

Medieval Market Design

Product Grouping on Medieval Fairs

First draft

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Abstract

This paper presents insights into the market microstructure of the late Middle Ages, particularly the market design of medieval fairs. It shows that different product genres were grouped. This grouping was seller optimal as well as socially efficient. Based on a model of product differentiation with ex ante uncertainty about the optimal trading partner, strategic interacting merchants will locate next to each other. This also minimizes search costs of the potential customers and is therefore socially efficient. This paper finds evidence that such an equilibrium was driven by both the town officials and the sellers. Furthermore, it documents that it evolved over time.

Keywords: Medieval markets, market microstructure, product differentiation

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Introduction

If we go for a walk in the old towns of Europe, we often find streets named “Book Lane,” and “Linen Street.” These names indicate which goods were sold on these streets. They belonged to the medieval market terrain. Every medieval town had a market. Markets were strictly designed and organized by the town officials and were the cornerstone of any public exchange. It does not matter if these were weekly fish or grain markets or yearly fairs.

The local concentration of certain product genres is one building block in the evolution of the microstructure of medieval markets. The evolution of markets and in particular of a complete system of fairs across Europe were one element of the commercial revolution that began at the end of the High Middle Ages. This evolution led to the first integrated European market during the Late Middle Ages and culminated in the creation of the first stock exchanges in Brugge and Antwerp.

Although economic historians have become aware of the striking importance of these markets, little research has been done to understand the underlying microstructure of medieval markets in a formal comparative institutional analysis. Avner Greif and others (Greif 1993, 1994, 2002, Greif et al. 1994) have examined institutions that facilitated credit transactions and impersonal exchange. The key issue in this line of research is to overcome the commitment problem between different groups of merchants. The effects of information transmission and reputation play a central role in their analysis.

This paper is concerned with a different aspect of the market. The question is, how do sellers on these markets meet potential buyers? How can a foreign merchant who enters a city or a fair know that he will find the right buyer for his specific goods? How is it possible that at a fair where hundreds or even thousands of merchants with complex preference structures met for only a few days, they were able to find optimal trading partners. Put it another way, how were medieval traders matched, and how did medieval markets clear?

To analyze this, we examine the large medieval wholesaler fairs from the 13th to the 16th century. We examine the market rules of the main fair cycles of Western Europe. Smaller fairs or local markets would provide further answers to this question. However we will concentrate on these large markets, because their size highlights the complexity of exchange and the problem of an optimal allocation. We focus on the phenomenon of grouping. Although other aspects are also important, they must be studied separately.

The hypothesis advanced in this paper is, that the grouping of products increased the aggregate wealth of buyers and sellers. The concentration of sellers with similar products reduced search costs. Although this also increased price competition, the sufficient heterogeneity of the products and the uncertainty of sellers having a customers, makes such a grouping optimal. In most cases this grouping is not only socially efficient, but also profitable for the sellers. Therefore the evolution of such a market organization can be both self-enforcing and socially optimal. Consequently the grouping can be interpreted as the work of a social planner as well as of profit maximizing sellers. These results complement the existing view of grouping done by historians in case studies of single fair(s) cycles. Many studies argue that the main reason for grouping was the need of town officials and guilds to control quality and collect fair fees (i.e. Dietz 1901, I, p. 79f., Brübach, p. 362; Wedemeyer-Moore p.152f.)

To produce these results we use the following methodology. Since only a limited set of data is available for this time period, we have to rely on individual qualitative observations and cannot make any econometric quantifications. However these observations are sets of rules, which we identify as economic institutions and which possibly met an economic incentive and allocation need. To show this, we put our rules into the frame of a game theoretic model of strategically interacting sellers. Furthermore we check if these outcomes are also socially efficient, i.e. if the outcomes maximize the profits of the sellers and

consumers surplus. We rely on results produced by game theorists working on the theory of product differentiation.

