition and privileges to a guild — i.e., $V^G = R^G$. The guild obtains an intertemporal payoff equal to

$$U = (1 - \alpha) \left[W - V^T \right],$$

which is shared equally among its n members.

5.3. Merchant guild versus tax-collector

Building on the previous results, we can now study the conditions under which recognizing a merchant guild is optimal for the ruler. Of course, if recognizing a guild leads to full collusion, the ruler prefers not to hire the tax-collector, unless his monitoring cost is zero (in which case the ruler is indifferent between the two taxation regimes). When, instead, the monopoly outcome does not obtain under the guild regime — i.e., if $\pi^* < 1$ even at $n = m$ — the ruler faces the following trade-off. On the one hand, hiring a tax-collector ensures full collusion in all states relative to the guild option. On the other hand, however, the tax-collector's monitoring activity is costly and thus there are limits to the surplus that the ruler can extract from him.

The resolution of this trade-off is studied in the next proposition:

Proposition 2. *The ruler's profit maximizing strategy is as follows:*

- *For $m \leq \underline{n}$ a guild is recognized.*
- *For $m \in (\underline{n}, \overline{n})$, there exists a threshold $c^* > 0$, with*

$$c^* \equiv \left[\frac{2m(1-\delta) - (2-\delta)}{\delta\sqrt{2}} \right]^2,$$

such that:

  - *If $c \geq c^*$ a guild is recognized.*

– *If* $c < c^*$ *a tax-collector is hired.*

- *For* $m \geq \overline{n}$ *a tax-collector is hired.*

Hence, the ruler never prefers to recognize a guild rather than hiring a tax collector if merchants' monitoring ability is very poor. Conversely, when the guild features a strong cooperative ability, so that the monopoly outcome is not vulnerable to individual deviations, the ruler prefers to deal with an association of merchants. Finally, even when there cannot be full collusion under the guild regime, the ruler may still prefer not to hire the tax collector if his monitoring cost is large enough relative to the loss of monopolistic power that would be emerge under the guild regime.

It can be easily verified that the net gain of recognizing the guild increases when merchants are more able to overcome free-riding problems in mutual monitoring, and when they are more patient — i.e., c^* is increasing in m and decreasing in δ. The guild's monitoring ability plays a crucial role in the trade-off discussed above. Such monitoring ability will depend on several factors, including the geographical and population characteristics of the polity, which may make it easier or harder to detect alien or excluded local merchants who engage in unauthorized trade, as well as the polity's openness to foreigners, and its attractiveness to alien merchants. Monitoring ability will also depend, on the other hand, on the degree of trust among guild members, and the extent to which they are able to overcome free-riding incentives and cooperate to monitor effectively: in other words, on their *social capital*. In this sense, the guild members' social capital is valuable not just for them, but also for the ruler.

Taken together, the results obtained so far imply that, although fostering inequality within the merchant class, guilds did not necessarily lead to a *de facto* monopolization of trade. This provides a novel trade-off between the *efficiency* and *equity* implications of guilds, which may help reconciling in a simple theoretical framework the positive and negative earlier views of merchants' guilds.

5.4. Empirical validation

The theoretical analysis developed so far is able to account for the emergence of merchant guilds as a mechanism to foster cooperation between merchants and rulers, bypassing the need for costly monitoring by other parties hired as tax-collectors. In so doing, the model also provides a rationale for the observed privileges granted by rulers to merchant guilds (notably the right to exclude non-members from trade, as well as members who have deviated from guild rules), the transfers made by guilds to rulers, the tax exemptions obtained by guilds, and the membership restrictions imposed by guilds. All these implications are amply borne out by the evidence that is reviewed in this section.

Merchant guilds were ubiquitous in medieval Europe, suggesting that the trade-off between tax-farming and merchant guilds was typically favorable to guilds. In terms of our model, this would be the predicted outcome when merchants are sufficiently patient, and when merchant guilds' monitoring ability (which depends on trust among members, and their resulting ability to overcome free-riding incentives and cooperate to monitor effectively) is sufficiently high. The historical evidence suggests that this was very much the case: merchant guilds were social groups or networks whose members participated in a variety of social and religious activities together; they held regular assemblies and

feasts; when abroad, they lived in their own quarters of foreign cities and interacted closely. As argued by Gross (1890), trust was clearly perceived to be very important: symbolically, English merchant guilds required "an oath of fealty to the fraternity" from new members. In practice, close and repeated interaction facilitated monitoring and the exchange of information; this, together with the establishment of a variety of norms and sanctions for members who breached them or helped others to breach them, helped to sustain trust. The social capital thereby generated by merchant guilds was, according to our model, a key factor influencing rulers' support for the guilds over tax-farming.

