Taxation and Collusion in Central Europe: The Rise, Spread and Fall of Craft Guilds

JOB MARKET PAPER

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Abstract

This article investigates historical organizations which developed as an institutional response to insufficient state capacity to collect revenues and support markets: craft guilds. Craft guilds were a response to problems associated with raising royal revenues and governing city's markets during the medieval and early modern period in Central Europe. The theory consistent with historical evidence predicts that the rise, spread and fall of guilds was a result of the complementary relationship between local craftsmen and their rulers. Guilds enabled craftsmen to utilize the benefits of collusion by offering their capacities to sovereign authorities in exchange for market privileges. The study highlights a trade-off between the number of taxpayers and the amount of taxes and civil service provided by an individual, and the ability of craftsmen to generate high enough collusive profits to compensate rulers for the exclusive rights.

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1 Introduction

Historical experience indicates that the establishment of formal institutions is a key factor for economic growth and development (North 1990, 2005). The state's institutional capacity to raise revenues and enforce private contracts was particularly important. Indeed, European history has shown that the transition from traditional rural to modern society was associated with the birth of strong states characterized by the ability to raise taxes to meet the exigencies of war, and by the ability to govern markets (Tilly 1975, 1985, 1990; Levi 1989; Schumpeter 1991; Bates 2001). This transition, however, was not immediate. A growing body of literature suggests that occupational guilds played an important role in these functions during the period when state's supportive institutions were weak and still not fully developed (North and Thomas 1976; Gustafsson 1987; Persson 1988, pp. 52-54; Swanson 1988; Hickson and Thompson 1991; Bates 2001, pp. 50-69; Stabel 2004; Prak 2006; Ogilvie 2014; Dessí and Piccolo 2016). Pre-modern rulers bestowed a variety of privileges on their agents including rights to establish guilds. With these privileges, traders and producers could exclude outsiders from market activities and subsequently increase their members' standards of living. In exchange for the monopoly, the rulers demanded taxes and services utilizing the guilds' internal capacity and their superior knowledge about local conditions. Guilds enabled sovereigns to increase their revenues and to supervise markets indirectly. However, guilds' effectiveness in these matters was questioned during the Early Modern Period. The European authorities, who benefited from the existence of guilds earlier, abolished these organizations because of their restrictive practices around the 19th century.

Yet little is known about the specific mechanisms underlying the development of guilds. Why did the system of guilds emerge in late medieval times if it obviously could benefit the local governments in levying taxes and governing markets earlier? Why did this system prevail for such a long time if it turned out to be ineffective in its restrictive practices? And what explains the long-lasting relationship between professionals and rulers?

The existing theoretical literature on the role of guilds in supplementing the state's institutional capacity has merely focused on one type of these cooperatives: merchant guilds. Greif et al. (1994) analyze how alien merchant guilds secured protection of merchants against medieval authorities. Guha (2012) examines how merchant guilds prevented fair authorities at Champagne to collude with dishonest traders. Dessí and Piccolo (2016) explain how local merchant guilds enabled cooperation between traders and rulers. However, merchants were not an only force involved in governing pre-modern markets: local craftsmen had at least an equally important role. Merchants engaged in wholesale and long-distance trade. But general consumption was satisfied through local craft producers. Furthermore, these specialized producers represented the main part of pre-modern urban population. Analyzing the development of their organizations and the role of government in it therefore leads to better insights into the formation of modern states. This study does that.

The theoretical analysis in this article explains the rise, spread and fall of craft guilds. To do so, it combines the micro-level historical evidence with a rational choice model. The key is to understand when the ruler granted exclusive privileges to a subgroup of local producers, and hence establish the guild. Two conditions had to be satisfied. First, craftsmen had to be able to secure collusive profits in order to remunerate rulers for exclusive privileges. In the model, this is affected by the frequency of trade interactions and the size of industry. Collusion is possible only if craftsmen interact with each other often enough to punish deviating colleagues. But even if they do, the size of the industry must be small enough to make collusion successful. Second, the increase in royal revenues from these remunerations must compensate rulers for the loss of excluded tax-payers. Thus, the authorities faced a trade-off between the number of taxpayers and the amount of taxes and civil service provided by an individual. While granting monopoly rights to local producers could increase their per-head contributions, the exclusive rights also excluded some potential contributors. Examining under what circumstances these conditions were satisfied leads to a variety of testable predictions.

While much of the research on occupational cooperatives focuses on Western Europe, the historical analysis in this article investigates the development of craft guilds in Central Europe. Early trade in the area of Prague was characterized by infrequent interactions on the markets. Producers did not live in the community and hence could not sustain collusion necessary for raising enough profits to pay rulers for exclusive rights. Craft guilds were not recognized. However, in the late medieval times, specialized workers settled down in the area and started to trade regularly. Cooperation became possible. Craft guilds were established by local rulers as colluding producers could offer them payments and their service. But as the market expanded during time, so did the guilds' restrictions. A greater and greater part of the labor force was denied access to crafts increasing the ruler's opportunity costs. As a result, the ruler abolished guilds by a series of national laws in the 19th century. In this respect, my paper contributes to the literature by extending our knowledge about guilds and their role to Central Europe.