This paper is part of a much more ambitious research agenda. Modern microeconomic theory, ranging from game theory to mechanism design, offers powerful analytical tools that help to analyze the incentive structure of historical institutions and contracts. This enables the researcher to connect to and build upon a much older literature that has analyzed historical institutions in great detail: the Historical School. Working under the influence of legal historian Savigny (1814, 1815-31), this approach analyzed economic institutions from a legal standpoint. While that research agenda was often lacking in economic analysis, it was rigorous and systematic in the description of the respective legal framework and the analysis of its outcomes. This research agenda has generated a vast literature on medieval and early modern institutions, which can now be analyzed with the tools of modern incentive theory.¹

The remainder of the paper is structured as follows: Section I gives general insights on the appearance fairs in the Late Middle Ages. It deals with the market microstructure of the fairs and in particular with the phenomenon of grouping similar products. Section II gives some intuitive explanations for such a behavior and sets some critical parameters, which support the agglomeration of similar products. Section III builds a game theoretic model on these parameters. We identify the optimal theoretical outcomes and show how the seller's optimal outcome is linked to the socially efficient equilibrium. Section IV looks into selected sources, which are related to the outcome. It interprets the organizational evolution of these fairs and investigates the behavior of sellers and the town officials related to the agglomeration of products. Section V finally examines the process of decentralization within these fairs and the beginning of the disappearance of good markets.

¹ The birth of formal economic analysis of historical institutions can be identified in the research of Greif (1993), Greif, Milgrom and Weingast (1994) using game theory. The first approach in mechanism design was started by Gonzalez de Lara (2001).

I. Medieval fairs and their microstructure

The focus of this article is on the medieval wholesaler fairs of Europe. They can be differentiated from other regular markets in the following way. Local markets often took place once a week and catered to the local retail trade. In contrast, fairs took place only once or twice a year and interregional wholesaler trade prevailed. Most fairs were part of a fair cycle system. They lasted often for two or three weeks within a cycle, i.e. when the market period, ended another inter-linked fair started a few days later in another region. Fairs were quasi-centralized commodity markets because business was transacted according to a strict set of rules set up by town officials. On this market platform competitive trade took place.

The origin of medieval fairs dates at least as far back as the 9th and 10th century (Jarnut 1996). The first known interregional fair cycles from the High and Late Middle Ages were in the Champagne region of France, in England, Flanders and the Lower Rhine (Irsliger 1996). Their late medieval and early modern successors were the cycles of Brabant with the fair sites in Antwerp and Bergen-op-Zoom, the cycles of the Wetterau with Frankfurt as the hub and the fairs of Chalon-sur-Saone, Geneva, and Lyon in the French region. During the High and Late Middle Ages, most fair cycles were set up in Western Europe, along the trade axes between the North and South, the newer fair cycles were set up in Central and Eastern Europe. This change involved the switch of trade axes and the greater importance of this region for the economic growth of Europe. (Blockmanns 1996).

The market microstructure of Frankfurt

Let us go now into the micro level of these markets and pick the example of the Frankfurt fairs. Although there are few sources about the trading behaviour of single merchants, a little bought ledger of the merchant Mulich from the 1495 spring fair (Fastenmesse) in Frankfurt has survived (Röhrig 1971). The bought ledger gives particular insights about the kind of products he purchased as a commissioner for his brother in Luebeck. (Röhrig 1971, p. 310f.) The list is incomplete, as he purchased products for himself and perhaps also for his partners. Still, the source gives us two insights. First we can discover an impressive variety of goods. The bought ledger differentiates among fifty-two different goods: textiles, spices, jewellery, raw metals like silver and mercury, weapons accessories, precious wood, wire and brass. Secondly, we can find a high differentiation within a specific product type. I.E. Mulich distinguishes eight kinds of velvet from Milan and eight kinds of velvet from Genoa.

Complementary insights on the variety of goods indicate the complex fee system that the town officials of Frankfurt set up. The taxes that were paid depended upon what kind of product the merchants were selling. (Rothmann 1998, p. 118ff.)

