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Brokerage regulations in central Western Europe, ca. 1250-1700

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Abstract

This paper examines brokerage regulations in Central and Western Europe from approximately 1250 to 1700. Based on a sample of 70 cities with more than 1609 sets of regulations, we find that brokerage was a multifunctional institution, which served matchmaking, quality certification, and tax collection functions, mainly in product wholesale markets but also in finance and real estate markets. We argue that the implementation of regulations for matchmaking and certification solved incentive problems related to asymmetric information between buyers and sellers, consequently improving the allocation process and fostering trade. In line with these results, we find that most brokerage regulations occur along trade routes and in merchant towns.

Keywords: Brokerage, urban economic policy, allocation mechanisms, pre-modern trade
JEL: N23, N43, N73

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1. Introduction

Studying the economic history of late medieval and early modern Europe is intriguing because of its trade-driven urbanization (Lopez 1976, Bairoch et al. 1988). Cities became specialized production and trade centers into which foodstuffs, inputs for local production, and non-locally manufactured products were imported and from which locally produced goods were exported. These trade flows were accompanied by economic regulations enacted by town governments (Hibbert 1967; Dijkman 2011; Gelderblom 2013). A central aspect of the economic policy of medieval and early modern towns was the implementation and regulation of allocation mechanisms. Town statutes and regulations organized spot markets, intermediation, and bilateral trade. Examining the organization of allocation mechanisms is important because they determine the meeting of buyers and sellers, information aggregation, price formation and final transaction of goods. In this way, regulations of allocation mechanisms influence the (strategic) behavior of buyers and sellers, the matching and clearing efficiency, and the division of surpluses between buyers and sellers. Thus, allocation mechanisms can either create positive welfare effects or reduce welfare gains and thus determine the long-run growth of a town or, more generally, of a society.

Analyzing these regulations in Central Western Europe is especially interesting because cities in the Holy Roman Empire were politically and economically autonomous (Heinig 1983; Isenmann 1989; Johannek 2000), as economic policy was made by municipal governments. These were representatives of *Free* and *Imperial* cities or of local worldly or ecclesiastical dukes. Territorial regulations imposed by the king or emperor were rare until the early modern period. Rather, common economic interests beyond the city borders were organized through commercial federations, such as the Hanseatic League (Dollinger 1966; Friedland 1991), or through smaller town leagues, such as currency unions (Boerner and Volckart 2011).

In addition, this area of investigation offers manifold trade geographies. We can find land-, river- and sea-based trade routes connecting the Mediterranean to the Baltic and North Seas, Western and Eastern Europe. Cloth; inputs for textile production, such as wool, linen, fustian, fur and leather; dyes; spices; wine; fish; grain; construction materials; and many other types of products flowed along these trade routes during the study period (Kellenbenz and Walter 1986; Postan 1987).

In this complex world, it is interesting to explore how allocation mechanisms were once designed and organized by municipal authorities and whether these designs solved incentive problems related to trade. In this paper, we will focus on one type of allocation mechanism – intermediation by

brokerage. The organization and regulation of brokerage in towns has been frequently documented during the study period but requires closer examination. Where, when, and for which kinds of trade goods can we find brokerage? Which kinds of brokerage regulations were introduced? Did the market participants and the towns that enacted and enforced these regulations gain economic benefits?

Based on an analysis of brokerage policy in 70 cities in Central and Western Europe from approximately 1250 to 1700, this paper shows that cities used brokerage regulations to determine intermediation and trade activities. Town governments used brokerage as a multifunctional institution. Above all, it brought together buyers and sellers without a private intermediary. This clearing mechanism reduced the search, match and bargaining costs for both sides of the market.
In addition, brokers performed quality control certification for goods and verified the creditworthiness of buyers. These functions solved Akerlof-type lemon problems (Akerlof 1970), as separating high from low-quality items reduced information asymmetry between buyers and sellers and thus increased trade. This type of quality control went beyond a simple weighing and measuring of products, requiring specific expertise and product knowledge from the broker. Both brokerage functions reduced negative externalities due to incentive problems based on asymmetric information and opportunistic buyer and seller behavior and thus improved welfare. This made towns attractive market platforms for buyers and sellers. Thus, brokerage promoted trade and created ex ante incentives for merchants to make trade investments.
Brokerage also had a third function, tax collection. The role of brokers as tax collectors might indicate their use as the long arm of a rent-seeking town government or local ruler. However, it is difficult to assign brokerage to rent-seeking activities, except in a few cases. The collection of taxes may also have served the provision of local public goods, such as infrastructure or security. These three brokerage functions were sometimes complements but also occurred independently. Matchmaking and quality certification frequently appeared as complements.

Furthermore, we can document these functions throughout the period under investigation. However, we find earlier more brokerage regulations related to matchmaking than to product certification. In addition, the certification of buyers can be only observed from the 15th century onwards, while brokerage regulations on tax collection are more evenly distributed around the average sample period. In addition, matchmaking and certification can be observed throughout the geographic area under investigation, but these functions are intensively documented along the main trade axis during the investigation period, that is, in the catchment area of the Rhine/Main Rivers to the Rhine-Meuse-Scheldt delta and along the North and Baltic Seas. The distribution of brokerage regulations

of tax collection was regional. Furthermore, we show that these brokerage regulations covered a wide range of wholesale products. The appearance of regulations for certain products is documented along the corresponding trade routes and varies over time. Finally, the appearance of different types of brokerage designs is related to varying product, demographic and political characteristics.

These variations support the argument that market policy was at least correlated with trade activities and likely had a positive impact on the economic development of pre-modern towns. Furthermore, the results suggest different allocation policy needs for different product markets over space and time to solve the information asymmetry problems of these different environments.

We examine brokerage regulations from Central and Western Europe, roughly within the boundaries of the Holy Roman Empire north of the Alps. We collected brokerage regulations from 70 cities from 1250 to 1700, resulting in a sample of approximately 1609 sets of regulations. These observations are based on an analysis of 227 cities in the area with at least 5000 inhabitants during the period under investigation (following Bairoch 1988). We produce descriptive statistics and conduct statistical significance tests to demonstrate the robustness of the results. We restrict the empirical analysis to these descriptive statistics and conditional statistical tests based on the data we observe to reduce concerns about the validity of the estimated coefficients due incomplete data.

In a next step, we interpret these results in terms of economic incentive theory. We show how these brokerage regulations shaped the incentives of intermediaries and market participants and solved different types of negative externality problems due to information asymmetry. We thus follow the methodological tradition established by Greif and others (Greif 1993, 1994, 2006; Greif et al. 1994).

Furthermore, we embed this analysis in a single case study of the city of Cologne to place these results in a broader economic and historical context. Our analysis considers the multifunctionality of brokerage regulations. This allows us to investigate a long period and to engage in a comprehensive quantitative study of many towns and thus produce some generalizable findings. However, such an analysis comes at a price. In following such a methodology, we are precluded from discussing our findings in the broader institutional context of a city. The main brokerage functions (i.e., matching, certification, tax collection) may have been performed by other institutions and thus our results may be biased by non-observables. (Please see the methodological approaches of Gelderblom and Grafe 2010, Gelderblom 2013 motivated by Lane 1958 and the focus on the multifunctionality of institutions adopted by Ogilvie 2007.) Other market-making institutions might have served similar purposes and thus complemented or replaced the brokerage

function. To solve this problem, we use Cologne as a case study for both brokerage and other institutional designs. Consequently, we can discuss alterations of the results in what serves as a robustness check. However, we cannot generalize these findings to all cities with brokerage regulations (or even those without them). Thus, a study of more cities should be conducted.

Finally, it is important to mention is that this paper offers an economic policy perspective based on a study of formal institutions, which captures a specific dimension of the issue. This study does not examine other dimensions such as the business performance of brokers in specific towns or periods by reviewing their account books or economic, political, and social roles. (See von Brandt 1954; Blendinger 1994.) Such investigations can be enlightening but are beyond the scope of this study.

The study of brokerage has a long tradition in economic and legal history (Labandt 1861; Stuart 1879; Goldschmidt 1882; Gilliodts- van Severen 1881; Ehrenberg 1885; Heymann 1898; Frensdorff 1901, Pelsmaeker 1905, Dilis 1910, Toebelmann 1911; Beukeman 1912; van Houtten 1936; Schmieder 1937; van Houtte 1950; Schubert 1962; Blaum 1978). These scholars have produced descriptive case studies of individual towns. However, no systematic, quantitative, institutional incentive analysis has been conducted for brokerage regulations over the 1250-1700 period. Their contributions include the discovery of the first-source material and the identification of individual regulations. Their focus was the all-encompassing historical investigation of brokerage, and thus, these economic and legal historians did not engage in economic quantification or interpretation.

Later scholars of medieval markets have concentrated on the monopoly power of guilds in local retail and export markets (Munro 1990, Hickson and Thompson 1991; Epstein 1998; Richardson 2004). They conclude that such monopoly power was rather limited, although some guilds had monopolies in goods production in their hometowns, selling in local markets was competitive, and the exchange of products between towns was open and competitive. This was true both for raw and finished products in regional and long-distance trade. In complementary research, Gelderblom and Grafe (2010) examine the evolution of merchant guilds and find a significant correlation between the existence of merchant guilds and missing public market facilities. They argue that merchant guilds facilitated the matching of demand and supply in markets of limited size for long-distance trade goods.

Related to this line of research on the role of guilds in medieval markets, a debate has arisen over the impact of medieval rent-seeking institutions that determined the allocations of goods in medieval markets. Ogilvie (2004, 2008, 2011) argues that rent-seeking institutions, especially

guilds, played important roles in limiting economic growth during the Middle Ages and the early modern period. In contrast, Epstein (1998, 2008) attributes positive effects to guilds due to their apprenticeships and contributions to technological change.

Research by Greif and others (Greif 1993, 1994, 2006; Greif et al. 1994) has examined the institutions that enabled credit transactions and impersonal exchange in medieval markets. This line of research focuses on solving commitment problems among groups of merchants in long-distance trade. Overcoming this commitment problem is a necessary precondition of the market-making activities considered in this study.

Finally, several monographs have studied related medieval market microstructures from a more holistic point of view (see, for example, Rothmann 1998, Reyerson 2002, Murray 2005, Zuijderduin 2009, Davis 2011, Greve 2012, Dijkman 2011, Gelderblom 2013).

The remainder of this paper is structured as follows. Section 2 provides the case study of Cologne. Section 3 expands the horizon to the whole investigation area, section 4 presents an economic interpretation of the regulations found, and section 5 returns to Cologne and compares institutions. In section 6, additional elements of brokerage that played a more important role in related studies are discussed. Section 7 concludes.

2. Brokerage Regulations: The Case of Cologne

We begin by examining the evolution of brokerage regulations in Late Medieval Cologne to gain an impression of the form, organization and use of brokerage in one of the most important economic and political cities of the Middle Ages. Cologne, one of the largest cities north of the Alps, had more than 40,000 inhabitants from the 13th to the 17th centuries (Bairoch 1988). It maintained its leading position until the 16th century. When the axis of trade shifted to the Atlantic by the end of the 16th and into the 17th century, Cologne could not keep pace with other growing cities, such as Hamburg and Amsterdam. Cologne's economic importance was based on its local production, position along major trade routes (north-south and east-west) and strategic use of these routes (Kellenbenz 1967; Schönfelder 1970; Irsliger 1979). The latter involved implementing a staple market for many goods along the Rhine (Kuske 1939). In addition, Cologne's strong trade and political interests are indicated by its participation in the Hanseatic League (Wollschlaeger 1988). Finally, merchants from Cologne could be found all over Europe at this time (Gramulla 1970; Hirschfelder 1996).

At the beginning of the 13th century, Cologne and the surrounding region were under the political and economic control of an archbishop (Lau 1898; Groten 1998) who was one of seven *Kurfürsten* (prince-electors) to crown the Holy Roman Emperor. The powers of this archbishop were gradually curtailed by the city's patricians. By 1288, the bishop was had been forced to flee to Bonn after an abortive attempt to increase his power.[2] The next two centuries brought about the incremental economic and political autonomy of Cologne. This change involved power over the legislation and jurisdiction, which influenced political and economic rights.[3] In 1475, Emperor Friedrich III officially declared Cologne a free city (ruled only by the Emperor). In the early 13th century, a consulate of patricians played an advisory role for the archbishop, but over the centuries, it assumed more political and economic power[4] (Militzer 1996). By the early fourteenth century, the legislative power of the consulate is documented in its protocols (Huiskes 1990).

The appearance of the first brokerage regulations issued by the council coincides with this political development; the oldest records date to 1321. It is possible that there were earlier forms of brokerage based on a 12th century source document from Cologne and evidence of extensive regulations from the cities of Brugge, Dordrecht and Ypres (with which Cologne traded) during the second half of the 13th century.[5]

The first known brokerage regulations in Cologne date to the first half of the 14th century: regulations for wine, grain, fur, and wood can be documented.[6] These regulations restricted the intermediation activities of brokers to matching buyers and sellers, prohibiting brokers from engaging in private business. For a successful match, they received predetermined fees on a per unit basis or based on the final price. Furthermore, a broker was sworn in by the town council. The privilege of becoming a broker was limited, and a few brokers were usually appointed for each product. We have no exact figures for the 14th century and few for the 15th century. In the late 15th century, documents indicate four brokers for wine, four for cattle, and eight for horses.[7]
The function of a broker as a matchmaker is documented for Cologne from the early 14th to the

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2 This reduced his influence in the city. However, he kept all his economic and political privileges at least nominally.

3 This included direct economic privileges such as coinage rights and taxation privileges (Heinig 1983, pp.289-292). These privileges were gained with the help of the king using the weakness of the archbishop and rivalry between the king and the archbishop (Ibidem, pp.267-270).

4 The council (*Rat*) was embedded in two partly representative boards: the *Schöffengericht* and the *Richerzeche*. The latter has been documented since 1398. This process reveals a steady increase in political plurality.

5 For Cologne, see Toebelmann (1901, p.135); for Dordrecht and Brugge, see Hoehlbaum (1876, Hansisches Urkundenbuch I, nr 1090, nr 436), Gilliodt van Severen (1881, pp. 124-9); for Ypres, see Pelsmaeker (1905).

6 Stein (1895, II, pp. 5, 15, 19-21); Loesch (1907, II, pp. 122-126).

7 For wine, 1471: Stein (1895, II, p. 496); for horses, 1479: Ibidem (pp. 565f.); for cattle, 1482: Kuske (1917, II, pp. 470f.).

seventeenth centuries (and beyond).[8] The right of brokers to engage in intermediation was exclusive. Other people were excluded from intermediation, and transgressors were punished.[9] Innkeepers were barred from participating in brokerage activities.[10] However, some sources reveal that innkeepers had limited intermediation rights for their own customers during the early 15th century.[11] Conversely, brokers were not allowed to host merchants.[12] Furthermore, we have detailed evidence that brokers were not allowed to participate in any kind of business related to their work. They were not allowed to buy or sell, nor have any partners who did.[13] We even have evidence of one broker who was not allowed to live with his father because they worked with in the same product; family members were not allowed to do business related to the product the broker was intermediating.[14] Some regulations set time limits on these restrictions; for example, after terminating activities, a broker had to wait for one year to conduct private business.[15] Early regulations also only allowed brokers to conduct business for people who were in town, and business by order was not allowed.[16] Only in the late 15th century do sources mention that brokers provided intermediation for non-present merchants, and measures were taken to guarantee proper transactions.[17] The brokerage fee was based on the transaction units and could not be changed. Typically, a fixed fee per unit was paid,[18] but occasionally, fees were based on a percentage of the transaction price.[19] In most cases, percentage fees were linear (in a few cases non-linear). Similarly, there was a fixed step function fee per unit.[20] The fee was split equally between the buyer and the

8 However, due to a breakdown of the archive, the author had to work with selective sources for the regulatory details for the second half of the 16th and 17th century. Thus, this case study focuses on sources from the 14th to the 16th century.