It also follows from our analysis that rulers had an interest in supporting merchant guilds, but not also separate guilds of producers/suppliers, such as producers of agricultural commodities supplied to merchants and then sold by the latter to consumers. The emergence of such agricultural guilds would have given rise to inefficiencies associated with double marginalization — and indeed, medieval rulers did not support the establishment of such guilds. A similar argument applies to craft guilds, except of course the case where craftsmen were also merchants trading the commodities they produced. Again, the historical evidence is consistent with this implication of our theory: craftsmen often belonged to guilds that combined production and trade[36], thereby obtaining recognition and privileges from rulers. On the other hand, they struggled to obtain support from rulers when their interests were in conflict with those of merchant guilds.[37] For an empirical treatment of craft-guilds — see, e.g., Richardson (2001), (2004) and (2005).

Finally, it is interesting to consider the implications of our analysis for city-states ruled by merchant oligarchies. These represent, in a sense, an extreme form of integration between ruler and local merchants. Does this make local merchant guilds unnecessary? Our model suggests that the answer is no: there is still a need for norms to sustain non-competitive profits and extract maximal surplus from trade, and monitoring to ensure enforcement of those norms. Indeed, most city-states whose governments were dominated by mercantile interests possessed local merchant guilds. A notable exception was Venice, a special case in many respects. Venice gained its autonomy (from the Byzantine emperor) much earlier than other Italian city-states. Long before the tenth century, its ruling class owned some land but was also involved in maritime trade: "As early as 829 the will of Venetian Doge Justinian Partecipazio mentioned among his assets a substantial sum (1,200 silver pounds) invested in oversea commercial ventures" (Lopez, 1971, p.63). Thus mercantile interests played a key role in Venice from very early on. Indeed, it is perhaps the historical example that comes closest to 'perfect' collusion between ruler and local merchants. Yet it did not possess a local merchant guild. The puzzle is easily explained by observing that the city government itself took on the tasks that local merchant guilds performed elsewhere: it established maritime regulations and withdrew the right to trade from any Venetian merchant who breached them, or who breached financial contracts; it imposed fines for smaller breaches of mercantile rules; it monitored closely Venetian merchant colonies abroad. It also excluded alien merchants from many types of commercial activity in Venice and required them to trade, when allowed to, only through Venetian brokers. Thus the norms that allowed extraction of

[36] See Luchaire (1902), p.241, for some French examples, and Gross (1890), p.107, for some English ones. In some cases, craftsmen were, to begin with, highly dependent on merchants, who supplied them with necessary raw materials from other polities, and sold the finished products in international markets. The relationship between the two was then dominated by merchants (see Racine, 1979, pp. 297, 714-715).

[37] See for example Dilcher (1984), p.71 and Frölich (1934), pp. 36-37.

surplus from trade by merchant guilds elsewhere were also adopted in Venice.[38]

6. Trade, taxation and collusion with multiple guilds

In this section we extend the previous analysis by considering the case where the ruler has the option of granting recognition and privileges to more than one guild. To be consistent with the above single-guild model, we keep assuming that the ruler has full commitment power and that merchants are capital unconstrained. For simplicity, we focus on the case where the ruler chooses between recognizing one or two guilds (the analysis can be easily adapted to study the case of more than two guilds) and keep aside the tax collector option, which will be informally discussed at the end of the section.