These goods were not chosen by chance, but show the specific tastes of the customers. Mulich's business correspondence supports this argument (Röhrig 1971). Hence, this source sheds some light upon the complex preference structure of the demand side. How was Mulich able to find all his goods in the short fair period? These goods were sold by a variety of sellers. For a better sense of the size of the Frankfurt fair, Dietz estimated the number of stalls (1901, pp.80f). He estimated that in 1600 there were 460 outside stalls and between 500 and 600 inside stalls. So all in all there were more than 1000 stalls at the fair. Furthermore, after the 15th century, the Frankfurt fair was divided into a week of arriving and installing, a week of commodity trading, and a financial market clearing week. (Dietz I, p. 40f.) These periods

were strictly fixed and a penalty needed to be paid in case of violation. Hence Mulich had only a week to purchase these listed goods and conduct his other businesses.

How could a merchant find everything he wanted at the Frankfurt fair within such a short time? If we examine the geography of the market, we can see how this worked. Different types of products were grouped in close proximity. The trade in wine took place at the bank of the Main, the trade of drapery was centred around the “Saalhof,” the linen trade was based at the “Leinwandhaus,” the leather trade at the “Trierer Hof,” books were traded in the “Buchgasse,” and goldsmiths were located at the “Römer,” (Rothmann 1998, p. 117).

In addition to this geographical differentiation or grouping of similar products, we can observe brokers on medieval markets, who were responsible for specific products. We can find at each fair 100 to 200 brokers for more than 20 different product genres, (Schubert 1962).

Finally there is evidence that products had been sold during different periods. So was the second week (which was in the 15th century the commodity trade week), in Frankfurt also known as the “Lederwoche” (“leather week”). Textile traders from Brabant showed up at the end of the trading week. (Dietz I, p.40f; Amann, H., p.104; Brübach, p. 145)

The bottom line is that the Frankfurt fairs knew three different dimensions of market participants: a geographical, a temporal and an ordering via intermediaries. In all these dimensions we can observe a grouping for some product genres.

The grouping of products

Is such a marketing structure for the Frankfurt fairs of the 15th century unique, or is this a more general phenomenon among all European fairs from the High Middle Ages to the Early Modern period? Let us have a examine Europe’s main fair venues. Let us focus on the geographical and temporal grouping. Although the mechanism of brokerage contains some similar elements, we must analyse this separately.

The oldest signs of inner structuring are from the Champagne and the English fairs, particularly from St. Ives, from the 12th and 13th century. At the Champagne fairs, traders were grouped by their place of origin (Bautier 1953, p.126). This grouping was more than just a grouping around one house; often a whole street was occupied by merchants from the same region. In the Champagne fair towns of Provins and Bar-sur-Aube for example, a “vicus Alemannorum,” a lane of Allemans (i.e., south west Germans and Swiss Germans) existed (Thomas 1996, p. 27).

Although there was no product- specific grouping in the Champagne fairs, there was a timely differentiation for specific products at all six Champagne fairs. Generally, all Champagne fairs lasted 46 to 47 days. The first week was the preparation week when traders arrived, and installed themselves and laid out their products. Then three different periods, one for each of three different product categories, followed: one for clothes and drapery, one for leather and fur products and one for spices, colouring and dyeing products. Such a product period was again divided into a period of observing and quality controlling by traders and local market controllers, and a second period of buying and selling. At the end of these product periods there were two weeks of paying, clearing and making out of bills of exchange. All of this activity was very tightly regulated; there was no way of doing business outside of the scheduled times. If traders came late to the fair they had to pay a fee if they still wanted to sell their goods (Bassermann 1911, pp. 19-28; Schönfelder pp. 24-26).