9 In general, the exclusive right can be derived from the brokerage oath or directly from the regulations. The first exclusion statements related to punishment regulation date back to 1360: Stein (1895, II, pp.33-35); such regulations can be documented through the 15th century: for example 1407: Ibidem, (pp.178-81); 1450: Stein (1893, I, p. 36).

10 1348: Loesch (1907, II, pp.122-6); 1360: Stein (1895, II: pp.33f.); 1427: Ibidem (pp. 251-3); 1480: Loesch (1907, II, p. 119).

11 1400: Stein (1895, II, pp.129f.); 1407: Ibidem (pp. 178ff.); 1420: Ibidem, (pp. 129f.).

12 1370: Stein (1895, II, pp.53ff.); 1406: Ibidem (pp. 187f.); 1465: Kuske (1917, II, pp. 153-5); 1480: Loesch (1907, II, p.119).

13 The following are examples over the centuries: 1335: Stein (1895, II, p.5); 1375: Ibidem (pp. 61-65); 1407: Ibidem (pp. 178-181). 1450: Stein (1893, I, p. 353); 1490: Kuske (1917, II, pp. 827-840); 1587: Militzer (2005, I, p. 543).

14 For the case of cattle brokerage in 1468, see Grote (1990, I, p.354); fish in 1467, Kuske (1917, II, pp. 153-6).

15 Stein (1893, II, pp. 33f.).

16 1365: Stein (1893, II, pp. 33-35).

17 For instance, the goods of non-present merchants had to be sent and stored in warehouses; see 1486: Stein (1893, II, pp. 603-607.) Alternatively, brokers had to announce the names of the absent merchants, and deals had to be testified and approved by a second broker; for wine regulations from 1490, see Kuske (1917, II, pp. 837-840).

18 Unit fees were set for homogeneous consumption goods; for grain in 1335, see Stein (1895, II, p.5); wine 1375: Ibidem (pp. 61-65), 1475: cattle 1470: Kuske (1917, II pp. 259-265), butter 1475: Ibidem (pp. 327-8), fish 1465: Ibidem, (pp. 153-156).

19 The percentage fees were paid for high-value goods with price variation, such as horses 1407: Stein (1895, II, pp. 178-181), real estate and financial instruments 1401: Ibidem, (pp. 137f.), and some textile input products, such as linen 1370: Ibidem (pp. 50-1) or wool 1486: Ibidem (pp. 617-8). However, wood was also regularly subject to percentage fees; for example, 1370: Ibidem, (pp. 53-5).

20 We find non-linear percentage fees for horses in 1360 and 1365: Stein (1895, II, pp.33ff.). This means that a specific percentage must be paid up to a maximum price; then, after this threshold, a comparably lower percentage fee is

seller. Fixed fees can be documented from the beginning to the end of the sample. In some cases, brokerage income from fees had to be divided among all brokers from the same product.[21]

We find source material for basic foodstuffs such as grain for the 14th and 15th centuries,[22] fish for the 15th and 17th centuries,[23] cattle and meat for the 15th and 17th centuries,[24] wine from the 14th to the 17th centuries,[25] and oil, fat, and butter for only the second half of the 15th century.[26] In another large group, we find raw textile products, such as wool, linen,[27] and cloth,[28] and for fur, skins and leather products.[29] We find evidence of brokerage for all these goods from the 14th through the 16th centuries. In another group, we identify spices, dyes, and salt,[30] evidence for which can be found for the 15th and 16th centuries. For construction materials, we find wood, brick and shale from the 14th to the 16th centuries.[31] Furthermore, we find evidence for metals (iron, steel, copper and lead) during the 15th century.[32] Evidence of horse brokers exists for the 14th to the 17th centuries.[33] Finally, we document financial products such as money (gold, silver), bills of exchange, and rents from the 15th to the 17th centuries[34] and brokerage for inheritance, land and houses for the 15th and 16th centuries.[35]

Another frequent broker obligation was to inform the buyer of the quality of the goods being intermediated. This service began with very simple information about the type and quality of goods available and included more specific statements that the broker had inspected the goods for quality and would not sell low-quality goods as high-quality goods. We find this type of quality certification by the broker from the middle of the 14th century.[36] We find another type of quality or

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paid. Step-function fees can be found for cattle in 1450: Loesch (1907, II, pp.146-149). In this case, the merchant paid per unit, fixed fees up to a maximum price. For higher prices, he paid a higher fixed higher fee.

21 We have repeated evidence for wood and wine brokers. For wood brokers, see, for example, 1407: Stein (1895, II, pp. 187-8); for wine 1461: Ibidem (p. 387).

22 Examples are 1335: Stein (1895, II, p. 5); 1497: Ibidem, (p.694).

23 Examples are 1409: Groten (1990, I, p. 82); 1465: Kuske (1917, II, 153-6); 1485: Ibidem (pp. 500); 1530: Kuske (1905, p.267); 1624:Militzer (2005, I, p.671); 1682: Militzer 2005, II, p.916)

24 Examples are: 1448, Loesch (1907, I, pp. 147f.); 1470: Kuske (1917, II, pp. 259-265), 1544: Militzer (2005, I, p.369), 1596(Ibidem, p.586); 1645: Militzer (2005, II, p. 765), 1690: Ibidem (p.693)

25 Examples are: 1321: Stein (1893, I, p.5); 1375: Stein (1895, II, p. 61-65); 1427: pp. 251-3; 1490: Kuske (1917, II, pp. 837-840); 1550: Groten, 1990 (V, p. 756); 1635: Militzer (2005, I, p.715); 1688: Militzer (2005, II, p.954)

26 Examples are 1475: Kuske (1917, II, pp.327-8); 1499: Ibidem, (p.792).

27 Examples are 1370: Stein (1895, II, pp. 50-3); 1400: Ibidem (pp. 13f.); 1486: Ibidem (pp. 617-8); 1546: Groten (1990, V, p.382).

28 Examples are 1360: Stein (1895, II, pp. 28-32); 1445: Loesch (1907 II, p. 457); 1529: Groten (1988, III, p. 152).

29 Examples are 1345: Stein (1895, II, p. 15), 1486: Ibidem (pp. 603-7); 1515: Groten (1989, II, p. 273).

30 Examples are 1400: Stein (1895, II, pp. 129-30); 1414: Ibidem (p.222); 1486: Ibidem (pp. 617-8), 1525: Groten (1988, III, p. 266).

31 Examples are 1370: Stein (1895, II, pp. 53-5); 1427: Ibidem (pp. 253-6), 1549: Groten (1990, V, p. 674).

32 Examples are 1418: Stein (1895, II, p. 222); 1486: Ibidem (pp. 610-5 and 617-8).

33 Examples are 1347: Loesch (1907, II, pp. 122-6); 1427: Stein (1895, II, p. 233), 1498: Kuske (1917, II, pp. 778-9), 1595: Militzer (2005, II, p. 577). 1604: Ibidem (II, p. 613).

34 Examples are 1418: Stein (1895, II, p.222), 1486: Ibidem (pp. 617-8.), 1589: Militzer (2005, I, p. 555), 1698: Militzer (2005, II, p. 1017)

35 Examples are 1401: Stein (1895, II, pp. 136-7); 1450: Stein (1893, I, pp. 332f.); 1587: Militzer (2005, I, p. 547), 1675: Militzer (2005, II, p. 872).

36 We found one source from 1365 for horse brokerage, which discusses product information revelation. Other sources

buyer creditworthiness certification only since the 15th century; the first statement dates to 1407, but more frequent statements appear only from the second half of the 15th century.[37] Whereas we find matchmaking activities for all major product types, information about certification was more selective. We find ample evidence for fish,[38] wine,[39] spices,[40] construction materials,[41] and horses[42] but only single observations for textiles, financial products and properties[43]. For credit quality, we find few observations: two for spices and one each for horses, linen, cattle, lead, fur, houses and property. [44]

Using the service of a broker was generally not mandatory. In rare cases, merchants were forced to use a broker. We find some evidence of this for construction materials during the late 14th and early 15th centuries. We find frequent evidence for wood.[45] Furthermore, the compulsory use of brokerage is documented for salt.[46] During the early 16th century, obligatory brokerage for foreigners was frequent for wine.[47] A general brokerage obligation, particularly for foreigners, is repeatedly documented over a longer period, for instance, in Brugge (Giliodts-van Severen 1881); however, this requirement is not observed in this source investigation.

Beside matchmaking and quality revelation, we find scant evidence that the broker was responsible for complementary collection of a general market tax or trade completion tax.[48] Thus, the broker did not regularly extract taxes that created an income stream for the city. However, the town profited indirectly from the brokers when they had to pay a fixed annual lease for their business[49] or a fraction of their brokerage fees.[50]

These rules also detailed the penalties. We find monetary penalties for brokers who did not follow

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start from 1400. Examples are 1400: Stein (1893, I pp. 129f.); 1407 Ibidem, (pp. 157ff.); 1450: Loesch (1907, II, p.53); 1486: Stein (1895, II, p.618f.); for more and later examples see the following footnotes about different products.

37 1407 for horses: Stein (1895, II, pp. 178ff), further examples are 1450 for spices: Stein (1893, I, p.353); 1470 for cattle: Kuske (1917, II, pp. 259ff.); 1489 for houses and rents: Stein (1895, II, pp. 618f.)

38 An example is 1465: (Kuske 1917, II, pp. 153ff.); for a detailed investigation of quality control in fish markets and the role of fish brokers, see Kuske (1905).

39 Examples include 1407: Stein (1893, I, pp. 151ff.); 1427: Stein (1895, II. 251ff.); 1550: Militzer (2005, I, p. 397).

40 1407: Stein (1895, II, pp. 190f.); 1414: Ibidem (p. 217); 1450: Stein (1893, I, p. 360f.); 1486: Stein (1895, II, pp. 607ff.)

41 Examples are 1407: Stein (1895, II, p. 184); 1435: Ibidem (p. 280f.), 1450: Kuske (1917, II, pp.1ff.)

42 1365: Stein (1895, II, pp. 33ff.); 1407: Ibidem (pp. 178ff.).

43 1466 for linen: Stein (1895, II, pp. 412ff.); 1486 for fur: Ibidem (pp. 596ff); 1486 for houses and rents: Ibidem (p. 618f.).

44 For spices 1450: Stein (1893, I, 360f.); 1486: Stein (1895, II, pp. 607ff.); for the other products in the order of the text: 1407: Ibidem, (178ff.); 1466: Ibidem, (pp. 412ff.); 1469: Kuske (1917, II, pp. 259ff.); 1486: Stein (1895, II, pp.613ff.); 1486: (Stein, 1895, II, pp. 596ff.); 1486: Ibidem (pp. 618f).

45 1370: Stein (1895, II, pp. 53ff.); 1407: Ibidem (pp. 187f.); 1427: Ibidem (pp. 253ff).

46 1407: Stein (1895, II, pp. 190f.); 1414: Ibidem (p. 217).

47 1519, 1522, 1523: Militzer (2005, I, pp. 311ff.).

48 1400, 1420: Stein (1895, II, pp. 129f).; 1486: Ibidem (pp. 603ff); 1486: Ibidem (607ff.); 1486: Ibidem (pp.618f.).

49 For example, for cattle 1470: Kuske (1917, II, pp. 259ff.) or oil 1499: Ibidem (p. 792).

50 However, we only document such brokerage fees in a few instances; for example, for lead 1486: Stein II (1895, pp. 513ff.) or leather 1486: Ibidem (pp.603-7).

the rules. When they did not pay the fines or repeatedly violated regulations, brokers were imprisoned for several months or expelled from the city for several years, and they lost their jobs. The heaviest penalties were levied for violating prohibitions on private business and charging more than the specified fees.[51] Similar penalties were imposed on people who engaged in brokerage without permission.[52] The application of these penalties is recorded in the protocols of the city council, which also document investigations of brokers, probationary periods, and dismissals.[53]

3. Brokerage Regulations in Central Western Europe

3.1 Data and Statistical Interpretation

Having analyzed Cologne as a case study, we proceed to a more comprehensive study of Central Western Europe, which mainly covers the Holy Roman Empire north of the Alps. Map 1 depicts all the cities analyzed in this area. We investigate cities that had at least 5000 inhabitants (following Bairoch 1990). Map 1 differentiates cities with and without brokerage regulations.[54] We found approximately 1233 sources that can be categorized into 1609 sets of brokerage regulations for these 70 cities.[55] The information quality of these sources depends on the city and period. For some cities, we have only a few years of documentation; for others, we have centuries of very detailed information. The density of brokerage regulations over several centuries often correlates with the economic importance of the city. In addition to Cologne, we also have long series for Brugge, Frankfurt, Leipzig, Strasbourg, Hamburg and Amsterdam. However, such series also exist for smaller merchant cities, such as Constance or Wuerzburg. Some source texts contain only a few lines while others are several pages long. Some regulations are written in an abstract form, others as applied regulations pertaining to a case. Still others are cases and relate to regulations. The transitions between stages of forms and types of sources are fluid. Therefore, clear differentiation of

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51 Examples include 1335 for grain: Stein (1895, II, p.5); 1365 for horses: Ibidem (pp. 33ff.); 1407 for wood: Ibidem (pp. 87f).; 1465 for fish: Kuske (1917, II, pp. 153ff.).

52 Examples include 1360 for horses: Stein (1895, II, pp. 33f.); 1409 for spices: Ibidem (pp. 201ff.); 1470 for cattle: Kuske (1917, II, pp. 259ff.).

53 Examples include 1410: Groten (1990, I, p. 84); 1484: Ibidem (p. 683); 1527: Groten (1988, III p. 434).

54 The 13th century is a natural starting point, as we do not document any brokerage regulations before this time in the area of investigation. There is fragmented evidence of a type of intermediary, the so-called “Lychtkeuffer” in the southern region of the area, but they do not seem to have had an official legal status or to have been obligatory. Comparable brokerage institutions from the 13th century onwards can be documented in the Mediterranean, particularly in Italian merchant cities during the 11th and 12th centuries. (For an extensive debate, see Laband 1861, Goldschmidt 1882, Toebelmann 1911, Schmieder 1937.)

55 This study is based on a translation and analysis of original edited and non-edited documents containing several thousands pages of documents in various Germanic dialects. This study, which lasted for several years, captured a large share of brokerage documents, which hopefully provides a representative characterization of the period and area under investigation. Of course, such a study can never be complete, and the discovery of new material will further qualify the picture.

types of sources and further categorization is not possible. Consequently, we aggregate the information derived from the original source material.[56]

Due to the fragmented nature of the data, we also provide only descriptive statistics. We examine different types of brokerage functions in different cities and determine whether these observations statistically and significantly relate to time, demographic, geographic and political variables. In addition, we analyze how different brokerage regulations are statistically related to different product types. We report statistical significance tests as chi-square tests for categorical variables and as t-tests to compare the means of continuous variables, such as population size or source year.[57]

The focus of this quantitative analysis is on the three brokerage functions we have identified in Cologne and their role in the sample.[58] We identified brokers as matchmakers, as quality certifiers, and as tax collectors. As matchmakers, brokers received a fixed fee for each match they made, but they were not allowed to buy and re-sell on their own account.[59] In addition, we found that brokers acted as quality certifiers. Here, we differentiate between ensuring the quality of the transacted goods and the creditworthiness of the debtor. Finally, as tax collectors, brokers collected extra taxes that were complementary or directly linked to the transaction. The town could also profit indirectly by receiving portions of the brokerage fees or requiring annual leases for brokerage licenses. This suggests monetary transfers to the town that may have served public goods purposes but may also have reflected rent-seeking activities. In addition to these three functions, we report a regulation that gave brokers the exclusive right or privilege to conduct brokerage business. This is a pre-condition for any of the three intermediation functions. We will report this requirement in the statistics but will not discuss it in detail because it represents a large share of the regulations and follows the distribution of the sample. Interesting variation is observed when comparing the three functions. Furthermore, we will interpret these results in this chapter, but we will discuss these three functions from an economic perspective in chapter 4. Other functions that have been identified in previous

[56] We have to address one specific challenge when weighting the data appropriately because in some cities, sources refer only to one type of product and related regulations and other sources refer to different products with differentiated regulations. To make these sources and regulations comparable and to incorporate different products, we consider the regulations for the different product types in one source separately. (For the identified different products, see sub-section 3.5.) This increases the number of regulations from the actual source documents slightly but gives a more accurate comparative perspective. (However, the overall results do not change w.r.t. the identified differences and statistical significance if we consider the statistics of the original sources without weighting and identifying by product.)