Consider a polity where $2N$ merchants are potentially active and can sell a homogenous good. Each merchant belongs to one of two symmetric groups of size N.[39] A natural interpretation for the two groups would be local and alien merchants, or alien merchants from two different polities of origin. Merchants belonging to both groups compete in the same market by setting prices and both the static and the dynamic games are modeled as in Section 4.[40]

To study the ruler's choice between recognizing one or two guilds, we assume that in each of the two groups, a subset of merchants organize themselves as a subgroup, able to act in its members' common interest — i.e., a 'guild'. A first natural question one may want to ask is how the presence of two guilds modifies the bargaining game between ruler and merchants. The answer seems intuitive: if the ruler only needs to recognize *one guild* in order to maximize his revenue, the presence of two potential candidates allows him to gain bargaining power by playing the two organizations one against the other. A simple way of modeling this is to assume that the ruler gains full bargaining power vis-à-vis each guild (whose reservation value is set to zero). This would be the case, for example, if recognition and privileges were assigned by letting guilds to bid competitively for such rights.

Clearly, the ruler will only grant recognition to *both guilds* if this entails some (net) benefit relative to the single-guild regime. Our analysis so far suggests a very likely potential advantage of granting recognition to both guilds: this may induce more efficient monitoring, and thereby relax the minimum density requirement for each guild. For example, a guild of local merchants is likely to have better access to information about possible unauthorized trading activities by excluded local merchants, while a guild of alien merchants from a particular polity of origin will be more easily informed about any trading activities by other citizens of that polity (who are not members of the guild).

To capture this feature in a simple way, we assume that when both guilds are recognized, the minimum density of each is reduced by a fraction $\phi \leq 1/2$ — i.e., $m_i = \phi m$ for $i = 1, 2$. The parameter ϕ captures the extent to which having two guilds, rather than just one, increases monitoring efficiency

[38] Ashtor (1983), pp.68-9, 78, 411, Choroskevic (1996), pp.84-6, Gonzales de Lara (2001), pp.25-6. Ashtor (1983), p.71, Mueller (1997), pp.89-90, 266-7.

[39] As will become clear in the remainder of the analysis, allowing for asymmetric groups (i.e., with different sizes) would not bring additional insights, since the individual incentive constraint that needs to be satisfied for collusion to be an equilibrium of the market game with multiple guilds depends only on the total number of merchants active in both guilds.

[40] Obviously, it would be easy to provide a rationale for multiple guilds if we assumed that different groups sold different goods and were active in different markets. We abstract from this possibility to focus on the more interesting trade-off between one and two guilds when merchants sell the same good and are active in the same market.

— i.e., for $\phi < 1/2$, multiple guilds generate '*economies of scale*' in monitoring, and these scale economies are greater the lower is ϕ.

However, while increasing monitoring efficiency, multiple guilds may make it harder to sustain collusion. This is because a cooperative trade agreement must now be also not vulnerable to 'group' deviations in addition to individual ones — i.e., to deviations at the guild level. To investigate the interaction between these two effects, and the resulting trade-off between recognizing one or two guilds, we start by analyzing the collective behavior of the two guilds, as well as the behavior of their individual members. In so doing, we retain the same assumptions as in the earlier analysis concerning behavior *within* each guild. In particular, an individual guild member who deviates from guild norms — e.g., by setting a lower price and thereby 'stealing' trade from other guild members — will be punished by exclusion.[41]

The main difference relative to the single-guild case concerns collusion *between* guilds. Following Chang and Harrington (2007), here we assume that if the members of one guild collectively deviate from a collusive agreement with the other guild, collusion may be restored with probability $\theta \in [0, 1]$, after a period of punishment where each active merchant makes zero profits. This assumption differs from the standard infinite punishment hypothesis made in Rotemberg and Saloner (1986). However, as they argue, "such infinite-length punishments are unlikely to be carried out in practice". Indeed, two of the reasons they give for considering infinite punishments unrealistic in the case of oligopoly seem to apply with at least equal force to the case of merchant guilds. First, "once the punishment period has begun, the oligopoly would prefer to return to a more collusive arrangement". Second, "one can think the reason why firms succeed in punishing each other at all (even though punishments are costly) is because of the anger generated when a rival cheats on the implicit agreement. This anger, as any 'irritational' emotion, may be short-lived". Moreover, one important factor hindering collusion in an oligopoly setting is of course the possibility of being caught breaking the law, and the constraints this places on firms' ability to communicate effectively and trust each other. Merchant guilds, in contrast, would not have had to worry about any such sanctions and constraints imposed by rulers.[42]

The parameter θ is meant to capture cultural, social and ethnic differences between merchants belonging to different groups. The idea is that greater heterogeneity between the two groups entails a lower probability of recartelization θ — e.g., sharper differences in cultural, ethnic and social characteristics make it harder for the two groups to communicate effectively and trust one another again once a collusive agreement has been broken by one group's collective deviation, hampering future recartelization. There is substantial evidence showing that ethnic diversity can make it harder to achieve trust and cooperation — see, e.g., Alesina and La Ferrara (2005) for a survey.