At St. Ives in England, a very complete picture of the structuring is available, because the abbot of Ramsey controlled nearly all rentals. The abbatial stall lists from 1278, 1284 and 1287 are available as sources. The structuring of traders was mixed. Some traders were located by their products. These products were either foodstuffs or craftsmen offering on-the-spot services. Then there were the wholesalers who often had their shops in front of permanent dwellings or in stalls built in rows each year; these were located by the origins of

their trading communities and not by products.² However, often these groups were located with groups from other communities that sold similar products (Wedemeyer-Moore 1985, pp. 146-54). In addition to this geographical and product grouping there was no other differentiation of products, although we can find again a very strict and regimented schedule, as there was a fee for late entry (Wedemeyer-Moore 1985, 198f).

The fair of St Giles, also in England, gives a less complete picture. However sources also indicate that sellers with comparable goods were grouped on specific streets, as were merchants from same towns (Wedemeyer-Moore 1985, p. 146).

Let us turn now to the fairs of Chalon-sur-Saone in France, which flourished at the end of the 13th and through the 14th century. In Chalon we can find a fair, which was exclusively structured by its products. Until 1280 there were “la grande halle” or “la halle aux draps” with 98 stalls, “la halle des bureaux” with 86 stalls, “la halle de la pelleterie” with 74 stalls and “la halle de changeurs” with 64 stalls. There were selling locations between these halls. All halls sold different sorts of products: the first two sold drapery, the third sold fur, and in the last one contained exchange offices and products that did not fit into the other halls. Inside the halls the locations were precisely divided into product groups and different types of quality. Drapers were matched again with traders’ home towns (Dubois 1976, pp. 62-67). In the 14th century some halls were renovated and sometimes their names were changed when new kinds of products were sold there. Eventually more halls were built: “les halles des merciers,” “les halles des cordouanniers” and “les halles des selliers.” (Dubois 1976, pp. 83-88).

More evidence is available for the fairs of Bergen op Zoom during the 15th century. In the “Lakenhal” textile products were sold, skins and cattle were traded in the “Huidenmarkt”, grain in the “Korenmarkt”, and the “Juwelierspand” featured gold, jewellery, and fine textiles. We also can find halls, which were exclusively run by merchants from specific towns, though often these halls were again grouped, grouped along the same street. However separated

² Verlinden 1971, p. 135 makes the same observation for the fairs of Flanders. Stabel (2000) also observes product grouping, i.e. in Ypres.

houses also existed, such as the “Oosterlingen huis” or “het Engelse huis.” (Slootmans 1985, p. 270-279; 300ff.).

Finally at the 15th and 16th century Castilian fairs of Medina del Campo we find strong differentiation, especially for woollen fabrics. Goods were separated according to place of origin and quality (Alonso, 2001).

II. Search costs, price competition, and uncertainty

Search costs

Intuitively, such market structuring helps the demand side in general and our merchant Muhlich in particular, so that when he attended the Frankfurt fair, he could easily find the products that he wanted. Such an argument assumes that Muhlich does not know ex ante where he could find the desired products, or with which seller he would conduct his business. It is essential to see that search costs were an important element for the medieval merchants. Since we compare costs within a market town, we cannot explain them purely by physical transportation costs between stall A and B. We have to analyse the search costs within a fair site, which are different in case of agglomeration compared to a dispersed location of stalls with all kinds of products.

A merchant on the market had to make a close inspection of the goods he bought. Therefore each visit to a single stand did not only include getting there, but also checking the products on display. Buying products on the basis of a sample was not a regular practice until the early modern era. The creation of market rules concerning standardization of product size and measure offer supporting evidence. Selling the products from a centralized spot offers transparency. Merchants can more easily compare different products.

Furthermore a merchant inspecting but not buying a product faced the risk that the product could be sold to someone else. The more time he spends comparison shopping, the more likely it is that someone else is going to buy the product that he wants. The smaller the searching costs, the less he has to spend on travelling from location to location and the smaller the complementary costs.