[57] We avoid more advanced econometric investigation due to the fragmented data, the high number of binary explanatory variables and likely strong endogeneity between different variables.

[58] A statistical analysis and comparison of cities with and without brokerage regulations can be found in Boerner and Quint (2016), which also provides a more detailed analysis of the matching design we discuss herein.

[59] In some towns, we find a weaker form of intermediation wherein the broker received fixed fees per match made but no clause forbade private business. We discuss such variations in detail in Boerner and Quint (2016).

studies are small compared to the aggregate number of observations. We will comment on some of these functions in section 6.

3.2 Different Brokerage Designs

Table 1, columns (1) and (2) provide the number of observations for the designs and the number of towns for which these regulations can be documented. We find matchmaking in 32 towns (409 observations) and quality certification in 26 towns (242 observations). Moreover, we find product certification in 24 towns (235 observations) and debtor certification in 11 towns (128 observations). Finally, tax collection is observed in 24 towns (172 observations).

In some cases, these functions are used in combination with other regulations, while in other cases, they are stated exclusively. Table 1 also provides these statistics. The mention of all three functions in one regulation was rare. We document this only 23 times in seven towns. Most of the time, we find matchmaking and certification as complementary functions, a pairing that is observed 124 times in 16 towns. Regulations combined with taxes occur less frequently. The number of the exclusive observations is smaller in each group, but the proportions look similar. It is important to mention that exclusive or combinations of functions in specific city regulations do not generalize to the whole sample of regulations of a town. For instance, in Cologne and Frankfurt, we find regulations for both matchmaking and quality certification; however, there are also regulations for matchmaking and quality certification alone. This finding is also in line with the aggregate numbers. Whereas we find the complementary use of matchmaking and certification in 16 cities, both functions are applied (not necessarily in the same regulation) in 19 towns.[60] In contrast, the exclusive use of one type of regulation in a city over the complete investigation period is rare. The exclusive mention of the broker as a certifier occurs in two towns; as a tax collector, in three. Regulations on matchmaking are found for only eight towns.

These findings confirm previous reports that matchmaking was the predominant brokerage obligation. Furthermore, the application of different brokerage designs in the same town must be investigated. We will later relate this phenomenon to product characteristics, place and time.

3.3 Design and Period

An examination of the timing of the implementation of these regulations yields the following

[60] Such patterns are also found for other (combinations) of rules.

picture. Table 1, column (3) shows the average year for each brokerage design, and column (4) provides the earliest and latest observations.[61] Matchmaking tends to be performed first. We find an average year of 1454, significantly earlier than the average year of the sample. Revelation of quality, with an average year of 1550, and creditworthiness, with an average year of 1609, are introduced significantly later. Taxation, with an average of 1473, occurs slightly later than matchmaking but is not significantly different from the distribution of the whole sample. This order can be confirmed by analyzing the numbers for exclusive implementation of specific types of regulation, showing even clearer results for the earlier introduction of the matchmaking function. We find an average year of 1392 for matchmaking; for taxation, 1468; and for quality revelation, 1528. This exclusive implementation of a regulation can be interpreted as the only function for a specific time and product or, at least, as the specific emphasis of the regulation.

Whereas the average year for the exclusive implementation of a specific brokerage design is earlier than for the average year of all observations for a specific brokerage function, the identified combination of different designs occurs later than the average numbers for all the observations. For example, the most frequent combination matchmaking and quality revelation occurs in 1579. This pattern indicates an increase in the complexity of designs over time.

Finally, if we look at the first and last implementations of these rules, we observe that most regulations can be documented from the beginning to the end of the sample. The exception is credit quality control, which can be observed only from 1406. We see the use of this type of regulation first in the important merchant towns of Frankfurt and Cologne. However, their use can be documented from the second half of the 16th century into the 17th century. Furthermore, cities that had already introduced certification of debtors had already introduced product quality certification regulations.[62]

Consequently, we conclude that the matchmaking and certification functions of the broker were known and used over the whole period, but the emphasis changed. Only the certification of the buyer creditworthiness appeared during this time. The use of a broker as tax collector occurred over the whole period, and the mean and standard deviation are consistent with the whole sample, which indicates no time-specific variation. We discuss the economic reasons for such time-specific effects in the next section.

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[61] The corresponding t-tests compare the differences between the mean of the specific design and the mean of the other observations and can be found in table 1A, Column (1).

[62] The only exceptions are the regulations from Danzig in 1597(Simson 1904), where credit quality control is introduced without the previous or simultaneous existence of product quality certification in any brokerage regulations.

How consistently these regulations were implemented is more difficult to determine from an aggregate perspective. For Cologne, we document a regular implementation after the first evidence for the complete period of source coverage. Such dynamics can also be observed in other cities for which we have long-run data, such as Frankfurt, Hamburg, Leipzig and Constance. Further generalization is not possible.

3.4 Design, Demography, and Geography

In their comparison of cities with and without brokerage regulations, Boerner and Quint (2016) show that cities with brokerage are larger,[63] more likely to be located on water trade routes (sea or river access), and have more trade routes[64] passing through the city than places without brokerage. All these variables indicate stronger trade activities, and therefore, the statistically significant relationship indicates that brokerage regulations corresponded with and likely supported trade activities. Can these city characteristics identify and explain differences in brokerage functions?

Table 1, column (5) compares brokerage functions and shows that tax collection is performed by brokers in smaller towns, on average (i.e., those with approximately 16,000 inhabitants). This smaller size can also be confirmed for any tax collection combination. The average size of cities with this regulation deviates significantly from the average population size of the whole sample (approximately 35,000); these towns are clearly smaller than those that rely on the matchmaking function (a population size of approximately 39,000) and product certification (35,000).[65] The cities with combinations of both are larger (approximately 42,000 inhabitants) than those with single observations and are clearly larger than any other combination. Only cities that rely on creditor certification are larger (49,000 inhabitants).

Assuming stronger and more complex economic activity in larger towns, the observations for these trade-supporting brokerage regulations are in line with the results in Boerner and Quint (2016). The smaller average population of cities with a tax collection function may have two explanations. On the one hand, smaller cities with less trade interest might use the broker solely as a tax collector, while larger trade towns had less interest in enforcing taxation mechanisms, which might deter merchants from visiting the town. On the other hand, larger towns were probably accustomed to higher trade volumes and used specialists to collect taxes. Smaller towns were more likely to allow

[63] To compare city sizes, the Bairoch (1988) population data have been used. These figures are approximations, and the resulting statistics can only be used to approximate a comparative perspective.

[64] For access to water trade routes and the number of trade routes (inclusive of water trade routes) passing through a city, see Putzger (1956), p.70.

[65] The corresponding significance tests are reported in table 1A, column (2).

a broker to fulfill several functions in one role.

As 89% of the towns with brokerage regulations are located along rivers or seacoasts, there is not much water trade route variation in the sample, which might explain differences in brokerage designs. It is worth mentioning that the likelihood of implementing creditor certification, as well as both matchmaking and quality revelation, in one regulation was higher in seaport towns. These results are in line with previous observations: seaport towns tend to be larger and to have stronger economic activity. In contrast, harbor cities are less likely to use brokerage for its tax collection function. This difference might reflect a weaker interest in any type of collection activity but may also reflect a large volume of goods entering and the need for specialists to collect different taxes.

The geographical distribution of cities with different types of brokerage designs is in line with these results. Whereas the matchmaking (map 2) and certification (map 3) functions are equally distributed among cities with brokerage regulations,[66] towns with trade-supporting brokerage and matchmaking and certification functions (not necessarily combined in the same observation) were located near important trade areas during the period under investigation. We find strong evidence in the catchment area of the Rhine, with observations dating at least to the 14th century. We have evidence along Rhine in Switzerland and southern Germany, from Constance, Basel, Schlettstadt, and Strasbourg down to Worms, Koblenz, Cologne, Dordrecht, Middleburgh, and Antwerp. Furthermore we have evidence along the tributaries of the Rhine along the Mosel River in Trier and the Main River in Frankfurt, Würzburg, and Nuremberg and along a land route extension to the Main connecting Southern German cities to Italy. Other observations start in the 16th century either along the coast (Amsterdam, Hamburg, Danzig) or in the eastern (Leipzig and Breslau). These observations are in line with the differences in regional importance over time. The north-south axis along the Rhine has been one of the most important economic regions since the Middle Ages (Irsliger 2010), while coastal cities gained in importance during the 15th and 16th centuries, which was also related to the rise of Atlantic trade. Finally, eastern cities, such as Leipzig, Breslau or Danzig, prospered during the early modern period (Kellenbenz and Walter 1986).

The use of a broker as a tax collector, however, seems to have been a regional function (map 4), which we find mainly in towns in Flanders, Zeeland, and South Holland and in southwestern Germany. In the latter region, this function was also apparent in smaller towns, which might explain

[66] Some Hanseatic towns along the Baltic and North Seas, particularly during the 14th and 15th centuries, seem to be outliers. In these cities, we find less frequent restriction of brokers from private business. As outlined earlier, these cities belong to a group for which we find a weaker form of intermediation.

the significantly smaller population observed for this function.

3.5 Goods and Designs

Furthermore, we differentiate the observations by product types (table 2).[67] We find brokerage for basic foodstuffs, such as grain, fish, cattle, meat, wine, beer,[68] oil, fat and butter.[69] In addition, we find brokerage for spices and dyes. Another set of products includes goods from the textile industry, such as raw textiles (in particular, wool, linen, fustian, and later, cotton), cloth, fur, skins and leather. Next, brokers for construction material can be found, which includes wood, bricks, and metals (iron, copper, tin, lead, and quicksilver). Then, we identify brokerage for finance, which includes bills of exchange, rents, and insurance, as well as silver and gold. Finally, we find brokers for property: land, houses, and inheritance. All groups but the latter are brokers for wholesale trade.

We find all of these product groups from the very beginning of our study period until the 17th century. We also detect variations in their frequency over time.[70] Brokerage regulations for construction materials, financial products, and houses are observed significantly later than the average of sample period. Food products (with the exception of fish), horses, and textiles (cloth and raw inputs) are observed earlier than average, where textiles are significant. This pattern might be explained by the importance of some products and information asymmetry that characterized certain markets over time. Whereas the organization of food markets and textiles supported and secured the basic food supply and the distribution of input goods for the local producing manufacturing industry in earlier times (Hibbert 1967), respectively, the development of financial markets (Denzel 2008) and the growth of cities subsequently created a need for brokers for financial products, construction materials, and property.[71] The later, more frequent observations of brokers for construction materials can be explained by worsening wood shortages due to deforestation during the late 15th and 16th centuries (von Below and Breit 1998; Radkau and Schäfer 2007), which might explain the creation of an official intermediary to improve (and potentially control) the allocation process.

Furthermore, the geography of brokerage regulations can be extended to specific types of products.

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67 We present these products as they are grouped in the documents.

68 Normally, either wine or beer is mentioned, depending on the region.

69 Butter gains prominence over time.

70 The average period for each product type can be found in table 2, column (3); the earliest and latest observations, in column (4). The corresponding significance tests comparing means are reported in table 2A, column (1).

71 These results also fit with the city sizes: these three product types can be found in larger cities. On the contrary, the observations for the other product types are smaller with the exception of grain (which is linked to seaport towns, which tend to be larger).

For instance, we find grain brokerage along the coasts of the North and Baltic Seas (map 5) (and, thus, along the shipping routes from producing areas in the east to consuming towns in the west) (van Tielhof 2002; Jahnke 2015, pp. 215ff.) and wine brokerage along the wine-producing areas (map 6) and trade routes of the Rhine, Main, and Mosel Rivers (Volk 1993; Rose 2011). The descriptive statistics support these findings.[72] The likelihood of grain brokerage increases when a town is located on the sea. Additionally, the share of wine brokerage among river towns is higher. Furthermore, we find brokerage for construction materials almost exclusively along water routes. Bulky construction material might have been transported via these water trade routes as occurred historically in the transportation of wood, which was normally floated down rivers (von Below and Breit 1998, pp.38f.). Then, we find brokers for horses in towns where many trade routes intersect, rarely observing them in coastal cities.[73] Horses were used for transportation along land trade routes. The same logic can be applied to cattle, which was driven along land trade routes to regional markets (Westermann 1979). Again, we find that a high mean of the number of transportation routes increases the likelihood of cattle brokerage, with a corresponding a very low likelihood along the seaside. Finally, we find a similar pattern for fish brokerage: a lower likelihood in seaside towns and a higher probability along river towns with many intersecting trade routes. This pattern might be surprising at first glance because a large share of the consumed fish came from the North and Baltic Seas (Sicking and Abredu-Ferreira 2009). However, the need for intermediaries to improve the allocation due to information asymmetry might have been higher in intersecting inland towns, where ships from the Baltic and North Seas (via river trade routes) met local demand and wholesale traders organized distribution along land trade routes, than in seaside towns where local fish markets could satisfy demand directly. Kuske (1905, pp. 227ff.) applies this argument to the success of inland Cologne, one of the largest wholesale fish markets at the time.

The list and interpretation of products could be extended. However, the main insight is that the geographical location of brokerage for specific product types indeed matches the trade geography of the time.

The population effects of different products are not very significant.[74] We find smaller populations

[72] The percentage of cities located on a river or by the sea and the average number of trade routes passing through a city for a specific product type can be found in table 2, columns (7)-(9). The corresponding significance tests of the statistical relationship (chi-square tests) can be found in table 2A, columns (3) and (4), and the comparisons of different means for the trade routes are in column (5).

[73] A higher number of trade routes typically proxies for an increase in the number of land trade routes. Rarely does more than one river pass through a town or city on the seaside, and the directions and trade routes are limited by the sea.

[74] The descriptive statistics can be found in table 2, columns (5) and (6) and the corresponding significance tests in

for cities with brokerage for products such as horses, cattle, and fish, which are related to locations with more trade routes and, consequently, to a higher number of land trade routes. These cities tend to be smaller than cities along sea trade routes, which is related to their potential for trade. Furthermore, cities with wine brokerage are significantly smaller because brokerage existed in many small, wine-producing towns in the southwest part of this area, which were less engaged in other trade activities and had less growth potential. Finally, cities with brokerage in finance were significantly larger than average cities with brokerage. Again, this is because larger cities with more trading activity had a greater need for a specialized financial markets and brokers.

We see other interesting variations if we analyze the importance of brokerage designs for different product types.[75] Matchmaking brokerage policies were related to raw textiles and to the fur, skin, and leather product types. Furthermore, we find significant relationships with wine and beer, construction materials, and finally, products that were traded in warehouses, such as spices, dyes, metals, oils and fats. The next section offers a more detailed economic explanation.
Product quality certification is significant for fish, cattle and meat, and construction materials, while buyer creditworthiness is more closely related to valuable categories, such as spices, dyes, furs, skins, property and financial products. However, we also find evidence for wine and beer.