In addition to the literature on guilds, my paper relates to the literature that investigates the determinants of state's institutional capacity. In this line of research, Acemoglu (2005), and Besley and Persson (2009, 2010, 2011) investigate incentives of governments to raise revenues and to support markets in a general context. I follow this research by investigating incentives of pre-modern rulers to establish the key institution in Central Europe that facilitated taxation and market governance: the craft guild.

2 Motivating Evidence

The evolution of craft guilds in pre-modern Prague was subject to a variety of distinct forces. Two forces were particularly important: the interest of producers as agents involved in trade, and the interest of rulers as sovereign owners of markets. The presented evidence will provide a starting point for constructing a theoretical framework and its implications, which will be presented in the following sections.

2.1 Prosperity, Regulations and Taxation

The historical process of state building in Europe was marked by never ending fighting over control of territory and power (Hoffman 2012). Rulers engaged in activities ranging from eliminating internal opposition and neutralizing external threats to protecting their own citizens and supporters. This was the case in politically fragmented and military insecure medieval and early modern Central Europe, where strong authorities were rather absent (Volckart 2002a, 2002b). Prague and its rulers were at the center of struggles over power, which periodically struck the city ever since its founding.[1]

However, the warfare and defense of the realm required substantial resources, putting pressure on fiscal innovations. Bohemian rulers used a political system based on royal cities, which were an inalienable part of the royal estate, to address these needs. The key to this system was a bargain between the sovereign authorities and the citizens of royal cities, which saw the authorities exchange various kinds of legal privileges for finance and support.[2]

Towns of Prague were the most important of royal cities. Here, local producers regularly bargained with the rulers or local authorities over specific privileges. Traditionally, the accession of a king, who owned local markets, was accompanied by multiple requests from Prague craftsmen for renewals and extensions of their privileges. Senior masters appeared before the king asking him to approve "all recognitions, liberties, donations, pious customs and rights", which were granted them before (PCA, CR, s. Řezníci 1a, inv. 1, ff. 24v-25r). But before approving any request, the authorities would consider the guilds' services and loyalty. A typical example is the privileges granted by the Bohemian king Ladislaus Jagiellon to the New Town Furriers in 1486, beginning as: "we [the king] acknowledge your loyal services, which you provided, are providing and will not stop providing, and therefore

[1] Over the centuries, Prague was involved in multiple conflicts, including the Battle of Prague in 1310, the Hussite Wars in 1419-1434, the rebellion against the Habsburg Monarchy in 1547, the invasion of Prague by the Passau Army in 1611, the Thirty Years War or the Siege of Prague by the Prussians during the Seven Years' War.

[2] For the role of royal cities, see Winter (1890a, pp. 3-23) and Vorel (2001).

we grant you greater privileges so that you can and shall do better in serving us ” (PCA, CK, s. Koželuhové 23b, inv. 11, f. 6r).

The records show that the public services provided by guilds were extensive. From the very beginning guild members were expected to contribute materially or financially to military activities of their towns. They performed this duty in various ways: patrolling inside a city; guarding city gates and towers; or paying for men-at-arms (Winter 1906, pp. 654-655; Melichar 1902, pp. 197-198). Furthermore, during riots, craftsmen had to report in full armor at given checkpoints. And in time of danger, they took part in defending their city (Pávová 1960).

Another traditional obligation of local guild members was provision of fire services. City charters assigned each guild a responsibility for acquiring its own fire equipment, such as leather buckets marked with the guild's sign, hooks and later even water pumps. Some guilds had specific obligations. Beer haulers and carriers were required to bring horses, while slaters, carpenters, stone-masons and bricklayers were to take their axes. Meanwhile, certain wood-processing craftsmen, such as cabinet-makers, were required to follow specific working standards in order to prevent fire (Winter 1892, pp. 246-247; Brátková 2000).

Guildsmen played a role during parades, processions and royal celebrations. Each guild took its position according its importance, guild members dressed up in uniforms, and its representatives waved standards bearing the guild's mark (PCA, SR, s. 993, pp. 257-258). It was an opportunity for the craftsmen to publicly display their worth to the city and to maintain their social status. This is seen, for example, by the fact that the Sawyers, Plankers and Wood-sharpeners of the New Town obliged their members to represent the town whenever necessary for the honor of their craft and "the adornment and beautification of the city" (Tomek 1895, p. 473).