If we keep in mind that a merchant only had limited time to buy products at fairs, we can argue that search costs indeed played a decisive role. The strict timing of other fairs document this. The travel book written by the merchant Ryff from Basel indicates how precisely the time between two market periods was calculated (Trog 1891).

Price competition

The argument so far mentioned influences upon the utility of the customers. However the sellers decide where they set up their stands. Grouped sellers also profit, as far as they can expect to be more visible to more potential customers with preferences for a specific product genre, which again lowers the searching costs of the demand side. This in turn can increase aggregate demand. However, the grouping of similar products also improves transparency on agglomerated markets. If we assume that there was price competition, then we can expect that the grouping of similar goods drove prices down to a competitive level. Therefore a seller might have an interest in reducing search costs for some customers. But at the same time, the seller's interest is to avoid competition and to make some extra monopoly profit. Consequently there are opposite forces at work that influence the decision of a seller, on where to set up his stall.

Whereas searching costs on medieval fairs can be easily identified, price competition is harder to observe. Price regulations made by town officials are known from local markets and typically for basic foodstuffs (Kelter 1937). However no such behaviour is known from the big fair places, which are of interest here. Rather there is evidence of price fluctuations

over time (Brübach 1994, p. 200ff.; Dubois 1976; van der Wee 1963). Therefore we can assume that price competition played a role in these fairs. We can also imagine that merchants from the same towns collaborated and fixed prices in advance. Monopolist pricing was debated especially from the 16th century onwards (Blaich 1961). Therefore we need to analyse the agglomeration of similar products from two different points of view: with and without price competition.

Uncertainty: Fluctuation and Heterogeneity of Tastes

If the seller knows that beside search costs for the buyers, also price competition plays a role in determining his profit, then he must decide where to position his stall. Ideally he should be as close as possible to his customers' lodgings. This, however, requires that the seller knows ex ante who his customers are. This is not necessarily the case. There are two reasons for the uncertainty of sellers. First sellers do not know who will come to the market. Therefore it does not make sense to focus on some specific customers. Second, if the sellers do know who will come to the market, they cannot anticipate the tastes and preferences of their customers.

Let us examine the fluctuation of merchants on fairs. In general, complete statistics about which merchants participated on these fairs are not available. An exception is the fair of Chalon-sur-Saone. Fortunately we have from the fair of Chalon a unique statistic about the pattern of market visitors from 1367 to 1406. This statistic shows that 82.3% of sellers just came up to 3 times to the fair, 14.1% from 4 to 19 times and 3.6% more than 20 times. This statistic is consistent for different groups of products. However, the data from the 92 renters of "la grande halle" are missing. These merchants were a main part of the business of the fair (Dubois 1976, pp. 142-45). We also cannot infer from this statistic which of these sellers belonged to the same trading company and maybe had the same stall for a longer period. This probably would reduce the fluctuation a bit. Nevertheless the statistic shows a rather strong

fluctuation, which supports the argument for the uncertainty of the sellers' side in a dynamic context.

For buyers we do not have such precise statistics, but from the observed data we know that about 62% of buyers just came once or twice to the fair (Dubois, 1976, p.179). So also here we recognise a strong fluctuation. This does not only support the argument about the uncertainty of the sellers, but also the search argument on the demand side.

Whereas the statistic from Chalon-sur-Saone supports the argument of strong fluctuation, some tenancy agreements for lodging and stalls for the later fairs of Bergen and Frankfurt give a different picture. Incomplete statistics and single sources of Frankfurt and Bergen indicate that stalls and houses were rented for several years (Brübach 1994, p. 359; Sloomans 1985, p.280ff.).

The second line of argument to explain high uncertainty about the customers can be based on a change in taste or in some characteristics of their products. The market for textile products, which represented the largest number of transactions, was quite dynamic. Each textile producer tried to improve his products and invented new fabrics. Successful innovation spread quickly over the continent (a survey offers Munro 2004).