Finally, we find the use of brokers as tax collectors for easily transportable goods, such as cattle and horses, or products with decentralized trade, such as wine, which was sold in wine cellars, and grain, which was often sold in many places at the same time. Horses can be assigned to this category because they were infrequently centrally traded. (We will provide further evidence for the case of Cologne in section 5.) Thus, the evidence indicates that this brokerage function was used where business transactions could be conducted non-centrally and quickly, the products were easily (re)moved, and the collection of taxation could be problematic.

Other Effects: Design and politics

In a complementary study, Boerner and Quint (2016) show that political institutions can account for brokerage regulations, which are more likely to be found in Free Imperial Cities and university towns than in territorial and bishop cities. This supports the idea of brokerage as a trade-supporting institution and points to the importance of educational institutions, which produced town officials who could read, write, and enforce regulations (Cantoni and Yuchtman 2014). Along this line, we ask whether (political) institutions had an effect on the formation of brokerage designs. However,

table 2A, columns (2).

[75] The descriptive statistics and significance tests can be found in tables 3 and 3A.

the observed variation is not strong and, thus, the explanatory power limited.[76] Whereas the implementation of brokerage regulations seems to have been politically motivated, variation in brokerage regulations can be explained in terms of product markets, trade routes, and time effects.

4. An Economic Interpretation

Having identified these three types of city regulations on an aggregate level, a more detailed economic interpretation needs to be provided. We begin with a discussion of the benefits of an official intermediary matchmaker.

The meeting of buyers and sellers in a medieval or early modern town was characterized by various matching difficulties. Sellers offered a variety of horizontally and vertically differentiated products. Textile products are a good example. Here, we can find the creation of new types and product standards in European regions, which was driven by competition and steady demand for new types of clothing (Munro 1998, 2003). Another example is the influx of exotic spices that needed to be matched to developing demand for new flavors (Freedman 2008). In addition, many products, such as wine, horses and cattle, are unique or have a unique qualities (Volk 1993; Rose 2011).

Furthermore, merchants might have different preferences over the values of the goods purchased or sold. Whereas all sellers must have been happy to receive high final selling prices, buyers had a preference for low purchase prices. Two sellers of similar products might had different minimum selling prices due to production or transportation costs; buyers could also have different reservation prices due to variations in tastes or future processing costs (e.g., if they used these products as intermediate inputs). Such a variety of qualities and price preferences[77] can create matching problems between buyers and sellers. Consequently, if merchants meet randomly in a decentralized fashion, the likelihood of striking a deal decreases due to expected price/quality mismatches, and potential welfare gains cannot be realized. Thus, the huge variety of product quality, preferences, and tastes might explain the statistically significant relationship between the matching brokerage function and some product types.

In addition, a bilateral meeting of buyers and sellers creates the need to bargain and agree on a clearing price. In such a process, incomplete information creates incentives for merchants to hide their preferences: buyers have an incentive to underreport their reservation price and sellers to

[76] We do not present or discuss these results in detail.

[77] A counter argument for such price variations would be that prices on medieval markets were often fixed and regulated. However, there is little evidence of this in wholesale markets.

overreport their reservation values, thus creating additional trading problems and leading to fewer matches.[78] The existence of such a bargaining space due to incomplete information can indeed be derived from some brokerage regulations in which brokers are reminded not to reveal information to one party to increase bargaining power to increase or decrease prices. For instance, the broker should not reveal that one side urgently needs to buy or sell, is rich or poor, or is uncertain if about the purchase.[79] In addition, the lack of public price information that fostered such asymmetry can be derived from the fact that official price lists evolved over time; starting mainly in the 17th century, official brokers were in charge of creating such lists.[80]

A complementary issue to this matching problem is that merchants pay search costs to find the best match. Buyers searching for a product incur travel costs, as well as costs to learn the prices and compare product characteristics. Seller search costs include finding the right buyers, as well as communication costs to promote their quality and type of goods.[81] Furthermore, in an environment where time is limited by merchants' travel (as they only stay in towns for a short time), the number of products is limited and re-selling is restricted, congestion in the transaction process can lead to sub-optimal matches. A merchant might decide not to inspect another seller's offerings or to not wait for a more willing buyer because this increases the risk of losing a better deal or not selling anything because the potential trading partner completes the business transaction with somebody else. Thus, fewer matches are created than would be possible because some sellers and buyers cannot locate the quality or price match they need, even if such pairs exist. In addition, not all matches are efficient because some buyers would have been willing to pay a higher price and other sellers would have been willing to sell for a lower price.[82] Such an environment can be for instance observed in wine markets, where buyers have to visit different wine cellars whose quality differs and amounts are limited, which makes comparison was costly, less transparent and not possible to do simultaneously. Some brokerage regulations for wine explain in detail how brokers should gather information about wine selling in different locations and guide buyers through wine cellars to

[78] Economists have shown that such a bilateral trading environment leads to inefficiency (Myerson and Satterthwaite 1983). The problem only decreases with an increase in the market size (Gresik and Satterthwaite 1989).

[79] For instance, see the brokerage regulations from Frankfurt 1450: Bücher (1915, pp. 249ff.); 1685: Beyerbach (1818, pp.700ff.); from Cologne 1427: Stein (1895, II, p.235); from Basel 1406: Schnell (1856, pp. 88-90); from Constance 1395: Feger (1955, p.156.), 1433: ibidem (p. 114); from Breslau 1670: Heymann(1898, pp. 383f.); or from Leipzig 1689: Moltke(1939, pp.11f.)

[80] For the evolution of price lists, see McCusker and Gravensteijn (1991); for specific regulations on the creation of such price lists by brokers during the 17th century, see for example, Hamburg or Amsterdam.

[81] For a general discussion of search costs in economic models, see Spulber (1996).

[82] For an economic discussion of this argument, see Roth (2008). Economists would now identify such allocation problems in heterogeneous specialist labor markets, where job market candidates are only available for a short time and often unique, efficient matching pairs can be created. However, medieval markets with heterogeneous non-standardized products, re-selling restrictions, and travelling merchants with short stays in foreign cities created a similar environment.

support the searching and matching process.[83] Thus, the significant statistical relationship between wine brokerage and matching might be explained by such allocation problems (beside the broad variety of wine offered on the market).

Therefore, a specialized and better-informed broker can reduce search and bargaining costs and create market-clearing matches. This is beneficial to the merchant as long as the gains from trade exceed the matching fees and the broker has an incentive to create more efficient market-clearing matches through his information. Gelderblom (2013) shows that brokerage fees were indeed low compared to transaction prices. Boerner and Quint (2016) analyze the observed brokerage matching design in this sample and argue, based on a formal institutional analysis, that brokers have incentives to create market-clearing matches and welfare efficient allocations. This incentive is driven by the fact that brokers profited only from matching fees and could not participate in the business themselves to extract a surplus.[84] Furthermore, Boerner and Quint (2016) show that brokerage design reduces the incentives of merchants and brokers to act strategically, which would reduce welfare gains. Consequently, the implementation of such forms of matchmaking by the town makes visiting the town more attractive to foreign merchants and participating more attractive to the local merchant because it improves the allocation and increases the surplus participation of the merchant. This can increase ex ante incentives to invest in trade activities due to higher expected profits. (In contrast, if a merchant does not expect to participate in the surplus division, he has no incentives to invest in trade or to visit the market town.)

Having derived such welfare-improving effects of the implementation of official brokers to function as matchmakers, we need to ask whether private intermediaries (matchmakers or market makers) could have achieved the same effects.

Economic policy in the Middle Ages was commonly concerned that powerful intermediaries could interfere in demand and supply (Hibbert 1967). Assuming strong information asymmetry and the potential economic and political power of some local merchants, such interference could have led to collusion, monopoly power and surplus extraction of a few. In addition to the frequently documented fear of official brokers doing so, evidence from market regulations exists that private intermediaries tried to buy up products before they passed town gates, entered harbors, or markets opened. Only after the market had cleared were private intermediaries allowed to buy leftovers.

[83] For example see the orders from Constance 1542: Kimmig and Ruester (1954, pp. 182ff.) or Heilbronn 1500: Jäger (1828, p. 146).

[84] This result also holds if merchants are forced to transact via a broker, as discussed in the next paragraph.

These actions were forbidden for everybody and harshly punished.[85] Consequently, the power of some private intermediaries could have easily destroyed welfare gains. Furthermore, the implementation of official intermediaries could have been useful in markets with temporary shortages, such as wood, or where weak transparency was likely, as in wine markets. Such incentive problems might have decreased during the early modern period when increases in population, markets, and trade flows created sufficiently thick markets and reduced information asymmetry. Indeed, during the 17th century, a critical number of unofficial but partly tolerated private intermediaries existed in growing cities, such as Amsterdam, Hamburg, Leipzig, or Nuremberg, and were engaged in documented brokerage activities.[86]

Finding the right type of good might be difficult because buyers are not able to determine the true quality of the goods. The existence of such information asymmetry and strategic use has been outlined in brokerage regulations reminding official brokers not to certify low-quality goods as high quality. Such information asymmetry can create incentives for sellers to offer low-quality goods at premium prices by advertising them as high quality. A buyer who expects such behavior is not willing to pay for high-quality goods. Thus, merchants of high-quality goods cannot sell anything and in turn stop coming to the town or producing this type of good even though there are people who would buy them.[87] Such information asymmetry thus creates welfare losses. The same is true when sellers would like to sell on credit but too many low-quality debtors exist; the inability to differentiate good from bad creditors reduces credit, and fewer transactions are executed. The introduction of a broker who is an expert in product quality and creditworthiness can solve this problem. If he is able and willing to reveal this information for a small fee, real gains in quality based on product differentiation can be achieved, and the benefits of credit markets can be realized.
The implementation of brokers who certified creditworthiness is reported for high-value products. Thus, assuming that wholesale or high-value product trade relied on credit, the introduction of an intermediary occurred where it created the largest gains. Product quality certification played a role in consumable products, where quality was crucial; consider, for example, the statistically significant relationship for the fish, cattle and meat, and wine and beer categories. The second significant group of products is construction materials. Here, a shortage of high-quality wood, which was critical for building houses and ships, might have been an issue. Thus, sellers could have had incentives to sell poor-quality goods at premium prices.

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85 For Cologne's grain markets, see Kuske (1917, II p.334, 338); poultry: Ibidem, (p.467f.) wine: Ibidem, (p. 822f.).

86 For Amsterdam: Noordkerk (1748, vol.2, pp.1060-3); Hamburg: Beukemann (1912, pp.545-61); Leipzig: Moltke (1939, p.14f.), Nuremberg: Roth (1802, p.338).

87 This scenario is modeled in the well-known market for lemons paper by Akerlof (1970) describing a used car market.

We can ask again why cities had to intervene and appoint official brokers as certifiers for product quality. Economists argue that the incentives should come from the suppliers of high-quality products (Grossman 1981; Milgrom 1981).[88] Indeed, is there evidence that traders created brands for their products. However, with branding came imitation (Kaiser 1987). Thus, buyers still needed experts who could distinguish originals from imitations. Furthermore, having both vertically and horizontally differentiated products and heterogeneity of tastes makes it difficult to establish common quality standards (Harbaugh et al., 2011). Alternatively, we might expect private certifiers. However, we do not observe the existence of such private agents. One problem is that such agents would have conflicts of interest: A problem identified in the literature on contemporary markets is that sellers can shop for certifiers who are willing to assign high rankings to their products, creating incentives for the certifiers inflate their ratings to obtain future business. On the contrary, reputation mechanisms on the certifier and buyer sides are hard to achieve because buyers are less informed about product quality and/or may learn slowly (Bolton, et al. 2012; Mathis et al. 2012). Consequently, having an official certifier who is under the control of the town might be a more efficient solution.

Having outlined the welfare-improving effects of brokerage as a matchmaking and certification function, we must now discuss whether brokerage was a rent-seeking institution. Following Tullok (1967) and Krueger (1974), such an institution extracts rents with the help of political power without being productive.

The collection of taxes is one candidate for rent seeking. Indeed, we find that this task is quite frequently mentioned in specific regulations,[89] appearing in some regions more frequently than in others. However, rent seeking assumes that collected payments go into the pockets of private persons and that merchants do not benefit from any public goods provided by the town, for instance, in the form of infrastructure or legal security. Examining the allocation and distribution of taxes and fees in general and of brokerage in particular is beyond the scope of this study.

Whether the payment of brokerage fees by buyers and sellers for matchmaking or certification activities can be considered rent seeking has not yet been discussed. Neither the use of brokers nor the payment of their fees was usually required; moreover, the fees were low and related to welfare

[88] However, this is costly only after a certain threshold value. See Grossman and Hart (1980).

[89] However, we only observe the exclusive use of brokerage as a taxation device in two towns, Heidelberg and Kassel, both of which were primarily residential rather than trading towns.

improving activities. Thus, demanding these fees could not have reflected rent-seeking activity. However, we find evidence in a few prominent merchant towns that foreigners were forced to use brokers. For example, in Brugge, such regulations are documented from the 13th to the 15th centuries. Only a few merchants were granted exemptions (Gilliodt van Severen 1881). In an examination of Brugge, Gelderblom (2013) argues that this was not a serious problem because there were only a few minor complaints, probably because fees were low and merchants received matching services. In addition, because in Brugge many brokers were also hostellers, this was an integral part of the transaction process for merchants.

Furthermore, we can document cases such as Cologne for which temporary forced use of brokerage occurred for select products either for everybody,[90] or only for foreigners.[91] In these cases, rent-seeking activities (based on the political power of some brokers) are possible. However, forced brokerage policies might also be motivated by the desire to monitor the allocation process, for instance, to control scarce products, as in the wood market of Cologne. Finally, in some earlier regulations, brokers were not allowed to arrange deals between foreigners,[92] to arrange only a limited amount,[93] or to arrange them only after a set period.[94] However, such regulations are rather restrictive profit-seeking than rent-seeking devices.[95]

Following this economic interpretation of the observed brokerage regulations, we can derive some interesting insights into the evolution of the business environment and the market microstructure. The emphasis on different institutional mechanisms at different periods might reflect different types of information asymmetry. The earlier role of brokers as official matchmakers can be explained by a need to find the right trading partners. Once trade flows have been established and institutionalized,

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90 For example, see the regulations of Frankfurt 1380 for hay: Buecher (1915, pp. 225f.); Dordrecht 1401 for wine: Fruin (1882, I, pp. 35ff.); Constance 1526 for cloth and fustian: Kimmig and Ruester (1954, p. 91).

91 For example see the regulations for Constance 1508 for wine: Kimmig and Ruester (1954, p.85), for Frankfurt 1381 for wine only if the deal was done outside a wine cellar: Buecher (1915, p.326ff.).

92 See Bruinswick 1320: Hänselmann (1900, II, pp.516f.); Hannover 1360: Fiedeler (1876, p.79); Greifswald 1433: Pommersche Jahrbücher (1901, pp. 119ff.); Danzig ca. 1460: Simson (1904, pp.42f.) The only later rules w.r.t. this type of regulations are from Hamburg 1589, 1606, and 1642: Beukemann 1912, pp. 541-5. However, in the frequent regulations from the second half of the 17th century, such regulations have disappeared.

93 See the regulations on wine brokerage in Frankfurt 1349: Wolf (1969, pp.84ff.), 1350, 1351: Bücher (1915, pp. 323ff.), 1381: ibidem (pp. 326ff.). Here, except during fairs, brokers could intermediate only limited amounts of goods between foreigners.

94 See the regulations from Luebeck 1410: Urkundenbuch der Stadt Lübeck (1858, Vol. 2, p. 765) and Leipzig 1464: Moltke (1939, p. 6).