Most importantly, guilds raised revenues from multiple fees, tolls and taxes, which in turn lined the pockets of the local and central authorities. A common source of revenues was a mandatory payment for a citizenship. All craftsmen before becoming local masters had to obtain the town right (*městské právo*) which included a considerable fee. For example a furrier's candidate was required "to gain the town right from the current lords and give them thirty four groschen according to old tradition" (PCA, CK, s. Koželušníci 7, inv. 9, f. 2v). Guilds had to pay a substantial part of their collective resources to the authorities in order to obtain their recognitions (e. g. Hücke 1939, pp. 13-17). Certain professions paid rent for their shops. According to the royal degree from 1354, New Town butchers had to pay 56 groschen from each workshop to a local abbey (PCA, CR, s. Řezníci 16, inv. 18, ff. 20v-22r). Other professions had a duty to inspect foreigners who came to trade in the Kingdom, and were responsible for collecting royal customs. Examples include the Furriers of the New Town, who expressed this duty in their ordinances from 1486 as: "litkupník of ours, from the New Town of Prague, who will be elected by us and confirmed by the Ungelt's officers, has full freedom and right to go in Ungelt and to inspect, to open and to examine goods, so that the ungelt [duties] will be paid. Because it often happens that other merchants do not declare goods and sell them, and as a result, the damage is done to his Grace" (PCA, CK, s. Koželušníci 23b, inv. 11, ff. 4v-5r). Undeclared goods found by guild members were to be confiscated on behalf of the king. Other goods seized at markets or in workshops were usually forfeited to the guilds themselves, but in certain cases belonged to the crown or to the city. For instance, meat seized by senior butchers was ordered to be sent to "the hospital or given away to the poor" (PCA, CR, s. Řezníci 16, inv. 18, f. 74r). When the Cobblers of the Lesser Town seized goods from chafferers or Jewish peddlers half was given away to the poor and half was forfeited to the guild (PCA, CS, s. Ševci 10, inv. 4, article 10). Furthermore, a proportion of all fines belonged to the authorities. The Old Town Furriers and New Town Drapers were expected to cede two thirds of the collected money to the local authorities (PCA, CK, s. Koželušníci 7, inv. 9, ff. 6r-10r; Tomek 1895, p. 456). The hatters from the New and Old Towns were obliged to divide each shock of Meissen groschen paid as a fine such that 30 groschen were given to the mayor and councilors, 10 groschen to the reeve and the remaining 20 to the guild (Tomek 1895, pp. 489, 491).

2.2 Privileges and Craftsmen

Craftsmen would have hardly provided their resources and labor without any benefits in return. The relationship between the authorities and the craftsmen had to be balanced between obligations and advantages if it was to work. Particularly, guilds aimed to secure stable standards of living for their members by laying down conditions for generating economic rents and equalizing production possibilities among members.

The *cechovní přímus* enabled local craft guilds to achieve these goals. It was the most important privilege granted by rulers. It demanded craftsmen, both local and foreign, to obtain membership before engaging in any sort of economic activity within the geographical area of the city (Winter 1906, p. 51; Fröhlichová-Karlová 1938; Janáček 1963, p. 99).

The privilege had two important effects. First, the *cechovní přímus* made membership in local craft guilds compulsory. An artisan who wished to practice his profession in Prague had to become a master craftsman in one of the local guilds, otherwise restrictions on his work and trade applied.[3] Second, the *cechovní přímus* included a legal right, even obligation, to take action against all those who did not respect these restrictions. The guilds' power was then regulated by the town's mile right, which enabled local craftsmen to prosecute intruders for interfering in the guild's activities, usually within the city itself and its rural neighborhood.

Craft guilds exhibited these effects in their formal rules. These rules guaranteed guild members a product monopoly. They defined the boundaries of guild memberships, distinguishing between the economic rights of members and nonmembers. A typical example comes from the New Town Furriers' ordinances, which state that:

> if any master of our craft, or anyone else who has not been granted the right of our guild and who wishes to practice our craft, is found to practice or intend to practice our craft, his goods belonging to our craft, whether finished or not yet finished, will be seized by our guild-masters (PCA, CK, s. Kožešníci 23b, inv. 11, f. 4r).

[3] There were exceptions to this rule including seasonal fairs, the guild's position, trading agreements, applicant's religion or social rank, among other things.

Similarly, two guilds of Prague hatters mandated in 1489 that "no one will bring hatter's craft into these towns apart from local hatters except for *jarmark* [seasonal fair]" (Tomek 1895, p. 488, 490). The exact form of this rule varied from cooperative to cooperative, but the notion remains the same: anyone other than the masters and their subordinates in the local guild would be punished for practicing and trading their craft within the local area.[4]

The benefits stemming from the guild's monopoly rights were guaranteed by a strict policy of member selection. With some exceptions of masters' relatives one generally had to qualify as an honest person, become a citizen of the city, show master-pieces, provide a birth certificate, serve under a local master and pay an entrance fee A typical example comes from the ordinances adopted in 1478 by the Goldsmiths of the New Town:

> anyone who wants to settle down as a master in this town, ... shall serve as a journeyman among the masters in this town in the area where they live, and for three years, shall honestly behave himself, ... and, further, he shall show three masterpieces of the craft: making a seal, making a shield and helm and chalice, and setting a gemstone (p. 481).

That these rules were indeed followed is evident from the records of the Old Town Painters (1490-1582) and the Old Town Furriers (1598-1648), in which requests for membership are often listed with notes about completing masterpieces, providing certificates, paying fees and presenting recommendations (PCA, CK, s. Koželuhi 8b, inv. 12; Chytil 1906, pp. 202-310).

The royal and city recognitions did not only guarantee a trade monopoly to the local guildsmen. They allowed locals to effectively establish criteria for production and trade within the city and to legally punish noncomplying producers. But they also had a negative impact.

The downside of the government privileges was their restrictions imposed on a great part of labor force. Many of non-privileged craftsmen were sentenced to live

[4]For other examples, see PCA, CK, s. Koželuhi 7, inv. 9, ff. 7r-8r; PCA, CK, s. Koželuhi 23b, inv. 11, ff. 1r; PCA, CS, s. Ševci 2, inv. 3, article 15; PCA, CS, s. Ševci 10, inv. 4, article 10; PCA, SR, s. 3502, pp. 23-26; and Tomek (1895, pp. 461, 468, 475, 476).

and work for local guilds if they wanted to earn at least some livings or work out law. And as expected such system "deepened class differences among members of the same profession" (Mendl 1947, p. 40).