Again, we rule out the unrealistic case of 'single member' guilds — i.e.,

(A5) $m_i = \phi m \geq 2 \quad \forall i = 1, 2.$

[41] It seems natural to assume here that a merchant who undercuts his fellow guild members and is expelled from his guild will not be welcomed in the other guild.

[42] In our model, the ruler will be simply indifferent about collusion among merchant guilds, once the ex-ante fees have been paid. If we introduced capital constraints and/or imperfect commitment, implying the need for ex-post transfers from the guilds to the ruler, recartelization after a deviation would be in the ruler's interest; this would make the case for allowing recartelization, with some probability, even stronger.

Finally, the ruler cannot create a single 'mixed' guild — i.e., an association of merchants consisting of members of both groups. There are two main reasons for this. First, substantial heterogeneity within a guild would make it harder to generate the required cohesion and trust among its members. Second, suppose the ruler of a given polity could establish a guild of local and alien merchants. Individual deviations from guild norms would then be punished by exclusion from this guild. However, this might be a rather weak punishment for alien merchants, who could always continue to trade in other polities, and back home. In contrast, if alien merchants from any given polity belonged to a foreign 'branch' of the local merchant guild in their polity of origin, exclusion would be a much more serious punishment, since it would apply both at home and abroad. Indeed, as discussed in Section 3, such foreign branches of local merchant guilds were common, mixed guilds were not.

6.1. Individual versus collective incentive constraints

In this section we study individual and group behavior when two guilds are recognized. Two types of incentive constraints must be satisfied for collusion to be feasible:

Individual incentives. As already seen before, collusion needs to be incentive compatible for each active merchant — i.e., given that the two guilds cartelize, none of their members should find it profitable to deviate from this 'group' strategy. It is straightforward to check that this individual incentive constraint is the same as in the case of a single guild analyzed above. Hence, the no deviation condition entails

$$\pi \leq \frac{\delta \mathrm{E}\left[\pi\right]}{\left(n-1\right)\left(1-\delta\right)}, \tag{6.1}$$

where n is the total number of merchants active in both groups — i.e., $n = n_1 + n_2$. As seen before, condition (6.1) implies

$$\pi^* = \frac{2(1-n(1-\delta))}{\delta}.$$

Hence, if privileges are recognized to both subgroups of merchants, there is an upper-bound on the number of members that each guild can embody, which under the symmetry hypothesis equals to $\overline{n}/2$. As a consequence, the ruler cannot gain by granting recognition to the two guilds if merchants' ability to prevent unauthorized trade is sufficiently weak — i.e., if $m > \overline{n}/2\phi$. Notice that, compared to the single guild case, this condition becomes more difficult to satisfy when there are enough scale economies in monitoring — i.e., for lower values of ϕ.

Collective incentives. With two active guilds, one must also identify the condition under which collective deviations — i.e., at the guild level — are unprofitable. Recall that following a collective deviation the two guilds recartelize with probability θ after a period of punishment. Hence, the 'collective' incentive constraint writes as

$$\pi + \frac{\delta \mathrm{E}\left[\pi\right]}{1-\delta} \geq 2\pi + \delta^2\theta\frac{\mathrm{E}\left[\pi\right]}{1-\delta}.$$

Where the left-hand-side of this inequality captures the (intertemporal) gain that each guild obtains from obeying to the collusive agreement. The right-hand-side, instead, measures the gain from a

collective deviation: the first term is the guild's spot gain from deviation, the second represents the expected gains from future recartelization. This condition can be rearranged as

$$\pi \leq (1-\delta\theta)\frac{\delta \mathrm{E}[\pi]}{1-\delta}, \tag{6.2}$$

implying that the collective incentive constraint becomes tighter the larger is the probability of recartelization θ — i.e., if recartelization is more likely, collective deviations become more attractive. It then follows that, (6.2) implies

$$\mathrm{E}[\pi] = \int_0^{\pi^{**}} \pi d\pi + (1-\pi^{**})\pi^{**},$$

and hence

$$\pi^{**} = \frac{\delta(1-\delta\theta)}{1-\delta}\left[\int_0^{\pi^{**}} \pi d\pi + (1-\pi^{**})\pi^{**}\right] \quad \Rightarrow \quad \pi^{**} = \frac{2(\delta(2-\delta\theta)-1)}{\delta(1-\delta\theta)}.$$

Equipped with this characterization we can now start analyzing the implications on collusion of granting recognition to both guilds.