95 Such constraints do not affect the broker's incentives to create market-clearing matches given the matching options available (under the assumption that the broker acts as a matchmaker as described in the large number of brokerage regulations documented). However, they may have affected clearing efficiency because in a larger set of potential buyers and sellers, a foreigner might have been willing to offer a higher buying price or lower selling price for a given level of product quality. For some matching pairs, such constraints might have created a higher share of the surplus for the local merchants than would have been generated by trade.

a broker is not needed as a matchmaker. However, with the growth of trade volumes (often related to a need for the inspection of product samples) and an increase in the variety of products, the demand for brokers as certifiers increases. Finally, the later use of brokers as verifiers of buyer creditworthiness implies the development of a more prominent credit market and the creation of new types of information asymmetry. Over time, this is consistent with more frequent observations of brokers for financial instruments. In addition to to this time dimension, we can identify the importance of different forms of regulation for specific product types, which clarifies the differentiated information structures of business environments.

5. Further discussion

Analyzing different brokerage mechanisms is interesting, but it is important to understand these mechanisms within a more complete frame of medieval markets and market mechanisms. We cannot do this here for the whole sample, but we can more closely examine the city of Cologne.

We identified matchmaking as the main brokerage function. Alternatively, medieval spot markets where buyers and sellers meet at a specific place and time might also solve matchmaking problems. Spot markets can be housed in open-air markets, halls or warehouses. Such markets have been regularly documented. Spot markets aggregate demand and supply and thus also aggregate information, create transparency, and reduce strategic behavior if the market is sufficiently large and homogeneous. These features can also reduce search, match, and bargaining costs. For some types of products, these markets were also subject to staple rights, which forced foreign merchants to display and offer their products for a designated number of days before moving on (Kuske 1939).

Let us analyze how brokerage of the main product types identified relates to organized spot markets in Late Medieval Cologne. We can distinguish three categories: 1) brokerage where no spot markets can be found; 2) brokerage as a complementary function in an organized spot market; and 3) brokerage as an alternative form that parallels a spot market.

The first category of products for which we cannot find centralized spot market includes houses and property, financial products, and wine. The missing spot market for houses and property can be easily explained by the lack of transportability of these products. Thus, real estate brokers are needed for matchmaking. Cologne had an emerging market for financial products. By the Late Middle Ages, a differentiated rent system had developed and a growing market was documented (Kuske 1956, pp. 99ff.; Schönfelder 1970, pp. 63ff.). Furthermore, bills of exchange were regularly

used (Kuske 1956, pp. 96f.), and gold and silver coins were used as currency (Kuske 1956, pp. 170ff.).

However, we do not find all-encompassing centralized markets for these products. The first attempts to establish exchanges date to the late 16th century, when merchants asked the town to provide a space where they could meet informally to conduct business (Helten 1923). At the time, the only central place was used by money changers (Keussen 1910, Tafel II). Before the 14th century, Lombard houses existed and were possibly locations for more concentrated financial transactions (Kuske 1956).

The reason for such missing markets might lie in their developing character. Financial instruments were generally not tradable until the late 16th century. Thus, this market was rather heterogeneous and thin, and using a broker was a more flexible and convenient choice. Furthermore, credit markets related to merchants and wholesale markets for consumption products were organized alongside the product transactions. For instance, the cattle market was accompanied by the so-called *Viehtafel,* an institution where credit and bills of exchange related to the cattle trade were issued (Kuske 1903, pp. 99). Thus, the separation of the good from the financial market had not yet taken place.[96]

Cologne had one of the largest wholesale wine markets in the region (Herbron and Militzer 1980; Uytven 1965). The steady documentation of wine brokers fits very well into this picture. However, there is no evidence of a centralized marketplace or warehouse for the clearing of wine barrels. Kuske (1903, p. 109) argued that wine had to be quickly unloaded and brought to wine cellars; otherwise, it would have affected the quality of the wine. Therefore, building a warehouse or spot market for wine would not have been helpful. Brokers who showed buyers around different wine cellars adequately identified matches, thus precluding the formation of a central marketplace. In addition, many local wholesalers imported wine from wine-growing areas. Therefore, a market that served importers and local wholesalers was a less acute need (Herbron and Militzer 1980; Uytven 1965).

In the second category of products, the brokerage function was nested within a centralized spot market. This category includes wholesale products that were traded in warehouses (Kuske 1903, pp, 122ff.). In the warehouse at the *Alte Markt* (old market), later known as the *Leinenkaufhaus* (linen warehouse), linen, yarn, foreign cloth, fur, leather, and various metals were traded during the 14th

[96] However, at least since the 17th century, bills of exchange from the cattle market in Cologne were traded in Amsterdam (Kuske 1903, p.99).

century. This was the only place where these goods could be sold. Brokers assigned to different products had to be present during the warehouse opening hours and had to serve the merchants if they were needed. During the 15th century, some were transferred to another warehouse due to a lack of space, but the clearing mechanism stayed the same. Thus, we find centralized spot market housed in warehouses with complementary brokers.[97]

Similarly, a second large warehouse, the *Malzbüchel*, which was founded at the end of the 14th century, housed trade in spices, dyes and different types of metals, and the corresponding brokers were required to be there. Interestingly, we find the first brokerage regulations for spices around the same time as the foundation of this warehouse. There is some evidence that in the *Domwage* (the weighing house at the cathedral), spices were already being traded in the 14th century without participating brokers. It seems that with an upswing of trade, more structured clearing was organized. Furthermore, there is evidence that oil, fat, and butter were also traded in this warehouse during the 16th century. Whereas butter and fat had previously been traded in the fish warehouse, oil cannot be clearly traced back to any other central facility (Kuske 1911, pp. 40f.). Brokerage for these types of products can be found beginning in the late 15th century. If the brokerage activities were related to warehouse activities, this cannot be fully derived from the sources, but can be assumed because these products were also not allowed to be sold elsewhere.

More evidence of this type of complementary structure of spot markets and brokerage can be found for the food market. By 1426, a fish warehouse had been established (Kuske 1905, pp.288ff.), and all wholesale activities had to take place there. We find fish broker regulations from 1450, which pertain mainly to the warehouse. In addition, the brokers had to supervise retail fish markets. Before the 15th century, the wholesale market was probably the open fish market where retail sales also took place.[98] Another centralized market was the weekly (and annual) cattle market (Kuske 1903, pp. 95ff.). On this market, butchers, and sometimes private sellers, bought cattle for slaughter. This was the only market where trade was allowed. We have evidence of this market from the early 15th century. The presence of brokers, who had to be present while the market was open to offer their services, has been documented regularly since 1450. Grain was also sold at several centralized markets in town. The few brokerage regulations indicate that they were used, but it seems that there

[97] This pattern might also shed light on the significant relationship between the matchmaking function and warehoused products. The explanation is related to the appearance of complementary institutions. However, in this case, the use of warehouses per se still needs to be explained, which can also be linked to the improvement of the allocation mechanism related to the arguments outlined in section 4.

[98] Another group of goods, oil, fat, and butter, was traded in the fish warehouses and later transferred to the "Gürzenich" warehouse (Kuske 1911). Over the same period, brokers are mentioned but regulations do not refer to warehouse. However, the source material indicates that all these products had to be traded in warehouses, and we can infer that these brokers also provided intermediation in the warehouses. Thus, these brokers belonged to the third group.

was little need for grain brokers at this grain markets (Kuske 1903, pp. 103ff.).

Finally, the third category includes brokers operating beside spot markets. For example, a horse market was held at the *Neue Markt* (new market) once a week. However, horse trading was not restricted to this market, and deals could take place elsewhere in town (Kuske 1903, p. 118.). The market for wool was less organized. There was a central selling house for wool, the *Wollküche*, but wool could also be traded in homes (Kuske 1903, pp. 131ff). We can document wool broker regulations, but cannot link them to a centralized spot market. Furthermore, for construction materials, such as wood or bricks, we find partly centralized markets with brokers. However, some wood was directly sold from ships because merchants faced logistical challenges in transporting their goods to the market. Thus, in addition to their activities on spot markets, brokers were engaged in intermediation in markets beside the ships (Kuske 1903, pp. 112ff.).

Having discussed the markets for which we could identify brokerage most frequently, we can ask whether any important wholesale market remain for which we do not find brokerage but do find spot markets.
We know of a large centralized coal market in Cologne, (Kuske 1903pp. 105ff.), but no coal brokers can be found. We also find evidence that coal sales could be decentralized after the central market.

The second and third functions we found are quality control and tax collection. Again, we can ask whether other institutions performed these functions. In Cologne, we find a whole group of officials, who measured, weighed or simply counted goods that were for sale. Such controls were motivated by tax collection. The literature also clearly shows that taxes had been collected since the 14th century for all these products (Kuske 1914; Schönfelder 1970). However, such measuring procedures also helped to reveal product quality because officials verified the accuracy of the declared amounts and quality by opening packaging. Furthermore, because products of varying quality and size had different tax values, the controls revealed a basic product differentiation related to quality. This measurement and weighing can be found for most product types on the Cologne market, although we do not find that officials regulate horses, finance, or property sales.
Naturally, the next question is how these tasks differed from the quality inspection provided by the brokers we could assign to Cologne. There are two ways to differentiate their tasks and to explain their co-existence. One is the more sophisticated quality control task of the broker. For example, whereas a wine broker needed to taste wines to assess their quality, a wine controller (*Weinröder*) merely counted the barrels and checked whether and how much of a certain type of wine was present in a barrel (Kuske 1914, p. 22). A fish broker had to inspect fish in detail to judge whether it

was fit to consume, while other fish inspectors (for instance, the Heringröder) only opened herring barrels to check the amount, type and declared origin of the goods before sending them on to the market or warehouse (Kuske 1905; 1914, pp. 46ff.). For spices, the broker needed to have differentiated expertise. Again, the complementary inspector (the *Siebknecht*) only checked the general content (Kuske 1914, pp. 69ff.).

A second explanation could lie in the decentralized trading of some goods, such as construction material (Kuske1914, pp. 19ff.) or for horses where no complementary controller can be found in the historical sources. Thus, in this case the broker steps in and inspects the goods.

Furthermore, we can ask whether other institutions also checked buyers' creditworthiness. From the literature, we can only identify one institution, the so-called *Viehtafel*, where town officials related to the cattle trade checked buyers' creditworthiness and allocated credits for buyers and, later, specific bills of exchange, which were also traded in 16th century Amsterdam (Kuske 1956, pp. 80f.).

Finally, could these officials have offered brokerage services? Kuske (1914, p. 60f.) speculates on the role of *Kornmüdder* (inspectors who measured grain), and finds some evidence from the late 16th until the early 18th century. Furthermore, he finds a source indicating that *Kalkmüdder* (who measured limestone) in the 18th century were involved in intermediation. Whereas the market for lime is marginal during our investigation period, the observations for the grain market are of some interest because we do not find many sources on grain brokerage in Cologne, perhaps due to the fact that these grain measurers did indeed provide brokerage. However, we find scant evidence of an either official obligation or occasional brokerage activities in the sources. What can be documented from these sources is that these inspectors and measurers also tried to use their positions to engage in private business, which was strictly forbidden by the town of Cologne.

Thus, from this study of the market microstructure of Cologne, we can conclude that brokers indeed played a prominent matchmaking role in most markets. However, their complementary role in spot markets and warehouses must also be taken into account. With regards to quality control, we see that different types of quality control were at work. Thus, we might ask whether a subsequent study might more precisely describe the interplay of brokers and other officials who counted, measured, and weighed products. Judging the role and importance of brokers in establishing the creditworthiness of buyers based on this case study of Cologne is difficult. It seems that such institutions and corresponding credit markets for purchasing goods were just developing. In addition, we speculate that specialized financial markets were developing to serve these needs and that financial intermediaries and brokers were important. Finally, from this study of Cologne, it becomes clear that tax collection was organized differently and was not the main purpose of brokers, at least in a city as large as Cologne. Thus, our study (in which this function is correlated

with small populations), suggests that in other large cities, such functions were also performed by other town officials. It is worth considering the interplay between brokers and other tax collectors. For instance, during the late 16th century, fish brokers in Cologne had to report their deals to the excise tax collectors who then reacted and levied taxes accordingly (Kuske 1905, p. 294).

6. Other issues

Let me conclude by discussing other aspects of brokerage policy that have been discussed in the literature and upon which this investigation could shed more light.

One interesting debate is about the role of innkeepers as intermediaries during the study period. Considering the heydays of Brugge, Antwerp, and Amsterdam chronologically, Gelderblom (2013) notes the declining importance of innkeepers as brokers. Whereas in 14th and 15th century Brugge, an important share of brokers were also innkeepers, he notices a decline of this dual function in Antwerp during the 16th century and even a temporary ban on innkeepers and other private persons working as brokers in Amsterdam. Gelderblom attributes this decline to a reduced need for hostellers due to alternative accommodation possibilities for merchants (e.g., rented or bought houses for all merchant groups from a town or region), which allowed the division of these two services. Such a dynamic might indicate an early natural link of the brokerage business to the hosteller function (Ehrenberg 1885). Furthermore, the brokerage regulations of Brugge and Antwerp reveal tension between the rights of innkeepers to work as brokers and those of intermediaries who worked only as brokers. Based on these and other observations, van Houtten (1936, pp. 134ff.) identifies two types of brokerage policies in late medieval cities. On the one hand, towns such as Brugge or Antwerp gave innkeepers brokerage privilege. On the other hand, some towns prohibited this double function and allowed only brokers to work as intermediaries. As van Houtten explains, this policy was means of creating an economic balance between these professions by allocating the profits obtained from merchants to brokerage fees for the broker and accommodation fees for the innkeepers.

However, the investigated brokerage regulations and identified policy intentions indicate that such a restriction is also meaningful if towns wanted to prevent the private business activities or strategic behaviors of brokers on behalf of one market participant. Allowing a customer and a broker to sleep under the same roof creates less transparent business activities and potentially conceals such behavior. The policies identified in our analysis to allow brokers work only as matchmakers might have been reactions to the declining need for hostellers and their subsequently reduced economic and political power, which allowed towns to restrict intermediation by private persons, particularly innkeepers (who were natural first candidate for foreign merchant intermediation).

An analysis of our sample supports such a conclusion. The dual function of hostellers and brokers

(as reflected in brokerage regulations) is observed mainly in prosperous Belgian towns starting in the late 13th century.[99] Such privileges indeed indicate an early (natural) connection between the hosteller and brokerage businesses (Ehrenberg 1885), as well as the economic and political clout of hostellers. The evidence for early 15th century Cologne indicates the early existence of this dual function, but brokers were later barred from being hostellers, and vice versa. Such restrictions have been documented since the middle of the 14th century in many towns in other areas. For example, we find such regulations for Frankfurt during the 14th and 15th centuries.[100] However, we do not find such observations there in the 16th or 17th centuries, which might indicate an earlier, traditional link between these professions followed by a separation policy leading to the subsequent a disappearance of such incentive problems and related policy interests.

Another discussion revolves around the role and importance of brokers as official certifiers or impartial authenticators of deals (Laband 1861; Goldschmidt 1882). This debate is again related to the origin of brokerage, which might have been the need for local official intermediaries to provide legal support for foreign merchants (who only had limited rights) in any disputes or disagreements among merchants that ended up in local courts.

Our sample indicates that such obligations were documented rather infrequently during the early period. However, they can be found in prominent trade cities, such as Brugge, Luebeck, Cologne or Basel during the 15th century (Gilliodt van Severen 1881; Pauli 1847, p. 226ff., 1420: Stein II, p.129f., Schnell 1856, pp. 88ff).[101] In Brugge and Luebeck, we find a bookkeeping obligation related to a duty of disclosure in court. Such a task is frequently documented beginning in the 16th and especially in the 17th centuries, when brokers are reminded to record the quantity, quality, and price of a deal; this obligation often also required them to keep a product sample.[102] These

[99] Regulations that explicitly mention this dual function are Antwerp, Brugge, Brussels, and Antwerp; see van Houtten (1936), pp.134f. Beyond these observations, no additional evidence for other cities was found in the brokerage sample of this study.