Consequently the demand steadily adapted to the new products. Sellers were confronted with changing demand. Products that had sold well a year ago would not be bought next year. A customer from the last year might not show up again. Sellers were confronted with a demand side, which could not yet rely on standardized goods, but had to check each product that fitted their inherent taste. Therefore the goods faced a random and heterogeneous demand. Evidence for such an element reflect the branding of products from the 13th century (Kaiser 1986, p. 728f.), when the fairs were already in full swing. Producers of goods for long-distance trade wanted to increase their market shares by binding customers to their branded quality products.

Finally, the role of the market maker, the town official, must be taken into account. Whereas each seller tried to maximize his profit and had an interest in locating and fixing the price so that he receives a monopoly rent, the market maker only shares this interest if his gain of market making directly depended on the prices received by the sellers. Town officials profited directly from a range of taxes and fees, which were directly or indirectly linked to the market transactions (i.e. for Frankfurt see Rothmann, p. 118f., for Chalon, Dubois 1976, p. 121ff.). However the only fees that were directly in line were some brokerage fees on which the towns normally participated and which in some cases were percentages on the price (Frensdorff 1901; Schmieder 1937). Otherwise these fees were per unit traded or fixed, i.e. when traders entered or left the market. Furthermore the town officials had an interest in creating markets, which attracted long-term buyers and sellers. Outside competition of other fairs put the pressure on town officials (Brübach 1994, p. 121ff.; Henn 1996) to create market structures that led to a competitive, not to a monopolistic or oligopolistic equilibrium, which only favoured one side of the market. Consequently we have to check if the agglomeration of products is the result of social planning.

III. A game theoretic model of agglomeration

Historical evidence shows that sellers with similar products tend to congregate. This observation can be interpreted in two ways. Either we assume that the market maker has made this a rule, because it maximizes his pay-off, i.e. the market maker's welfare is the social welfare of buyers and sellers. Then we have to ask if, given such a rule, the merchants have an incentive to participate on this market. Or we assume that the sellers themselves arrange to agglomerate, because it maximizes their individual profits. Let us first discuss the latter approach and assume the outcome is an equilibrium that is generated by strategically

interacting sellers and in a next step we check if such an equilibrium is socially optimal, i.e. if it maximizes sellers profits and consumers surplus.

The economic equilibrium concept we use, is a Nash Equilibrium approach. It means that merchants decide to agglomerate because they assume that all other merchants act rationally, i.e. maximize their profits when they make their allocation decisions. Therefore the concept hinges on the assumption of rational and strategically interacting agents. This leads to an agglomeration equilibrium if no merchant has an incentive to deviate from the agglomeration after all merchants have decided to congregate at the same spot.

Since sellers with similar goods agglomerate, we assume for the time being that they all sell comparable products. Furthermore the sellers know, where potential buyers lodge. For the sake of simplicity we assume a one-dimensional linear space with the length l .³ We do not have to assume that the space is geographical. The distance also can be understood as a measure of search costs., i.e. a potential buyer, who is located somewhere on the space $(0,l)$, has search costs that depend on how far he is from the next seller. The distance can be spatial, temporal or something else. The distributional form of the potential buyers along the one-dimensional space can be any kind. However let us assume that it is for the moment uniform.⁴

Given this knowledge, a seller has to decide where he wants to set up his stall. This is a strategic decision, because each merchant knows that all other merchants with similar goods simultaneously settle somewhere in the market town, before the fair starts. The closer a seller is to his customers, the more likely he is to sell his products. Since we assume a demand for a homogenous good, the customer buys from the merchant who has the lowest transportation or search costs. The location decision of the seller also influences his pricing strategy, i.e. locating closer to another stall, where similar goods are sold increases the price competition. Being isolated from the next seller means that a customer, who is close to the stand, must

³ The presented results also hold for a multi-dimensional space, see de Palma et al. (1989)

⁴ Equilibriums for other distributional forms have been calculated by Anderson et al. (1996).

decide whether to make a purchase there or incur extra searching costs and visit another stand. The higher these costs, the more the customer is willing to pay.