The restrictive entry into the profession led to regular conflicts between non-privileged craftsmen and local guilds. The situation often escalated into strikes of journeymen against their masters. Records refer to the first strike in Prague in 1399 with many others followed in the next centuries. Striking workers demanded better working conditions, admission to mastership, higher wages and greater freedom to practice their profession in general. However, such demands were rarely satisfied preserving a monopoly of guilds over local markets (Winter 1890b; 1906, pp. 752-762; Janáček 1963, pp. 240-247).

3 A Theory of Craft Guilds

This section develops a game-theoretical model that combines the interest of producers with the interest of rulers. The model only provides a simplified view on choices faced by actors in a pre-modern polity. However, the simplification allows to tackle the problems faced by both craftsmen and their kings; and leads to testable implication regarding the rise, persistence and fall of guilds.

3.1 Interactions on Pre-modern Markets

Consider an urban economy of perfect and complete information inhabited by a ruler and N identical craftsmen of one industry. All players in this world are risk-neutral, live for $T \geq 0$ periods, labeled as $t = 0, 1, 2, ..., T$; and discount their future payoffs with a common discount factor ρ.

The ruler wages wars and governs the city. To do so he collects taxes from $M > 1$ masters, who are craftsmen allowed to trade. His authority gives him power to decide M. He chooses one of the following: grant privileges to a guild or not grant privileges.[5] If he grants his privileges, the subgroup of $G < N$ craftsmen

[5] The rulers' ability to grant the exclusive privileges to or remove them from traders and

receives trading privileges: the guild is established. $N-G$ non-privileged craftsmen are excluded from trade: they do not earn profit and do not pay taxes. There is $M=G<N$ trading masters and $N-G>0$ excluded craftsmen. If he does not grant his privileges, the market participants are not regulated and all craftsmen are allowed to trade. Here, no one is excluded and thus $M=N$.[6] Regardless of his choice, a master is assumed to pay in each period a tax as a constant share $\tau \in (0,1)$ of his realized profit π.[7] The ruler's objective is to maximize total tax revenues.

In every of T periods, masters trade and pay taxes. They interact in a simplified collusion game. At the start of each period, a master chooses from two actions: collude or compete. If masters compete, each competitor earns π^c. Whereas if all masters decide to collude, they form a cartel and achieve shared monopoly profit π^m. Here, each master gets π^m/M which is more than in competition. But if a single master decides to compete while all other masters collude, he does not face competition and earns π^m for himself. Hence deviation from collusion is profitable. Finally, if anyone competes, colluding masters receive the lowest profit possible 0. To summarize, for a master in a given period: $\pi^m > \pi^m/M > \pi^c > 0$. At the end of each period, the ruler taxes profit-making masters. This is repeated over T periods. A master's goal is to maximize overall payoffs from the entire collusive game.[8]

The timing of actions proceeds as follows. Before trade takes place, the ruler decides who receives privileges for the rest of the game. If he grants privileges to the guild, non-privileged craftsmen are excluded from trading. Then, masters play as described above.

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producers is consistent with the historical practices in Prague (Mendl 1947, pp. 23-54).

[6]Note that N represents the (natural) size of the industry, whereas M represents the actual number of traders in the industry as decided by the ruler that can be lower than N.

[7]Historical accounts supports this assumption: rulers were able to collect from producers and traders a variety of tolls, sale taxes, rents from workshops, good-specific taxes (e.g. beer, wine), wealth taxes (*berně*) and others. See Tomek (1871, pp. 348-368) and Winter (1890a, pp. 3-24) for a list of common city taxes in pre-modern Prague.

[8]This specification captures the key historical evidence that early industries were far from perfectly competitive markets. Here, imperfect competition is captured by simplified Cournot competition. This assumption is likely to be consistent with the character of preindustrial markets since the number of producers was usually limited, changes in production capacities were constrained, and goods were generally produced at the same time and sold afterwards at periodical markets.

Table 1: Net payoffs of a representative master in the base game

	A number of colluding masters				
	$M-1$	$M-2$	$M-3$	...	0
Jan colludes	$(1-\tau)\pi^m$	0	0	...	0
Jan competes	$(1-\tau)\pi^m/M$	$(1-\tau)\pi^c$	$(1-\tau)\pi^c$	...	$(1-\tau)\pi^c$

The above game is dynamic. I will hereafter analyze the subgame perfect equilibria resulting from the players' pure strategies. The solution is found by applying the backward induction method.

3.2 Decisions and Finite Trade

The first variant of the game considers a situation in which craftsmen do not interact with each other on a regular basis. The character of this game is then associated with a finitely repeated game: $T < \infty$.

To find equilibrium decisions, let us at first investigate the problem of the base game: $T = 0$. After the ruler decides on the number of privileged craftsmen, masters interact on the market just once, profits are revealed and taxes paid. The decision problem faced by representative master Jan interacting with $M-1$ other masters is shown in Table 1. The elements in cells show Jan's net payoffs as an outcome of his choice and a number of colluding masters.

Whether Jan colludes or competes depend on choices of other masters. If all other masters collude (the first column), Jan decides to compete since $1 > 1/M$. He deviates from the collusion. In all other cases, there is always at least one already competing master. So if Jan colludes, he receives 0 and therefore Jan always chooses to compete. Jan's dominant strategy is to compete. Because all masters behave like Jan, universal competition is the outcome of a one shot game regardless of the number of masters or the ruler's choice.