[100] For Frankfurt in 1357: Wolf (1969, pp. 111f.); 1373: Buecher (1915, p. 248, pp.325f.); 1381: Ibidem (pp. 326ff.); 1425, and 1490: ibidem (pp.303ff). More similar regulations can be found in Wismar 1339: Mecklenburgisches Urkundenbuch (1884, vol. XIII, N. 7766 § 10); Würzburg 1387: Hoffmann (1955, p.80); Greifswald 1413: Pommersche Jahrbücher (1901, II, pp. 119ff.), Basel 1406: Geering (1886, p. 156). For these cities, we find no later regulations related to this topic. However, we find later evidence in Danzig 1597: Simson (1904), p. 125, and Hamburg 1642: Beukemann (1912) pp. 542ff, 1654: Ibidem (545ff.), 1673: Ibidem (550ff.) 1679 and 1692: ibidem (555ff.) Breslau1670: Heymann (1898, pp.383f.) All these cities have more pronounced brokerage regulations beginning in the 16th century, with the upswings of their economies. Thus, this pattern indicates time-lagged implementation of brokerage policies, as described in the previous set of towns.

[101] A brokerage document from Frankfurt 1496 says that a broker should speak in court, but the reason is not clear. Bücher (1915, pp. 245-247). Two sources from Posen indicate the same, 1501: Warschauer (1892, p.292); 1502: Ibidem (p.301).

[102] We find evidence in Frankfurt 1415: Bücher (1915, p.242); 1616: Schubert (1962, p.80); 1626 Beyerbach (1818, pp. 840-846); 1685: Ibidem (pp.700ff.); Amsterdam 1539: Dillen (1929, 139ff.); 1579: ibidem (pp. 406ff.), 1612: Noordkerk (1748, II, pp. 1060ff.); Augsburg 1549: Stadtarchiv Augsburg (Unterkäuferakten I); Bremen 1626, 1640: Akten Staatsarchiv Bremen, 1650: Blaum (1977, pp. 109ff.), Hamburg 1642: Beukemann (1912, pp. 542ff.), 1654: ibidem (545ff.), 1673: ibidem (550ff.), 1679 and 1692: ibidem (555ff.); Leipzig 1614: Moltke (1939, p. 11f.) and 1681: ididem (p.24).

documents do not reveal any direct links to information disclosures in court. However, beside tax collection purposes, such information collection seems convincing only for this type of record keeping.

These observations suggest that such a brokerage obligation developed over time and grew more important with increasing trade activities, when trade was based on samples without having inspected all the products, when product delivery occurred later, and potentially when some of the merchants were absent during the deal. Such developments are in line with a more prominent role for brokers as product certifiers and verifiers of creditworthiness on the demand side, which address similar types of information asymmetry.

Finally, a third topic of interest is the organization of brokers. Some scholars have found the development of powerful brokerage guilds, the most notable examples of which are in Brugge (van Houtten 1950) and Amsterdam (van Malsen 1933). Such observations would be consistent with the reported ubiquitous presence of guild institutions in pre-modern economic production and political decision-making processes. Thus, consider whether guilds played an important role in the organization of official intermediation activities.

Based on our sample, we find guild structures in Belgium and the Netherlands.[103] However, more generally (i.e., in these as well as other cities), we find evidence that towns directly organized broker behavior through brokerage regulations, often organizing them cooperatively. Quite frequently, regulations indicate that brokers should not compete[104] and that they should share the income they generate.[105] However, it is also written (sometimes in the same rules and in the same towns) that they should not work in groups or work only in groups of two.[106] Thus, towns seemed to walk a brokerage policy tightrope. The cooperative element is directly related to the fear that

[103] In Brugge, from the 14th through the 16th centuries, Gilliodts- van Severen (1881); van Houte (1950); in Brussels 1385: Des Marez (1904, pp. 345f.); in Antwerp 1437: Dillis (1910, pp. 310ff, 418-422), in Middleburgh 1545: Pols (1888, pp 487f.), Amsterdam beginning in 1578/9: Stuart (1879, pp.41ff.), Dillen (1929, pp.407-409).

[104] We find evidence for Antwerp during the 15th and 17th centuries, for example, in 1412: Dillis (1910, pp. 413-417); in Amsterdam during the 16th century, for example, in 1579; in Cologne during the 15th century, for example, in 1498: Kuske (1917, vol. II, pp. 778-9); in Dordrecht in 1401: Fruin (1882, I, pp. 35-7); in Frankfurt during the 14th, 15th and 17th centuries, for example, in 1437: Bücher (1915, pp. 239f.); in Hamburg during the 17th century, for example, in 1654; Beukemann (1912, pp. 545-9), in Hoorn in 1565: Pols (1888, 163ff.); in Middleburg in 1449: ibidem (p.122); and in Strasbourg in 1354: Toebelmann (1911) p. 161.

[105] We find complementary evidence for the already mentioned no-competition regulations (see previous footnote) from Antwerp, Amsterdam, Frankfurt, and Hoorn and more evidence for different regulations in the same cities and periods in Strassbourg during the 14th and 15th centuries, for example, in 1490: Schmoller (1897, pp.24, 64f.) Toebelmann (1911, p.162). Evidence also exists for other cities, such as Colmar in 1379: Waldner (1907, p.33); Danzig in 1597: Simson (1904, p. 125); Constance during from the 14th to the 16th centuries, for example, in 1460 (Feger 1955, pp.116f.); in Leipzig from the late 15th to the 17th centuries, for example, in 1499: Moltke(1939, p.9); and in Würzburg in 1474: Hoffmann (1955) p. 323.

[106] We find evidence for the same regulations (as noted in the previous footnote) for Antwerp (1437), Dordrecht (1401), Strassbourg (1490), Cologne (1498), and Hamburg (1654); for some cities, we find change (and introductions) over time; in Amsterdam, for example, 1612: Noordkerk (1748, pp.1060ff.), in Middleburg 1570: Pols (1888, pp. 793ff.); and during the same period, for in Strassbourg during the 14th and 15th centuries (see previously quoted sources). Other cities include Brugge in the 14th century; for example, regulations from 1303 limit the number of cooperative brokers to two, as in Enkhuizen 1637: Heijder (1979, p. 24) and Ulm 1522: Nübling (1890, p. 123).

brokers were working against each other in competing for customers. Such behavior would not have been in the interest of a town wishing to maximize welfare. Why is this so? The matching design gives the broker incentives (via brokerage fees) to use information to create market-clearing matches.[107] Competition among brokers reduces their willingness to reveal and share information, which reduces the quality of the matches due to incomplete information. The wine brokerage regulations from Colmar in 1379, for instance, mention an information-sharing obligation (Waldner 1907, p.33). We might then ask is why only small groups of brokers were allowed to work together: one answer is fear of collusion. A strong cooperative form might create incentives to violate prohibitions on private business, whereas independent brokers might better control each other's actions.

7. Conclusion

This paper has examined market policies in the form of brokerage regulations in late medieval and early modern Central and Western Europe from 1250 to 1700 based on a sample of 70 towns. The paper has identified brokerage as a trade-supporting mechanism implemented by town officials. Brokers were instrumental in matching buyers and sellers, offered quality certification services for products and provided creditor certification services for customers who bought goods on credit. Furthermore, brokers collected taxes for local governments. Whether tax collection was performed to provide merchants and citizens with public goods or whether it served rent-seeking purposes cannot be determined by this study.

This empirical investigation has shown that all three types of brokerage functions were applied individually as well as in combination in individual regulations. The most frequent combination observed was matchmaking and certification. Furthermore, we found period, geographic and product-specific variations in the regulations. The matchmaking function was documented more frequently and earlier than the certification function. Trade-supporting institutions were found along the most important trade routes. In addition, brokerage regulations for specific products correlated with the trade routes for those products. Finally, different brokerage designs were related to different product types.

To provide a more holistic perspective on brokerage institutions, we examine the case study of Cologne to inspect individual brokerage regulations and investigate how brokerage interacted with other market institutions. We found that brokerage indeed played a prominent role in the allocation

[107] For the formal argument, see Boerner and Quint (2016).

process. However, we also noted that brokerage complemented or replaced other mechanisms.

These results allow us to identify specific information and allocation problems during particular periods, regions, and product markets reflected in the institutional designs observed. In addition, the empirical observations enable us to shed light on the importance of formal market institutions in general during the period under investigation. Based on the economic analysis and interpretation, the correlations between regulations and trade characteristics suggest that such formal institutions must have been important for the growth and development of merchant cities. However, an empirical exercise that shows formal causation is left for future study. Finally, an examination of the interplay between these formal regulations and the daily business activities of brokers, as observed in complementary sources, would be of considerable interest but is beyond the scope of this paper.

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Appendix A: Tables of Statistics

Table 1: Brokerage Designs Descriptive Statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
designs	#obser-vations	# cities	period mean (st. dev.)	period min max	population mean (st. dev.)	population min max	river port share	seaport share	# trade routes mean
brokerage privilege	820	48	1462 (117)	1252 1699	35795 (27692)	1000 137220	0.46	0.41	5.38
matching	409	32	1454 (121)	1252 1699	38809 (30046)	1200 122600	0.31	0.51	4.83
quality certification all	243	26	1549 (104)	1291 1699	34923 (23481)	1000 78500	0.46	0.44	6.24
product certification	236	25	1549 (105)	1291 1699	34068 (23101)	1000 72980	0.46	0.43	6.25
creditor certification	128	11	1609 (86)	1406 1699	48662 (20883)	4595 78500	0.22	0.77	5.73
tax collection	173	24	1473 (94)	1285 1688	16605 (14237)	4420 66400	0.74	0.14	5.84
design combinations									
matching, certification, and tax coll.	24	7	1486 (82)	1372 1685	15213 (10405)	4595 44300	0.88	0.08	7.20
matching and certification	124	16	1579 (113)	1300 1699	42271 (23801)	4595 78500	0.40	0.55	6.64
matching and tax coll.	49	8	1493 (75)	1372 1685	14977 (9128)	4595 44300	0.73	0.22	6.16
certification and tax coll.	35	8	1478 (80)	1372 1685	13712 (10662)	4595 44300	0.80	0.06	6.62
exclusive designs									
only matching	260	25	1392 (72)	1252 1675	39532 (33049)	4210 122600	0.24	0.50	3.94
only certification	107	18	1528 (81)	1291 1642	28927 (21176)	1000 71520	0.50	0.36	5.87
only tax collection	112	21	1465 (100)	1285 1688	17636 (16646)	4420 66400	0.76	0.12	5.75
total # observations	1611	70	1472 (108)	1241 1699	34161 (26838)	1000 137220	0.50	0.39	5.55

Notes: Columns (1) and (2) report the number of observations and cities that can be assigned to different brokerage designs. Columns (3) to (9) report the mean, minimum and maximum values for quantitative variables and the shares of all observations for categorical variables for period, demographic, and trade-geographic characteristics related to different brokerage designs.

Table 2: Product Genres Descriptive Statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
products	#obser-vations	# cities	period mean (st. dev.)	period min max	population mean (st.dev.)	population min max	river port share	seaport share	# trade routes mean
wine & beer	124	33	1459 (100)	1252 1688	23617 (21977)	1200 107150	0.69	0.19	5.62
grain	78	26	1467 (125)	1252 1692	36800 (25003)	4360 170150	0.35	0.58	4.27
fish	89	22	1499 (82)	1320 1692	29027 (20396)	1000 125000	0.67	0.21	7.49
cattle & meat	51	19	1461 (87)	1252 1650	23166 (16673)	1200 45100	0.76	0.14	6.98
oil, fat & butter	61	23	1463 (112)	1252 1692	30286 (27172)	4904 107150	0.39	0.48	5.03
spices & dyes	77	27	1477 (103)	1252 1692	33107 (25113)	4700 107150	0.45	0.40	5.31
raw textiles	104	28	1459 (102)	1252 1692	31370 (26214)	4559 107150	0.64	0.26	5.44
fur, skin & leather	81	24	1448 (101)	1252 1699	36332 (27419)	1200 107150	0.58	0.30	5.79
cloth	108	32	1434 (98)	1247 1692	32411 (25722)	3000 107150	0.65	0.23	5.69
construction material	78	22	1513 (115)	1252 1692	37438 (25512)	4370 107150	0.50	0.49	5.71
metal	61	21	1448 (105)	1252 1692	29396 (28150)	4601 107150	0.33	0.54	5.33
finance	103	24	1498 (126)	1276 1699	412449 (24076)	4700 122600	0.49	0.38	6.00
property	47	16	1514 (114)	1276 1698	36811 (25983)	4300 114200	0.47	0.40	5.59
horses	83	24	1451 (88)	1252 1667	28186 (24663)	4700 107150	0.64	0.18	6.18
total	1611	70	1472 (108)	1241 1699	34161 (26838)	1000 137220	0.50	0.39	5.55

Notes: Columns (1) and (2) report the number of observations and towns that can be assigned to brokerage for specific products. Columns (3) to (9) report the mean, minimum and maximum values for quantitative variables and the shares of all observations for categorical variables for period, demographic, and trade-geographic characteristics related to brokerage for different products.

Table 3: Product Genres and Brokerage Designs Descriptive Statistics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
products	#obser-vations	# cities	brokerage privilege	matching	certification all	quality certificti on	creditwort hiness	tax collection	matching and certification
wine & beer	124	33	0.54	0.34	0.09	0.09	0.13	0.16	0.05
grain	78	26	0.67	0.32	0.15	0.15	0.12	0.21	0.09
fish	89	22	0.42	0.20	0.42	0.42	0.06	0.06	0.09
cattle & meat	50	19	0.58	0.20	0.24	0.22	0.04	0.22	0.10
oil, fat & butter	61	23	0.72	0.41	0.21	0.21	0.13	0.08	0.08
spices & dyes	77	27	0.70	0.45	0.23	0.21	0.17	0.10	0.16
raw textiles	104	28	0.63	0.39	0.17	0.17	0.12	0.10	0.12
fur, skin & leather	81	24	0.73	0.38	0.17	0.17	0.15	0.10	0.11
cloth	108	32	0.64	0.31	0.13	0.13	0.09	0.08	0.07
construction material	78	22	0.67	0.37	0.36	0.35	0.22	0.04	0.18
metal	61	21	0.67	0.41	0.13	0.11	0.10	0.18	0.11
finance	103	24	0.65	0.28	0.18	0.17	0.16	0.07	0.15
property	47	16	0.66	0.32	0.23	0.21	0.23	0.11	0.17
horses	83	24	0.61	0.29	0.08	0.08	0.02	0.17	0.05
total		70	0.51	0.25	0.15	0.15	0.08	0.11	0.08

Notes: Columns (1) and (2) report the number of observations and towns that can be assigned to brokerage for specific products. Columns (3) to (9) report the shares of all observations for different brokerage designs related to specific product groups.