Here we see two effects at work, which influence the decision of the seller. The closer he is to the centre of the possible location space, i.e. the area inside the fair town, the more he reduces the aggregate transportation costs of all potential buyers. This is the *agglomeration or demand effect*: decreasing transportation or search costs increases the demand. At the same time the merchant must remember that the pay-off depends not only on the quantity he sells, but also his asking price. The further away the seller is from someone offering similar products, the higher the costs for the buyer who is located close to him, since he must purchase the desired goods elsewhere. Hence, the further away the seller is from the next market stand, the higher his asking price. This is the *strategic effect*.

Based on these two effects and knowing that all the other sellers have the same knowledge, he must decide where he wants to locate and what price he wants to ask. This decision can be sequential, in such a case this is a *location-then price* game or if the decision is made simultaneously, then is known as *location and price* game in the theory of (horizontal) product differentiation. The location of the merchants, i.e. the agglomeration of merchant with similar products, is then a *Nash Equilibrium*, when no seller has an incentive to remove his stand from agglomeration, because all other sellers agglomerate. Furthermore there exists an *equilibrium pricing* in case no merchant wants to change his asking prices, i.e. cannot make any profit by increasing the prices given the pricing strategies of all other merchants.⁵

In addition to this setting we consider the impossibility of accurately and completely predicting a priori differences in buyers' taste. Let us assume that there is an individual

⁵ Theoretical output of the last two decades have shown that in general no agglomerative equilibrium with these two effects exist. The original idea of this model was presented by Hotelling (1929) and reformulated as a non solved problem by d'Aspermont et al.(1979). Taking into account a random element as we demonstrate next is necessary to receive an agglomerated equilibrium as we observe it on our markets. This idea was introduced by de Palma et al. (1985).

uncertainty about the buyers' taste, but on the aggregate level a seller can estimate the aggregate demand for his product.⁶ Based on these assumptions the following utility function for a consumer locating at x and buying a product at location x_i can be derived⁷

$$u_i(x) = v_i(x) + \mu\varepsilon_i$$

where

$$v_i(x) = a - p - c|x - x_i|$$

The function is divided into the sub-utility function v_i and a random, individual-specific element $\mu\varepsilon_i$ which may be positive or negative. The sub-utility function contains the value for the good minus the price and linear transport or search costs. Let the price be here as given, this allows us to elaborate the game without price competition first. As explained earlier, this can be seen as one possible case. However in a next step we will assume that there is price competition and price setting becomes endogenous. The sub-utility is at its maximum when x equals x_i , or in other words when there are no search costs or more generally when the characteristics of the chosen product exactly match the consumers' ideal characteristics. The random expression contains a parameter μ and ε_i as a consumer-and-seller-specific random variable. It therefore reflects the heterogeneity of tastes. Combining the systematic with the random element, the maximum utility can be expressed in probabilistic terms. Assuming u_i is the utility buying from a firm locating at i and u_j is the utility of buying from a firm locating at j , then the probability that the consumers buy from firm i rather than j , because of $u_i > u_j$, can be written as

⁶ A different approach takes Stahl (1981), (1982). He calculates equilibria by minimizing transport costs for aggregate uncertainty.

⁷ This is based on the model by de Palam et al. (1985). This presentation is taken from the simplified version of Beath and Katsoulacos 1991, pp. 30-33.

$$\Pr\left\{\varepsilon_i > \varepsilon_j + \frac{c(d_i - d_j)}{\mu}\right\}$$

The distance between x and x_i is expressed by d_i . The probability is at a maximum if the consumer would encounter i first and at a minimum if i is encountered after j .