Will the king grant his recognition under these circumstances? If the ruler does not limit the number of market participants, his total revenues will be $N\tau\pi^c$. But granting his privileges will reward him with $G\tau\pi^c$. Because $G < N$, the ruler will always prefer not to grant privileges.

Competition among N craftsmen and do not grant privileges are the equilibrium strategies in the single period game. The guild is not established.

If the game is finitely repeated, the unique subgame perfect equilibrium is to play the base game equilibrium every period. Jan will always profit from deviating in the last period of the game if others decide to collude. This is because future punishment including breaking collusion is no longer possible in the last period. Knowing this, no one has incentives to collude in the last period. The result of the last period is universal competition. The same logic applies to the penultimate period and so on back to the first period. So, the unique equilibrium in the finitely repeated collusive game is N masters compete in each period and the ruler does not grant his privileges.

3.3 Decisions and Infinite Trade

The second variant of the game considers a situation in which market interactions are repeated: $T = \infty$. Expectation of future interaction can be used as a mechanism for enforcing collusion. Master's current actions can be conditioned upon the previous course of the game, introducing the possibility of punishing defection.

Masters' capacity to enforce collusion and hence achieve greater profit differ with the ruler's choice. First, suppose privileges are not granted. There is a simple strategy available to masters that maximizes the scope of collusion: masters revert to competition forever in case any master deviates from collusion.[9] Therefore, collusion among N craftsmen is sustainable if

$$\frac{(1-\tau)\pi^m}{(1-\rho)M} \geq (1-\tau)\pi^m + \frac{\rho(1-\tau)\pi^c}{1-\rho}\ , \tag{1}$$

[9] Competition represents a subgame perfect equilibrium and the minimax. Therefore, threat of playing 'to compete' forever maximizes the punishment for deviants and hence the scope for collusion in the absence of the ruler's regulation. Furthermore, such a strategy is consistent with the historical practice of excluding the cooperative members who did not comply with its rules (e.g. PCA, CK, s. Koževšníci 8b, inv. 12, f. 2v, 33v).

where the left side of the equation represents the discounted profit from collusion whereas the right side shows the discounted profit from deviation. Rearranging Equation (1), we obtain the condition for collusion in the unprivileged industry:

$$M \leq \bar{N} = \frac{\pi^m}{\pi^m(1-\rho) + \rho\pi^c} \ , \tag{2}$$

where $\bar{N}$ is the maximum size of the non-guild cartel.

Second, the ruler grants his recognitions. This broadens options for enforcing collusion. Now, masters can be also excluded from the market, which increases the penalty for deviating. A craftsman does not earn any profit once he breaks a collusive agreement. Privileged craftsmen will be able to sustain collusion if

$$\frac{(1-\tau)\pi^m}{(1-\rho)M} \geq (1-\tau)\pi^m \ . \tag{3}$$

The left side represents the discounted profit from collusion. The right side shows the discounted profit from deviation which is less than before because a deviant looses the access to the market after breaking collusion. Equation (3) can be expressed as the condition in the privileged industry:

$$M \leq \bar{G} = \frac{\pi^m}{\pi^m(1-\rho)} \ , \tag{4}$$

where $\bar{G}$ is the maximum size of the guild cartel.

Inspecting Equations 2 and 4 reveals that the scope for collusion is greater if the ruler recognizes the guild because $\bar{G} > \bar{N}$. This result directly follows from $\rho\pi^c > 0$. Masters with royal privileges are better in maintaining collusion within the industry than without because they are able to impose more severe penalties on those who deviate, by excluding them from the industry.

Whether the ruler finds profitable to grant his privileges or not then depends on total number of tax-paying producers and their ability to monopolize the market. In an economy where $N \leq \bar{N}$, masters will collude regardless of the ruler's decision. In relatively smaller industries, competition is not an option. Here, the ruler earns

$\tau\pi^m/(1-\rho)$ if he grants his privileges to the guild or not. Since there is no difference in the outcome, the ruler is ambivalent about granting his privileges. As a result, there are two equilibria in the infinitely repeated collusive game with $N \leq \bar{N}$. First, N craftsmen collude and the ruler does not grant privileges. Second, $N-G$ craftsmen are excluded and the ruler grants privileges to the guild of $G < N$ masters who collude.

However, in an economy where $N > \bar{N}$, masters will collude only if the guild of $G \leq \bar{G}$ is recognized. But the ruler grants such recognitions only if it pays back. That is when

$$\frac{\tau\pi^m G}{(1-\rho)G} \geq \frac{\pi^c N}{(1-\rho)} \ . \tag{5}$$

Rearranging Equation 5 leads to the following condition for ruler's recognitions:

$$N \leq \bar{\bar{N}} = \frac{\pi^m}{\pi^c}, \tag{6}$$

where $\bar{\bar{N}}$ is the maximal size of the industry in which the guild is recognized.

Since $\bar{N} < \bar{\bar{N}}$, there exists a population size N that satisfy $\bar{N} < N \leq \bar{\bar{N}}$. For this population the ruler always prefers collusion on the market over competition. Thus the revenue maximizing strategy is to grant royal privileges to the guild of $G \leq \bar{G}$. Hence, the equilibrium in the infinitely repeated collusive game with $\bar{N} < N \leq \bar{\bar{N}}$ is $N-G$ excluded craftsmen from trading and the ruler grants his recognitions to the guild of $G \leq \bar{G}$ colluding masters.