Full vs imperfect collusion with multiple guilds. Let $\widehat{\pi} \equiv \min\{\pi^*, \pi^{**}\}$. For any $\pi > \widehat{\pi}$ merchants price below the monopoly level, and each guild earns $\widehat{\pi}/2$. Differently, for $\pi < \widehat{\pi}$ there is full collusion and each guild earns $\pi/2$. Of course, the extent to which $\widehat{\pi}$ lies within or outside the unit interval depends on the model key parameters as we shall discuss below.

Let

$$\overline{\theta} \equiv \frac{2\delta - 1}{\delta^2} > 0$$

be the value of θ that solves $\pi^{**} = 0$ — i.e., the upper-bound on the probability of recartelization above which (6.2) cannot hold. Notice that $\overline{\theta}$ is increasing in δ: the larger is the probability of recartelization, the more difficult is to stabilize collusion among the two guilds.

Lemma 3. *With two guilds, the ruler's profit is positive only if:*

- *Merchants' monitoring ability is not too small — i.e., $m < \overline{n}/2\phi$.*
- *The probability of recartelization is not too large — i.e., $\theta < \overline{\theta}$.*

Hence, the ruler makes strictly positive profits from granting recognition to both guilds if: merchants' ability to prevent excluded merchants from trading and undercutting the cartel is sufficiently effective (so that individual deviations are not attractive) and the probability of recartelization is sufficiently small (so that collective deviations are not attractive).

While the first point has extensively been discussed in the previous section, the main novelty of the regime with two guilds is driven by the collective incentive constraint. In particular, this condition implies that if the likelihood of recartelization after a collective deviation is sufficiently large, the temptation to cheat will be so strong as to make it impossible to sustain collusion. Of course, this temptation is mitigated if merchants are patient enough.

We now turn to study the conditions under which full collusion occurs with two guilds. Recall that $\underline{n}$ is the value of n that solves $\pi^* = 1$, and define by

$$\underline{\theta} \equiv \frac{3\delta - 2}{\delta^2} < \overline{\theta},$$

the value of θ such that $\pi^{**} = 1$.

Lemma 4. *With two guilds, full collusion obtains if and only if:*

- *Merchants' monitoring ability is sufficiently strong — i.e.,* $m < \underline{n}/2\phi$.
- *Merchants are sufficiently patient — i.e.,* $\delta > 2/3$.
- *The probability of recartelization is sufficiently small — i.e.,* $\theta < \underline{\theta}$.

The economic insight underlying this result is similar to that of Lemma 2. The additional requirement is that, with multiple guilds, also the collective incentive constraint must be satisfied in all states for the monopoly outcome to be viable. Intuitively, granting recognition to both subgroups of merchants allows the two guilds to jointly implement monopoly profits in the region of parameters where the individual and collective incentive constraints are jointly satisfied in all market contingencies. This is true not only when merchants' ability to prevent unauthorized trade is sufficiently strong (as required by the individual incentive constraint), but also when the discount factor is large enough and when the probability of recartelization is sufficiently small (as required by the collective incentive constraint). Finally, the role of the scale economies in monitoring is readily apparent: a reduction of ϕ relaxes the constraint on the minimal guild size, whereby making it more easy to sustain full collusion with two rather than with one guild.

This clearly illustrates the key potential cost and benefit of recognizing two guilds instead of one, when it comes to implementing full collusion.