Table 1A: Statistical Significance Tests for Brokerage Designs

	(1)			(2)			(3)	(4)	(5)		
	period paired t-test			population paired t-test			river port	seaport	# trade routes		
design	(a) difference= mean regulation - mean other obs.	(b) t-value	(c) p-value	(a) difference= mean regulation – mean other obs.	(b) t-value	(c) p-value	chi2 p-value	chi2 p-value	(a) difference= mean regulation – mean other obs.	(b) t-value	(c) p-value
brokerage privilege	19.70	3.66	0.00	-3422	-2.57	001	10.51 0.001	2.920 0.087	0.35	2.62	0.00
matching	24.36	3.94	0.00	-6263	-4.10	0.00	76.75 0.000	33.91 0.000	0.97	6.33	0.000
quality certification all	-91.46	-12.69	0.00	-846	-0.45	0.32	1.78 0.182	2.88 0.090	-0.80	-4.28	0.00
product certification	-91.10	-12.46	0.00	165	0.09	0.47	1.63 0.201	2.35 0.126	-0.80	-4.22	0.00
creditor certification	-148.84	-16.05	0.00	-15741	-6.44	0.00	44.10 0.000	87.35 0.000	-0.19	-0.76	0.22
tax collection	-0.47	-0.07	0.47	19840	9.41	0.00	46.67 0.000	50.48 0.000	-0.32	-1.50	0.07
design combinations											
matching, certification, and tax coll.	-22.83	-1.02	0.15	18725	3.41	0.00	14.70 0.000	9.49 0.002	-1.67	-3.04	0.00
matching and certification	-113.37	-11.64	0.00	-8729	-3.50	0.00	5.03 0.025	14.67 0.000	-1.16	-4.63	0.00
matching and tax coll.	-20.61	-1.31	0.10	19663	5.10	0.00	11.14 0.001	5.65 0.017	-0.63	-1.61	0.00
certification and tax coll.	-12.34	-0.67	0.25	20535	4.50	0.00	13.72 0.000	17.08 0.000	-1.01	-2.39	0.01

Notes: The table indicates whether different brokerage designs are statistically significantly related to specific periodic, demographic, and trade-geographic distributions of brokerage regulations. Column (1) reports paired t-tests comparing differences in the period mean for specific regulations and the mean of the total number of all other observations. Column (1a) reports differences between the period mean for specific regulations and the mean of all other observations; (1b), the related t-values; and (1c), the related p-values. Similarly, column (2) reports paired t-tests for differences in population size. Columns (3) and (4) report whether specific brokerage designs are statistically significantly related to cities with river ports or seaports. The columns reveal Pearson's Chi-square statistics for one degree of freedom and associated p-values. Column (5) reports paired t-tests for differences in the mean number of trade routes passing through a city for specific regulations vs. the mean for the number of trade routes relative to the total number of all other observations.

Table 2A: Statistical Significance Tests for Product Genres

	(1)			(2)			(3)	(4)	(5)		
	period			population			river port	seaport	# trade routes		
products	(a) difference = mean product type – mean other obs.	(b) t-value	(c) p-value	(a) difference = mean product type – mean other obs.	(b) t-value	(c) p-value	chi2 p-value	chi2 p-value	(a) difference = mean product type – mean other obs.	(b) t-value	(c) p-value
wine & beer	13.85	1.37	0.09	11438	4.59	0.00	18.43 0.000	21.26 0.000	-0.075	-0.30	0.38
grain	5.39	0.43	0.33	-2760	-0.89	0.18	7.79 0.005	12.42 0.000	1.39	4.33	0.00
fish	-27.95	-2.37	0.01	5849	1.86	0.03	11.39 0.001	12.00 0.001	-2.06	-7.10	0.00
cattle & meat	10.76	0.69	0.24	11756	3.06	0.01	134.73 0.000	13.88 0.000	-1.47	-3.82	0.00
oil, fat & butter	9.67	0.68	0.25	4040	1.15	0.12	2.90 0.089	2.07 0.150	0.54	1.53	0.06
spices & dyes	-5.97	-0.47	0.32	1120	0.36	0.36	0.68 0.410	0.08 0.778	0.25	0.80	0.21
raw textiles	14.22	1.29	0.098	2998	1.10	0.14	9.75 0.002	8.02 0.005	0.12	0.43	0.33
fur, skin & leather	25.88	2.10	0.02	-2273	-0.74	0.23	2.18 0.140	2.98 0.084	-0.25	-0.82	0.21
cloth	40.55	3.77	0.00	1889	0.71	0.24	10.12 0.001	11.85 0.001	-0.14	-0.53	0.30
construction material	-43.13	-3.44	0.00	-3431	-1.10	0.14	0.00 0.996	3.44 0.064	-0.16	-0.51	0.30
metal	24.82	1.75	0.04	4966	1.42	0.08	0.42 0.517	0.94 0.331	0.23	0.66	0.25
finance	-27.80	-2.52	0.01	-7560	-2.77	0.00	0.10 0.755	0.04 0.851	-0.48	-1.75	0.04
property	-42.74	-2.67	0.00	-2717	-0.68	0.25	0.20 0.654	0.06 0.809	-0.05	-0.11	0.46
horses	21.97	1.80	0.04	6313	2.09	0.02	6.89 0.010	15.74 0.000	-0.66	-2.19	0.02

Notes: The table indicates whether product characteristics are statistically significantly related to periodic, demographic, and trade-geographic distributions of brokerage regulations. Column (1) reports paired t-tests comparing differences in the period mean of rules for specific products with the mean of the total number of all other observations. Column (1a) reports the differences between the period mean of the specific product and the mean of the number of all other observations; (1b), the related t-values; and (1c), the related p-values. Similarly, column (2) reports the results of paired t-tests for differences in population size. Columns (3) and (4) report whether brokerage regulations for specific products are statistically significantly related to cities with river or seaports. The columns report Pearson's Chi-square statistics for one degree of freedom and associated p-values. Column (5) reports paired t-test for differences in the mean number of trade routes passing through a city for regulations for specific products vs. the mean for the number of trade routes relative to the total number of all other observations.

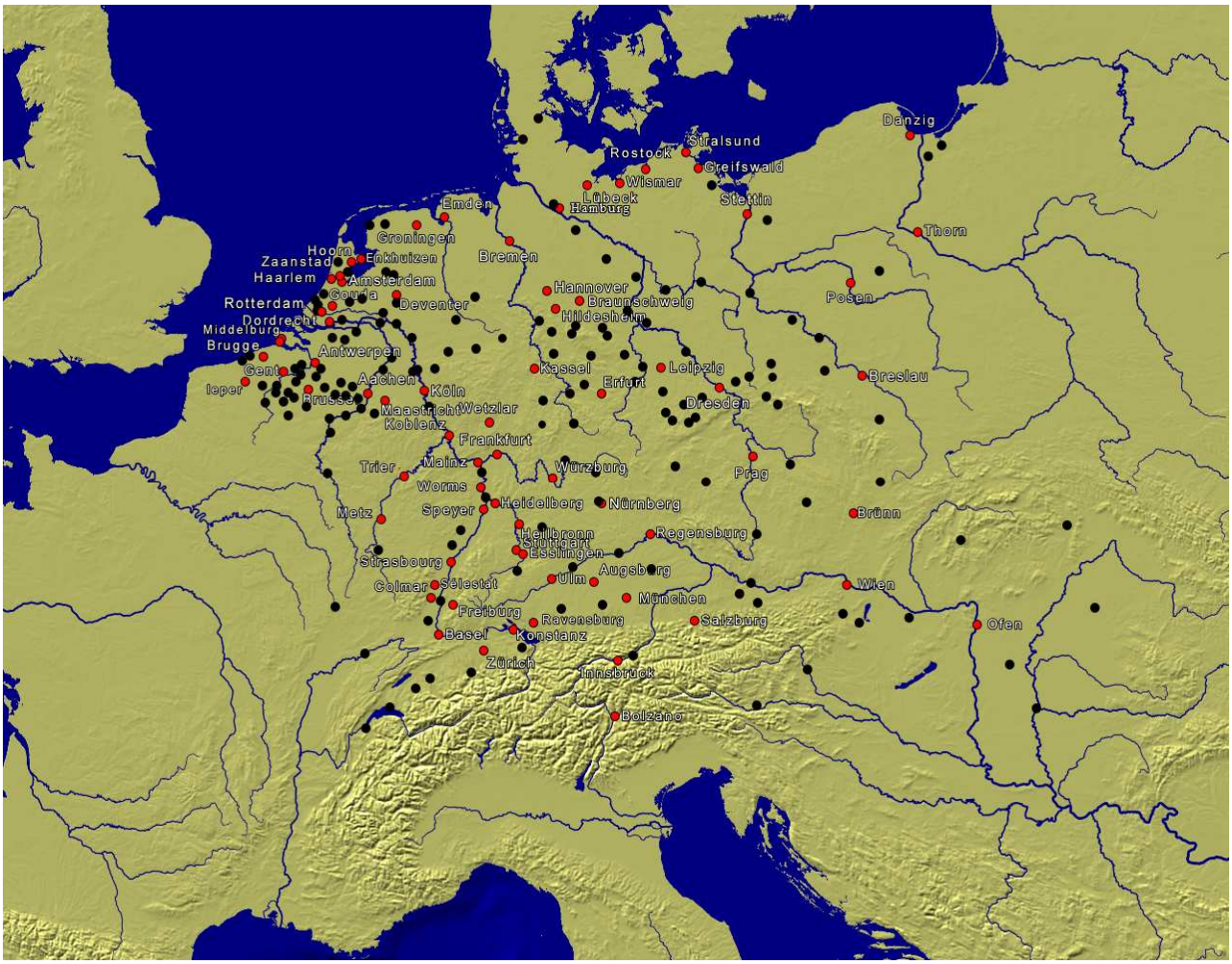
Table 3A: Statistical Significance Tests for Product Genres and Brokerage Designs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
products	#obser-vations	brokerage privilege	matching	certification all	quality certification	creditworthiness	tax collection	matching and certification
wine & beer	124	0.52 0.472	5.33 0.021	4.05 0.044	3.59 0.058	7.37 0.007	4.07 0.044	1.50 0.220
grain	78	8.12 0.004	1.89 0.169	0.01 0.939	0.04 0.861	1.45 0.229	8.17 0.004	0.18 0.668
fish	89	3.30 0.069	1.35 0.246	51.61 0.000	54.62 0.000	0.70 0.404	2.58 0.108	0.22 0.642
cattle & meat	50	0.74 0.389	0.94 0.331	4.45 0.035	3.32 0.068	1.17 0.280	8.99 0.003	0.32 0.569
oil, fat & butter	61	11.33 0.001	8.04 0.004	1.92 0.166	2.25 0.134	2.32 0.128	0.43 0.513	0.02 0.885
spices & dyes	77	11.40 0.001	17.09 0.000	4.34 0.037	2.43 0.119	8.83 0.003	0.01 0.919	7.04 0.008
raw textiles	104	6.39 0.011	10.98 0.001	0.37 0.542	0.56 0.455	1.86 0.172	0.17 0.678	2.18 0.140
fur, skin & leather	81	16.38 0.000	7.41 0.006	0.32 0.570	0.47 0.491	5.50 0.019	0.07 0.797	1.39 2.39
cloth	108	7.78 0.005	1.60 0.206	0.41 0.524	0.26 0.608	0.27 0.601	0.70 0.403	0.02 0.902
construction material	78	8.12 0.004	5.96 0.015	27.72 0.000	26.13 0.000	21.50 0.000	4.06 0.044	12.07 0.001
metal	61	6.73 0.010	8.08 0.004	0.019 0.661	0.51 0.475	0.31 0.578	3.52 0061	1.26 0.261
finance	103	8.27 0.004	0.43 0.512	0.97 0.324	0.70 0.402	8.66 0.003	1.78 0.182	7.26 0.007
property	47	4.37 0.036	1.07 0.301	2.62 0.106	1.70 0.192	15.82 0.000	0.00 0.982	5.90 0.015
horses	83	3.87 0.049	0.56 0.455	3.02 0.082	2.70 0.100	3.66 0.056	3.43 0.064	1.03 0.310

Notes: The table indicates whether brokerage for a specific product is statistically significantly related to different brokerage designs. Columns (2) to (8) reveal Pearson's chi-square statistics for one degree of freedom and the associated p-values.