Whereas if $N > \bar{\bar{N}}$, the ruler preferred strategy is not to grant privileges. Since $\bar{\bar{N}} > \bar{N}$, masters are not able to sustain collusion without privileges, thus they compete. The equilibrium in the infinitely repeated collusive game with $N > \bar{\bar{N}}$ is N masters compete and the ruler does not grant privileges.

3.4 Equilibria and Market Development

This section links the game equilibria with different stages of market development. There are four stages. Figure 1 provides the summary. As long as market inter-

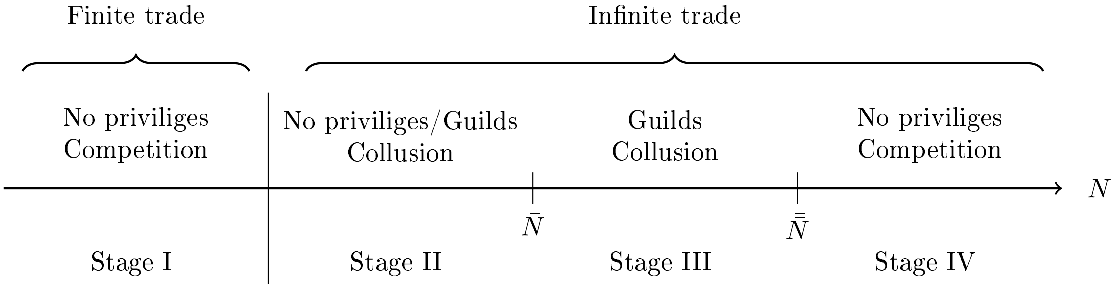

Figure 1: Summary on market development

actions are not regular, the stage of market development corresponds to the finite phase of the game (Stage I). Once market interactions became regular, the stage of market development corresponds to the infinite phase of the game and changes with the industry size, which is equivalent to N in the model (Stage II, III and IV).

Stage I refers to the period when market interactions are not common. In this stage, the model predicts markets to be competitive and unregulated. This result is intuitive. If craftsmen do not interact frequently and their relationships are not personal, it is very difficult to achieve any collusive agreement. Hence, the emergence of any local cooperative is unlikely and the ruler is better off with more traders who pay taxes. This changes once craftsmen started to interact frequently.

Stage II refers to a situation in relatively small industries with $N \leq \bar{N}$, where a group of market participants meet on regular basis. Here, collusion can easily be enforced even without obtaining exclusive privileges, for instance through informal cooperatives of craftsmen. The king has no real power over the outcome in the industry. Hence, rising taxes through market regulation does not change his revenues. Therefore, for a sparsely populated economy, collusion is always formed and the ruler is ambivalent in his decision.

Stage III shows what happen in intermediate sized industries, corresponding to $\bar{N} < N \leq \bar{\bar{N}}$. In contrast to Stage II, earning collusive profits become possible only with the help of the ruler. The size of the industry becomes too large for producers to self-sustain collusion. Here, royal privileges provide the enforcement mechanism necessary for fostering collusion. But they will be granted only as long as collusive outcome will be profitable to the ruler. The net losers are excluded craftsmen. In this stage, the guild and collusion dominate the economy.

Stage IV presents the situation in large industries, $N > \bar{\bar{N}}$. The equilibrium shows that above a certain size of the industry, collusion is no longer viable to the ruler. Increasing revenues through the system of guilds also have negative welfare implications. As population increases, more and more craftsmen are excluded from trading and hence the opportunity costs to the ruler of maintaining guilds increase. Hence, guilds are likely to be abolished once market development reaches the point when guilds are no more profitable. Thus, for a large size population, the ruler does not regulate markets and craftsmen freely compete.

4 Predictions and Evidence

My theory generates several empirical predictions explaining the rise and fall of craft guilds. The history of Prague supports them.

4.1 Guilds Are Not Recognized when Trade Is Irregular

The history of trade in the area of modern Prague dates back to the Early Middle Ages. During this time, buyers and sellers were not permanent residents of the settlement, often interacting infrequently with little or no ties to other traders of the same profession.

If trade is sporadic, my theory predicts unregulated markets with competition (Stage I). In fact, it predicts that the ruler would not grant privileges to groups of professionals trading on local markets and that local producers would not be able to sustain any form of cooperation. So, craft cooperatives would not be formed.

The surviving records on early market activity in the region supports this prediction. From its early days, the settlement under Prague Castle was known as an important trading center. By the 10th century, producers and merchants from all over Europe were coming to Prague's markets and fairs to buy and sell goods of various kinds. The settlement was "one of the largest centers of international trade", which was "an important link in the trade between East and West" (Hensel 1969, p.

56).[10]

When Judeo-Arab merchant Ibrahim ibn Jacob traveled to Central Europe in the late 10th century, he left a description of Prague as the town built of "stone and lime", where trade flourished. His records described Prague as a center of long distance trade, recording a variety of merchants including Jews, Russians, Slavs, Turks, and Muslims, who came to Prague to trade at the local markets. These foreign merchants came in with a variety of goods and coins and left with slaves, tin and various kinds of wool. Jacob also recorded local production. Prague craftsmen manufactured saddles, horse bridles and heavy shields that were used in the region (Hrbek 1951).