6.2. The ruler's optimal strategy with multiple guilds

We can now turn to the ruler's optimization program. The objective is to study the trade-off between recognizing one or two guilds due to factors other than bargaining power. In particular, it may be that if there are only two guilds and the ruler wants to recognize both, the guilds have some bargaining power. This is because the ruler cannot simply force them to bid competitively in an auction (as in the single-guild case). However, we are only considering the case with two (as opposed to multiple) guilds for simplicity, and if, for example, we had three guilds and the ruler could take full advantage of possible economies of scale in monitoring by recognizing just two guilds, an auction with competitive bidding would again be feasible. Thus it seems reasonable, and more interesting, to abstract from *ad hoc* differences in bargaining power and assume that the ruler has full bargaining power in both cases.

Since the ruler has full bargaining power, he fully extracts (expected) profits from trade — i.e.,

$$W = \frac{\max\limits_{n \in [2\phi m, \frac{\overline{n}}{2\phi})} \left\{ \int_0^{\widehat{\pi}} \pi d\pi + (1 - \widehat{\pi})\widehat{\pi} \right\}}{1 - \delta}.$$

Hence, recognizing both guilds maximizes the ruler's wealth if and only if

$$\max_{n\in[2\phi m,\frac{\overline{n}}{2\phi})}\left\{\int_0^{\widehat{\pi}}\pi d\pi+(1-\widehat{\pi})\widehat{\pi}\right\}\geq\max_{n\in[m,\overline{n})}\left\{\int_0^{\pi^*}\pi d\pi+(1-\pi^*)\pi^*\right\}\quad\Leftrightarrow$$

$$\max_{n\in[2\phi m,\frac{\overline{n}}{2\phi})}\widehat{\pi}\geq\max_{n\in[m,\overline{n})}\pi^*. \tag{6.3}$$

Notice that for $\phi=1/2$ — i.e., if there were no scale economies in monitoring when two guilds are recognized — the ruler would never strictly prefer to deal with two guilds rather than just with one. Hence, as long as $\phi<1/2$ dealing with two guilds rather than just one allows (other things being equal) the ruler to implement more easily full collusion by exploiting the scale economies in monitoring. Nevertheless, as seen in Lemma 4, full collusion with two guilds is not warranted as long as merchants are not patient enough, or if the probability of recartelization is too large. As a result, the ruler faces a non-obvious trade-off when choosing between one or two guilds.

Proposition 3. *The ruler's profit maximizing choice is as follows:*

- *For $m>\overline{n}/2\phi$ the ruler is indifferent between recognizing one or two guilds.*
- *For $m>\overline{n}$, the ruler never strictly prefers to recognize one guild.*
- *For $m\in(\underline{n},\min\{\underline{n}/2\phi,\overline{n}\}]$ the ruler prefers to recognize two rather than one guild if $\delta>2/3$ and $\theta<\underline{\theta}$, or if $m\geq m^*\equiv\frac{2-\theta\delta}{1-\theta\delta}$.*
- *For $m\leq\underline{n}$ the ruler never strictly prefers to recognize two guilds.*

As seen in equation (6.3), the ruler's optimal choice maximizes merchants' collusion ability. When both options secure full collusion, or when they both prevent any form of cooperation, the ruler is indifferent between recognizing one or two guilds. And, clearly, if one mode allows to sustain full collusion while the other does not, the ruler prefers the latter. When, instead, only imperfect collusion can be sustained regardless of whether one or two guilds are recognized (which happens for intermediate values of the monitoring ability), the ruler prefers the latter option if merchants are patient enough and the probability of recartelization is not too large, or if merchants monitoring ability is not too strong. This is because the comparative advantage of dealing with multiple guilds rather than just with one lies in the scales economies in monitoring.

Of course, when the ruler can also opt to hire a tax collector, the solution of his decision problem will be to deal with one or two guilds if full collusion is warranted by one of these options, or if the monitoring cost is sufficiently large when full collusion is not viable with either guild modes.

6.3. Empirical validation

The analysis developed in this section sheds light on the choice between establishing one or multiple guilds. In particular, we have shown that recognition of multiple guilds should have been more

likely when: (a) each guild could target its monitoring so as to exploit an informational comparative advantage, generating efficiency gains in monitoring, and (b) the probability of different guilds recartelizing after a deviation was sufficiently low. In small towns with low levels of international trade, the scope for efficiency gains in monitoring by multiple guilds must have been quite limited. In these cases, as our model would predict, a single merchant guild was typically recognized and granted privileges by the ruler. In contrast, rulers of important international trade centers — e.g., Bruges, Constantinople — generally recognized a number of guilds. Each guild's membership was normally quite homogeneous in terms of nationality, ethnicity and culture (e.g. Catalan, Genoese, Pisan, Venetian...) and very cohesive, with correspondingly high abilities to monitor potential trading activities by non-members from their polities of origin. Thus they satisfied condition (a) above. Cultural and ethnic *homogeneity within* guilds also implied significant *heterogeneity between* guilds, suggesting that condition (b) was satisfied as well; indeed, there is plenty of evidence of conflict, sometimes violent, between guilds.[43]