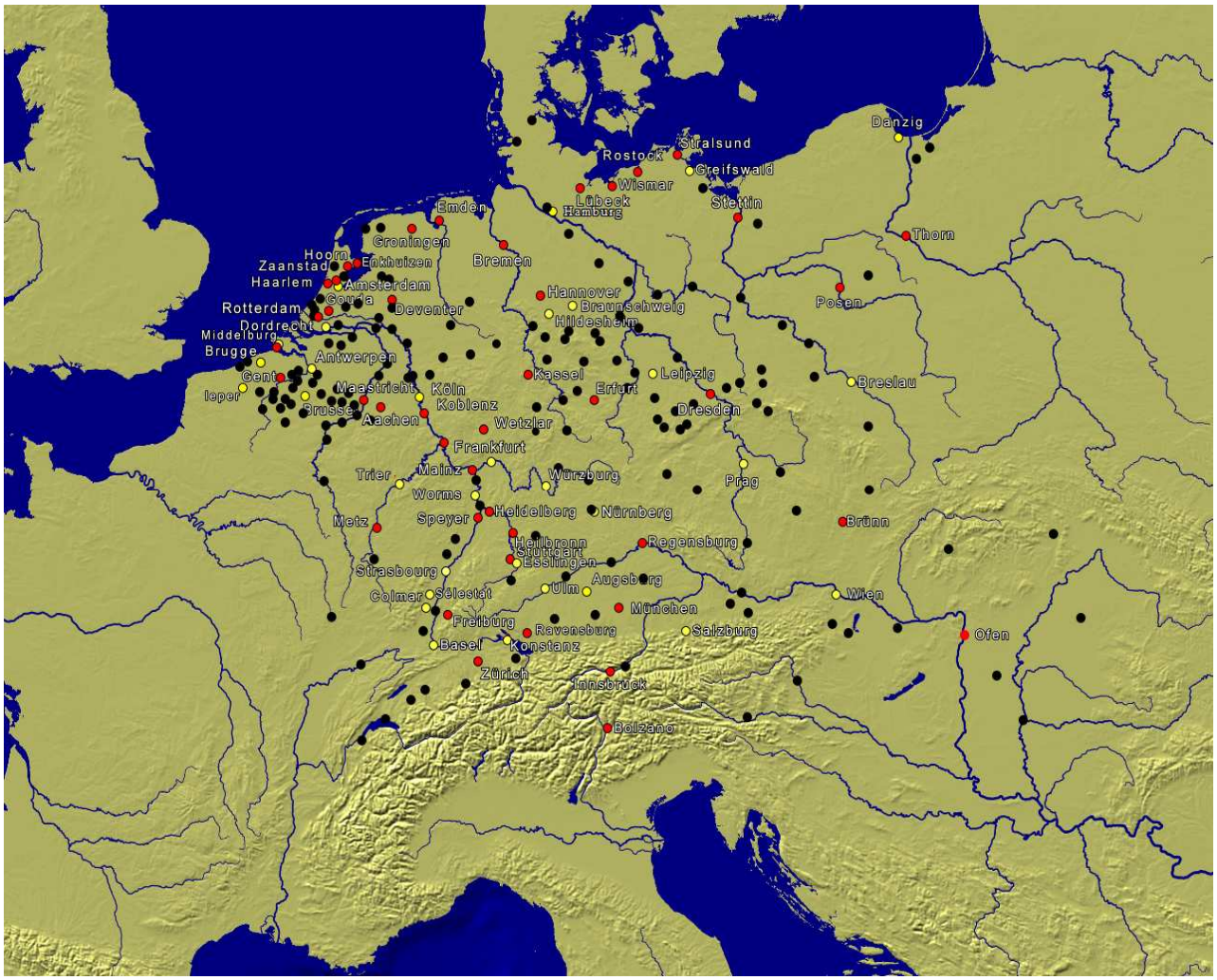
Appendix B: Maps

Map 1: Sample of Cities with and without Brokerage



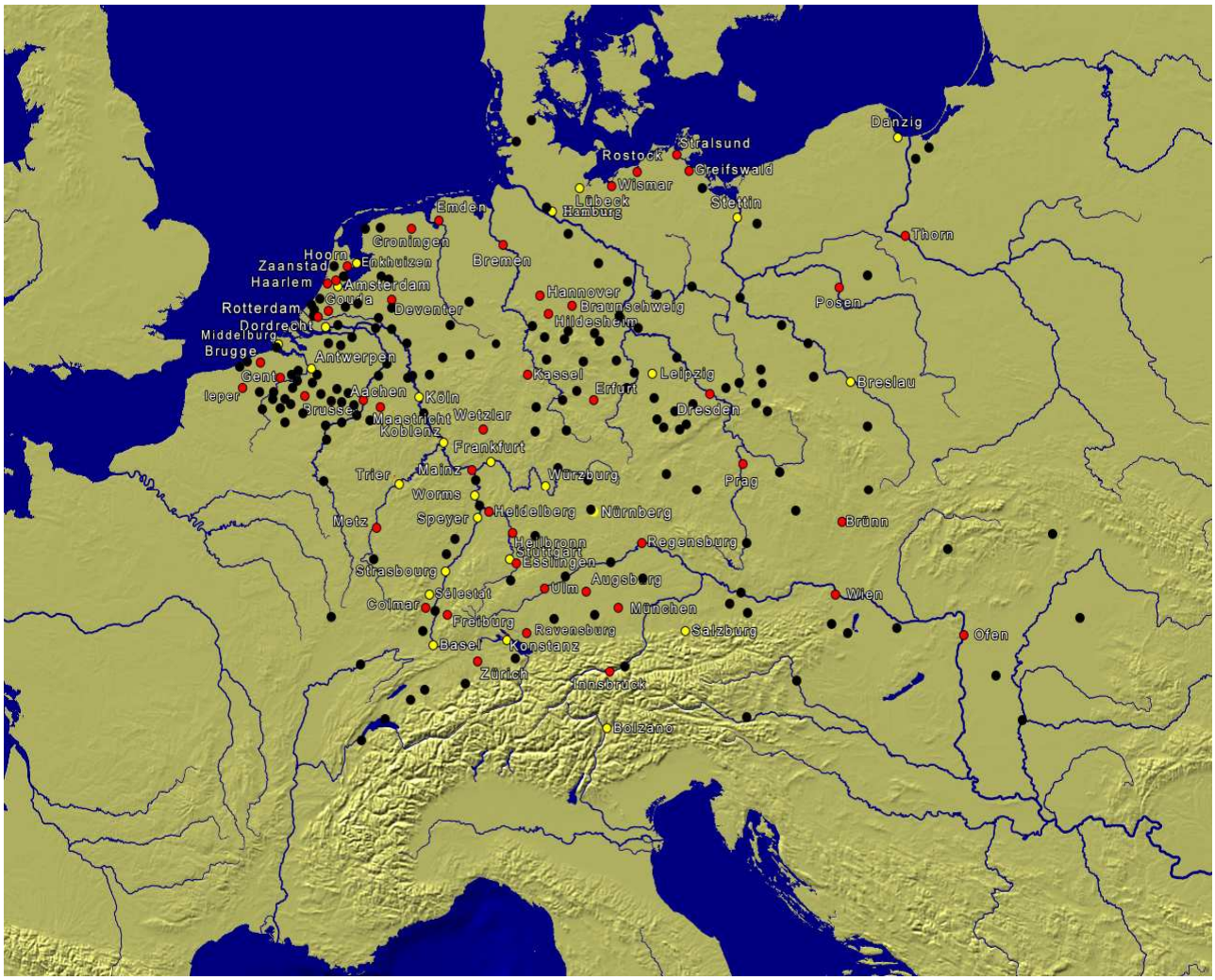
Notes: The dots mark all towns that are investigated and had, following Bairoch (1988), 5000 inhabitants at least once during the investigation period (1200-1700). The red named dots indicate the existence of brokerage. Other towns (without brokerage) are marked by black dots.

Map 2: Cities with Brokerage with Matchmaking Functions



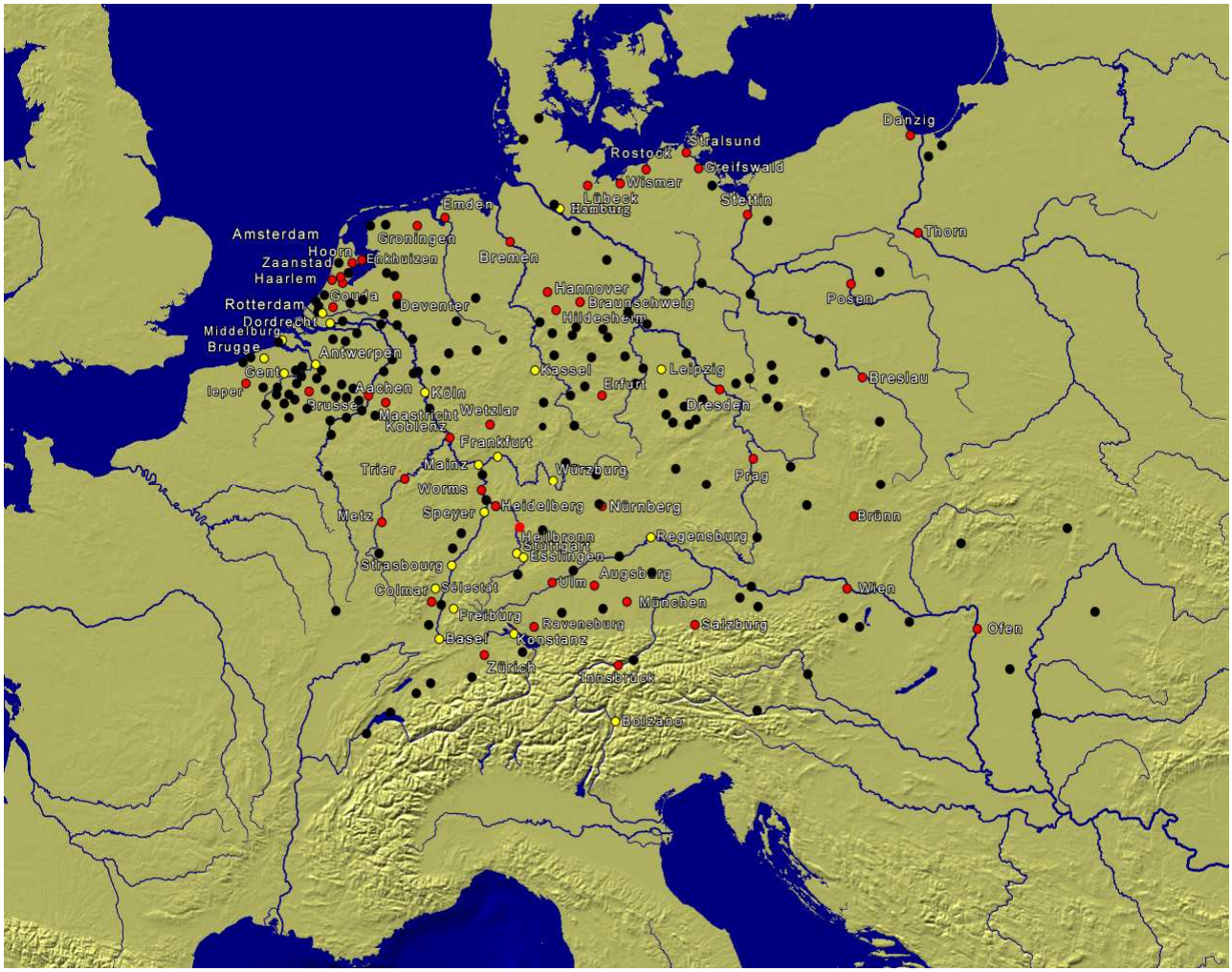
Notes: Cities with brokerage with matchmaking functions are marked with yellow dots and named. Other cities with brokerage (following map 1) are marked with red dots and named. The remaining towns are marked only by black dots.

Map 3: Towns with Brokerage with Certification Functions



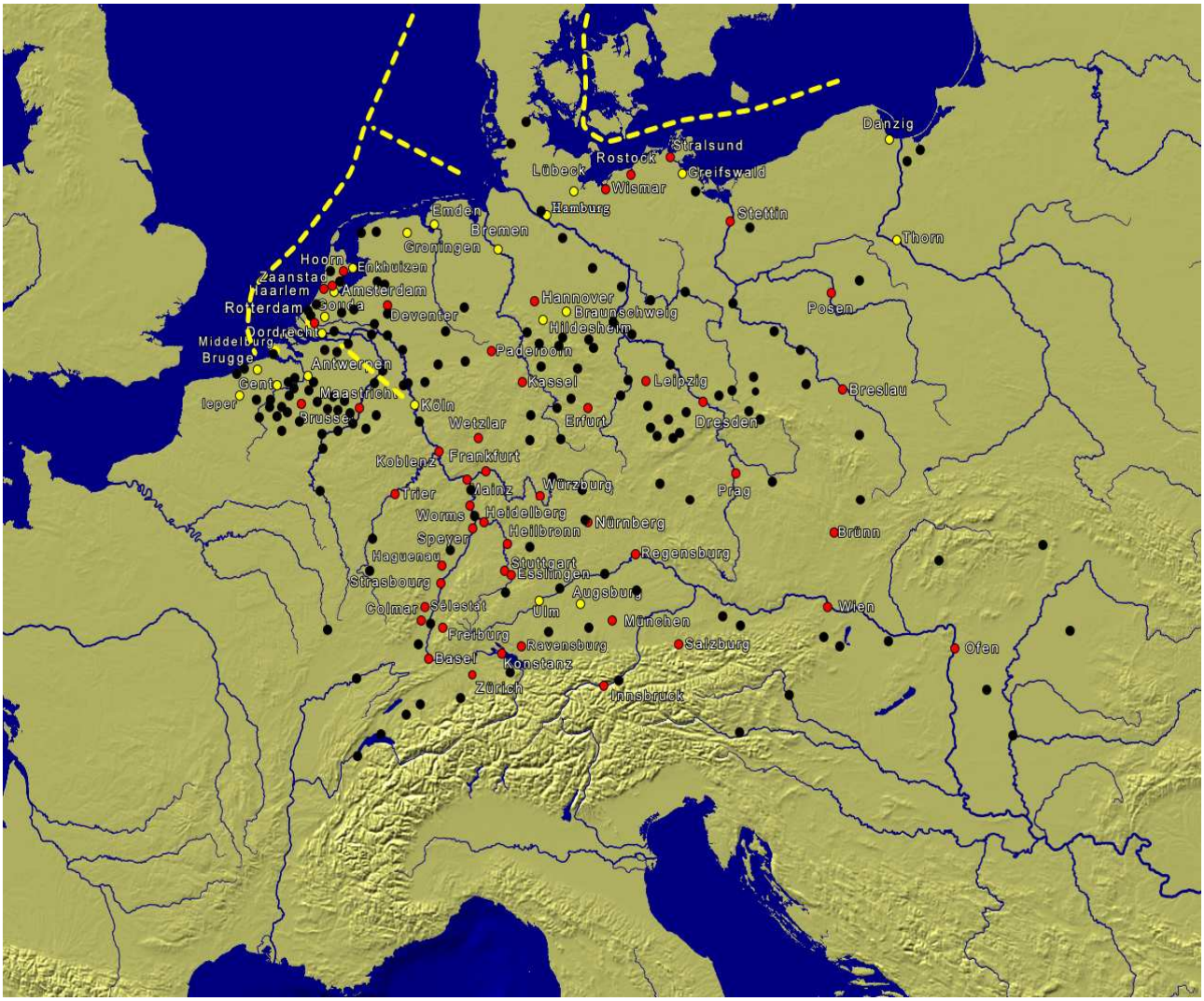
Notes: Cities with brokerage with certification functions are marked with yellow dots and named. Other cities with brokerage (following map 1) are marked with red dots and named. The remaining towns are marked only by black dots.

Map 4: Towns with Brokerage with Tax Collection Functions



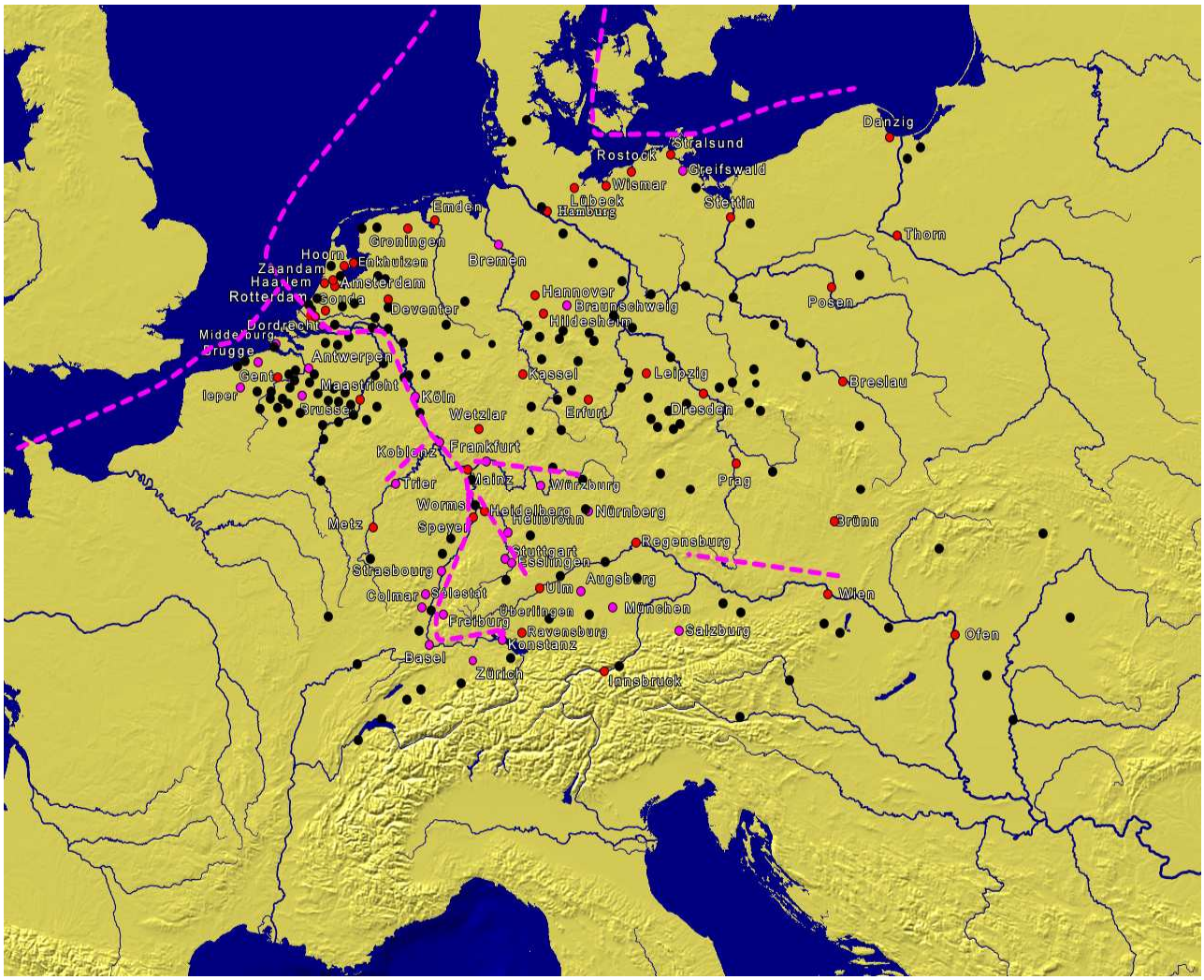
Notes: Cities with brokerage with tax collection functions are marked with yellow dots and named. Other cities with brokerage (following map 1) are marked with red dots and named. The remaining towns are marked only by black dots.

Map 5: Towns with Grain Brokerage and Trade Routes



Notes: Cities with grain brokerage are marked with yellow dots and named. Yellow dashed lines indicate the main grain trade routes. Other cities with brokerage (following map 1) are marked with red color dots and named. The remaining towns are marked only by black dots.

Map 6: Wine Brokerage and Trade Routes



Notes: Cities with wine brokerage are marked with purple dots and named. Purple dashed lines indicate the main wine trade routes. Other cities with brokerage (following map 1) are marked with red dots and named. The remaining towns are marked only by black dots.