But most of these early traders and producers were not permanent residents in the area. This comes from the nature of early trade: long-distance exchanges. During this time, "the traders at the markets did not meet potential consumers but traders met traders and together supplied the redistribution mechanisms" (Klápště 2012, p. 350). Prague was indeed an important meeting point. Many merchants and artisans came in temporarily, traded their goods, and left the settlement. The participants of local inhabitants on this trade was, however, negligible (Janáček 1983, pp. 19-20). Under these circumstances, it would have been very difficult for this mixture of merchants and producers, from all over Europe, who did not interact frequently, to establish a monopoly over the city's markets. Thus we do not find any records of organizations of local craftsmen in Prague prior to the 13th century (see Section 4.2 below).

As my theory predicts, the ruler's policy regarding trade when interactions are not frequent did not limit market participants. Quite the contrary; the local dukes tried to attract as many merchants and artisans as possible in order to increase revenues from tolls and a variety of market fees. They did that in two ways.

First, they provided protection to traders coming to Prague that no one else could provide in the rest of Bohemia. The trading route was guarded by two castles on each bank of the river (Prague castle and *Vyšehrad*). This was not all. In the

[10] For the role of Prague in early trade, see also Brutzkus (1943) and Janáček (1955, pp. 11-15).

12th century, the fortified court knows as *Ungelt* or *Týn* was set up near the actual marketplace. In this court the goods could be safely stored and merchants could peacefully rest (Mendl 1947, p. 10; Klápště 2012, pp. 387-390).

Second, they established permanent markets to attract more sellers and buyers. There were probably three marketplaces with a different nature and trading days: one for foreign exchanges, one for local consumption and one for wood trade. Apart from these markets, rulers held periodic fairs where everyone was invited to trade (Winter 1906, pp. 26-29; Mendl 1947, pp. 7-12).

4.2 Guilds Rise with Market Development

In my model, collusion within the industry emerge once local producers start to interact repeatedly. In the earlier stage of urbanization (Stage 2), collusion can be self-sustained or government supported. But in the later stage as the size of market expanded (Stage 3), collusion is possible only through craft guilds. The historical evidence on market development in Prague supports this prediction.

During the 13th and 14th century, the settlement around the area of Prague castle transformed in the city. Trading opportunities expanded as the internal market did. Specialized craftsmen, who settled in the city, became the majority of Prague population. Even some streets and marketplaces were associated with certain professions (Mendl 1947, pp. 18-25; Janáček 1963, pp. 101-102). So, repeated interactions among local producers became common.

As a result of the frequent interactions among local producers, cooperatives emerged. The first cooperatives of craftsmen probably formed around the 13th century, although the first documented cases are from the following century. These were voluntary religious fraternities, which were dedicated to a variety of saints and patrons. Among them were cooperatives of belt-makers, goldsmiths, painters and shield-makers or *institores iuniores* (Winter 1906, p. 184; Pátková 2000, p. 50). They were organizations of local producers, yet they did not hold exclusive privileges to local markets. Their primary goal was to help their members meet their spiritual and religious needs. They prayed regularly, paid for funerals, called processions, celebrated feasts and held magnificent ceremonies (Pátková 2000, pp. 51-69). Furthermore, the early fraternities provided their members with loans or basic forms of mutual insurance, and their regular meetings were a convenient place to discuss topics relevant to their business (Winter 1906, pp. 63-65).

These voluntary organizations did not have any power over craftsmen outside their membership. Thus, satisfying the economic interests of their members was limited. These fraternities could deny membership or expel craftsmen from their organization to enforce cooperation but nothing more. Limited power over craftsmen led to their decline over time and the replacement by a new form of economically oriented cooperatives with exclusive privileges: craft guilds.

The rise of craft guilds coincided with the commercial expansion and gradual urbanization of the region. Available evidence suggests that rulers did not grant exclusive privileges to these groups of local craftsmen immediately but over time. The oldest documented ordinances are from 1318 and grant the Tailors of the Old Town certain rights, but monopoly rights were fully granted to them only later, in 1341 (Mendl 1927). Similarly, the Painters of the Old Town had a voluntary fraternity already in 1348, but at that time they did not have privileges to the local markets, which were probably granted by representatives of the Old Town about decades later (Pátková 2000, p. 50).

The development of guilds took off after the Hussite Wars. Craft guilds became basic units of economic and social organization in most industries of the metropolis by the 16th century. They definitely replaced voluntary fraternities. Furthermore, the structures of local guilds spread well beyond their regional boundaries. Prague guilds were models for rural organizations, providing them with ordinances and guidance (Winter 1925, pp. 28-36).

The records show that as the city population increased from about 30,000 in the 15th century to 60,000 over the 16th century, numbers of local guilds increased as well. The actual estimates of variation in Prague guilds during their heyday is shown in Table 2.

These estimates support the theoretical prediction that craft guilds rise with

Table 2: The number of craft guilds and variety of occupations in the towns of Prague during the 16th and 17th centuries

	Old Town		New Town		Lesser Town		Total	
Period	guilds	occup.	guilds	occup.	guilds	occup.	guilds	occup.
1500-1539	30[a]	-	33	34	-	-	over 63	-
1540-1579	39	44	35	40	26	32	100	-
1580-1619	46	52	39	49	26	31	111	65

[a] Refers to approximate estimates, see Winter (1906, p. 580-581).
Notes: Available numbers correspond to years 1571 and 1599 in the Old Town; 1528, 1549 and 1600 in the New Town; 1577 and 1619 in the Lesser Town.
Sources: PCA, SR, s. 1420, ff. 183r-184v; PCA, SR, s. 1481, ff. 43r-44r; Winter (1906, pp. 580-581; 1909, p. 727).

gradual urbanization of the region. Over time more and more guilds emerged in the towns of Prague and at their peak around the end of the 16th century, there were more than one hundred guilds, representing more than 65 different occupations. But as they developed to their utmost, they also became more restrictive with further market development.