7. Concluding remarks

Understanding why merchant guilds emerged, and the role they played, matters not only for historical interest, but also for current debates over institutions and social capital. Merchant guilds have been widely regarded as an example of how social capital can benefit whole societies and economies. We have revisited the rationale for the emergence of merchant guilds, examining the implications of their comparative advantage in monitoring and hence their role as an efficient mechanism to enhance cooperation between rulers and the merchant class. Our theory suggests that merchant guilds did indeed generate some efficiency gains, but these gains benefited only part of the population (in particular, rulers, guilded merchants and, in some cases, final customers). Guilds, however, had also a dark side concerning inequality of wealth within the merchant class: restrictions on membership, often imposed by these associations, simply reflected the need for making non-competitive behavior in the trading market self-enforceable. This unequal distribution of market rents can help explaining the tendency of many medieval towns to become merchant oligarchies.

Our analysis also provides a theoretical framework capable of accounting for the basic trade-offs involved when a polity's ruler had to choose between granting recognition to a single or multiple guilds. This helps us to understand the observed distribution of guilds, and provides a rationale for the establishment of both *local* and *alien* merchant guilds, consistent with the historical evidence.

[43] On this see Abulafia (1978, 1986); Bahr (1911); Daenell (1905); De Roover (1963); Dollinger (1970); Greif et al. (1994); Lloyd (1991); Postan (1973); Pryor (2000); Reyerson (2000); Schütt (1980) and Smith (1940).

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8. Appendix

Proof of Proposition 1. The proof of this result is immediate. Under **A2**, one can easily show that it is strictly dominant for the tax-collector to pay the monitoring cost c in each period and extract all the surplus from the merchants if he expects them to collude efficiently. Moreover, if merchants expect the tax collector to monitor in each period, they will charge the monopoly price. In fact, in this case, they would be indifferent between colluding and pricing competitively since all the surplus they get from the market is taken away via taxation. Hence, there exists a SPNE of the game where the tax collector monitors in each period and merchants collude. Notice that if $N > 1/(1-\delta)$ this equilibrium is also unique. Indeed, in this case, a SPNE where the tax-collector does not monitor cannot exist because individual deviations will always be profitable for any equilibrium candidate where merchants get a profit lower than c. ■

Proof of Lemma 1. Note that $\pi^* > 0 \Leftrightarrow n < \overline{n}$. But, under **A3**, this is possible if and only if $m < \overline{n}$. ■

Proof of Lemma 2. Note that $\pi^* \geq 1 \Leftrightarrow n \leq \underline{n}$. But, under **A3**, this is possible if and only if $m \leq \underline{n}$. ■

Proof of Proposition 2. Three cases must be considered to prove the statement.

1) Consider first $m \leq \underline{n}$. In this parameter region full collusion is viable under both taxation regimes as seen in Lemma 2. Hence, the ruler prefers to recognize the guild since $c > 0$.

2) Next, suppose that $m \geq \overline{n}$. In this parameter region the ruler prefers to hire a tax collector because, as shown in Lemma 1, the guild members are unable to enforce a non-competitive outcome.

3) Finally, for $m \in (\underline{n}, \overline{n})$ full collusion is only viable in the tax collector regime. Hence, granting recognition to a merchant guild is optimal if and only if $W \geq V^T$ — i.e.,

$$\frac{2(1-m(1-\delta))(m-1)}{\delta^2} - \frac{1-2c}{2(1-\delta)} \geq 0 \quad \Leftrightarrow$$

$$c \geq c^* \equiv \left[\frac{2m(1-\delta)-(2-\delta)}{\delta\sqrt{2}}\right]^2. \tag{8.1}$$

Clearly, for $c < c^*$ the ruler prefers to hire the tax-collector. ■

Proof of Lemma 3. As for $m < \overline{n}/2\phi$, the proof follows the same logic of that of Lemma 1. Moreover, solving $\pi^{**} = 0$ with respect to θ, one has $\overline{\theta} \equiv \frac{2\delta-1}{\delta^2} > 0$. Hence, since π^{**} is decreasing in θ, even if $m < \overline{n}/2\phi$, with two guilds a non-competitive outcome can be sustained only if $\theta < \overline{\theta}$. ■

Proof of Lemma 4. As for $m < \underline{n}/2\phi$, the proof follows the same logic of that of Lemma 2. The rest of the argument simply follows from the fact that π^{**} is decreasing in θ and $\underline{\theta} > 0$ if and only if $\delta > 2/3$. ■

Proof of Proposition 3. The proof is developed in three steps:

Step 1. For $m \leq \underline{n}$ and $m > \overline{n}/2\phi$ the proof is straightforward and follows directly from the Lemmas 1, 2, 3 and 4.

Step 2. For $m > \overline{n}$, instead, the ruler never strictly prefers one rather than two guilds. This is because with one guild only the competitive outcome can be supported in the market game, while with two guilds a noncompetitive outcome can be supported as long as $\theta < \overline{\theta}$.

Step 3. For $m \in (\underline{n}, \min\{\underline{n}/2\phi, \overline{n}\}]$ two different cases must be distinguished:

A) If $\phi < \phi^* = \frac{1}{2} - \frac{1}{4}\delta$, then $\frac{n}{2\phi} < \overline{n}$. Hence:

A.1) For $m < \frac{n}{2\phi}$ the ruler prefers two guilds if and only if $\delta > 2/3$ and $\theta < \underline{\theta}$ since in this case this regime warrants full collusion while the single guild regime does not. If $\delta < 2/3$ or $\theta > \underline{\theta}$ there is imperfect collusion under both regimes and

$$\widehat{\pi} = \pi^{**} = \frac{2\left(\delta\left(2-\delta\theta\right)-1\right)}{\delta\left(1-\delta\theta\right)} < 1.$$

Hence, the ruler prefers to deal with two guilds rather than just one if and only if

$$\frac{2\left(\delta\left(2-\delta\theta\right)-1\right)}{\delta\left(1-\delta\theta\right)} \geq \frac{2(1-m(1-\delta))}{\delta} \quad \Leftrightarrow \quad m \geq m^* \equiv \frac{2-\theta\delta}{1-\theta\delta},$$

otherwise one guild is recognized.

A.2) For $m \in [\frac{n}{2\phi}, \overline{n}]$ the ruler prefers two guilds rather than one if $\delta > 2/3$ and $\theta < \underline{\theta}$. This is because in this case

$$\widehat{\pi} = \pi^*|_{n=2\phi m} > \pi^*|_{n=m},$$

since $\phi < \frac{1}{2}$. If instead $\delta < 2/3$ or $\theta > \underline{\theta}$, then

$$1 > \widehat{\pi} = \begin{cases} \frac{2(\delta(2-\delta\theta)-1)}{\delta(1-\delta\theta)} & \Leftrightarrow \quad \phi < \phi^{**} = \frac{2-\theta\delta}{2m(1-\theta\delta)} \\ \\ \frac{2(1-2\phi m(1-\delta))}{\delta} & \Leftrightarrow \quad \phi > \phi^{**} = \frac{2-\theta\delta}{2m(1-\theta\delta)} \end{cases}.$$

Hence, for $\phi > \phi^{**}$ the ruler prefers two guilds because $\pi^*|_{n=2\phi m} > \pi^*|_{n=m}$. For $\phi < \phi^{**}$ instead the ruler prefers to deal with two guilds if $m \geq m^* \equiv \frac{2-\theta\delta}{1-\theta\delta}$, and with one otherwise.

B) If $\phi < \phi^* = \frac{1}{2} - \frac{1}{4}\delta$ then $\frac{n}{2\phi} > \overline{n}$. For $m < \overline{n} < \frac{n}{2\phi}$ the same conclusions of A1 apply. Differently, for $m > \overline{n}$ the ruler never strictly prefers one guild rather than two guilds.

The proof of the proposition can be completed by gathering steps 1, 2, and 3. ■