4.3 Guilds Fall with Late Market Development

The theory predicts craft guilds to become relatively more restrictive as the market develops (Stage 4). This process may explain why rulers restrained the power of guilds with the birth of the modern state. To the extent that craft guilds functioned as substitutes for modern state institutions, the rulers were willing to support their existence. But once craft guilds became more costly compared to an alternative system, this willingness faded away. The evidence from the end of the Thirty Years' War onward supports this prediction.

The positive effects of guilds started to be questioned in the later part of the 17th century. During the period of proto-industrialization, craft guilds became an obstacle for further economic development. The main problem with guilds was their monopoly over local markets, which meant that a large part of the population was denied the opportunity to practice a variety of professions. The government reacted to these guild restrictions by passing new laws. An imperial decree liberalizing entry to guilds and restricting their power was promulgated in 1672 across the Holy Roman Empire. It prohibited guilds from discriminating against new members based on religion or origin (Mendl 1947, p. 50; Whaley 2012, p. 58). Furthermore, with the growth of mercantelism, the government in Vienna was considering a complex reformation of the economy.

The new course of policy was to place restrictions on, or even to prohibit guilds. Before its application, the government organized a questionnaire among the royal cities between 1698 and 1700, in which it asked for comments about the status of guilds. Even though the Count of Vrtba advised in 1699 that guilds across the country be abolished, his point of view was rare among the nobility. Despite the many downsides of the urban economy being controlled by craft guilds, it seems that the guilds' public functions were more important than market efficiency. In particular, Prague's council and mayor defended the presence of guilds as they, among other things, disciplined journeymen, kept them in line and educated them in religious manners, took care of their members, provided the city with revenues and increased the fame of the city (Mendl 1947, pp. 49-50; Urfus 1960).

The approach changed with the transformation from a feudal system to modern bureaucracy in the 18th and 19th centuries, during which multiple modern state institutions were formed (e.g. police, local courts, fiscal offices).[11] Within this development, the benefits of guilds were definitely outweighed by their costs. As a result, a series of laws that reformed guilds, in particular a law on the Imperial Guild Ordinance, was passed. Their goal was to restrict the guilds' power.

The new legislation aimed, following the mercantilist theory, at suppressing guilds' economically harmful practices and promoting competition. In particular, it relaxed limits on the numbers of subordinates each master might have, it allowed women to enter certain guilds, and it liberalized entry to industries (Mendl 1947, pp. 50-54; Urfus 1960; Whaley 2012, pp. 506-507).

The dissolution of guilds continued as markets developed. In 1754, the *cechovní přímus* was forbidden for new industries and some old industries, such as glass, pa-

[11] On the development of state institutions, see Hledíková and Janák (1989, pp. 161-202).

per, book-printing, textile and metal, were deregulated. This process was completed by passing the Commercial Law of 1859, which abolished guilds within the Habsburg monarchy (Mendl 1947, pp. 54-66; Kotous 2004).

5 Conclusion

The aim of this paper was to explain the rise, spread and fall of craft guilds in Central Europe. I embedded the relationship between the ruler and local craftsmen into the model, and argued that craft guilds emerged because they were able to generate high enough collusive profits from which they financed taxes and services that compensated rulers for the costs associated with their exclusive practices. The following predictions showed how guilds developed in pre-modern Prague. Once craftsmen settled down in the city and started to interact regularly, they were able to foster cooperation and to raise large enough collusive profits to pay for exclusive privileges. Rulers provided such privileges because guilds offered the means to tax economic activity, to ease expenses regarding the city's governance and to supervise local markets. But as the market expanded, the rulers had to abolish these privileged groups of producers because their exclusive practices restricted a large portion of the population from trade and hence lowered the number of potential tax-payers.

Studying the mutually beneficial relationship between governments and their citizens can substantially improve our knowledge about the evolutionary process and origins of public institutions. This is, however, not limited to historical periods. Including both private and public dimensions into the study of modern institutions can help us shed some light on current problems as well.

Today's developing countries are in a similar situation that the developed countries were in hundreds of years ago. Their capacity to raise resources and provide public goods are particularly weak. It should not be surprising then that state officials and local communities in those countries can benefit from mutual relationships like those of pre-modern rulers and craftsmen. For example, governing local markets through a group of local craftsmen is analogical to managing natural resources or providing public goods through local communities. Nevertheless, the extent to which local communities and governments achieved synergistic outcomes and how they achieved these is yet to be investigated.

Appendix

Primary sources are from the Prague City Archives located at Archivní 6, 149 00 Praha 4, Czech Republic. The abbreviations by which these sources are referred to are as follows: PCA (the Prague City Archives), CK (fond Cech kožešníků), CR (fond Cech řezníků), CS (fond Cech ševců), SR (fond Sbírka rukopisů), s. (signatura), inv. (inventární číslo).

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