The critical parameter in this model is μ relative to the search costs c . Values in the range from 0 up to ∞ can be chosen. In the case of 0, the random element plays no role in the utility function and the sub-utility function alone decides to the seller that the customer chooses. This means that the seller knows exactly who his customer is. Hence, he only needs to decide where to locate based on the discussed demand and strategic effects. If μ increases from 0, which indicates greater influence of the random element and sellers cannot determine on an individual level customers taste. If merchant decides to set up his stall in front of his customers' lodging with the highest utility (measured without the random element), then can a high μ relative to some (relative low) search costs c , motivate the customer to search for his desired product somewhere else?

Based on this setting an agglomerated Nash Equilibrium outcome can be calculated. If it exists, it always exists in the centre of the space. De Palma and others⁸ have shown that in this and similar settings a unique agglomerated equilibrium exists if the heterogeneity or random variable is large enough relative to the search costs. In such cases it is in the seller's interest to minimize the aggregate transportation/search costs of all potential customers. This compensates for any specific local gain by placing the stall somewhere else. The strategic gain, i.e. by locating at an extreme point (at the corner of the one dimensional space) is too small, because of the high uncertainty concerning the willingness of the potential customer really to purchase. The needed heterogeneity to create an agglomerated equilibrium is rather small. Therefore as long there is some heterogeneity, then we can expect an agglomeration

⁸ De Palma, Hong, and Thisse (1990); De Palma, Liu and Thisse (1993).

equilibrium. The greater is the number of participating sellers (in a fixed space), the more heterogeneity we need to create such an equilibrium. For little or no heterogeneity the equilibrium is dispersed or nonexistent. The specific structure of a dispersed equilibrium depends on the number of sellers.

The agglomerated equilibrium is for the most of the same parameter ratios also socially efficient, when it is a seller-driven competitive outcome. However the merchants agglomerate for a smaller heterogeneity/ searching costs ratio than the social planner would group them. Consequently whenever the social planner agglomerates sellers with similar products, so would the merchants. But the social planner would not always support the grouping of merchants. But as soon as there is enough uncertainty, the social planner and the competitive outcome are in line. This can be explained by the fact that under a common price the aggregate pay-off of the sellers is always the same. To increase sales, merchants minimize the transportation costs of sellers. If the uncertainty about the potential buyers location sufficiently large, the merchants always minimize the buyers' aggregate transportation costs. Consequently they maximize the welfare of the consumers and the seller's interest is to maximize aggregated welfare.

Now let us factor price competition into the model.⁹ Let us assume that the merchants are grouped by products. In case of homogenous goods, price competition would forces the prices down to a competitive level, implying zero profits. However if we assume some heterogeneity in taste, then price competition decreases, since a customer searches for a specific product. The higher the heterogeneity, the smaller the price competition. In general there is only an agglomerated equilibrium, when the heterogeneity is large enough. The minimum differentiation in one dimension needs sufficient differentiation in another dimension. However the equilibrium results with and without price competition are quite

⁹ de Palma et al. (1985); de Plam, Labbe, and Thisse (1986).

similar. The heterogeneity needed without competition to agglomerate is already sufficient to reduce price competition.

If an agglomerated equilibrium exists, then it is socially optimal. Therefore no self-enforcing equilibrium needs outside enforcement by the market maker. However, depending on the transportation costs structure, i.e. quadratic costs, there exists a dispersed market equilibrium for a low enough ratio, where there is excessive variety and an agglomerated equilibrium would restore a social outcome. But in general, as in the case without price competition, if the ratio of heterogeneity and search costs is high enough the competitive and optimal outcome are agglomerated and consequently in line.

The equivalence of the seller's optimum as well as the market maker's agglomerated equilibrium for a wide range of environments allows us to draw the following conclusion. If the social planner designs an agglomerated equilibrium, then the selling merchant always has an incentive to participate in such a market, because he never can make a higher profit if he violates this rule or if he sells his goods on another market. Consequently the market maker can also attract the most sellers. At the same time he does not harm the buyers with such a market policy.

VI. theory and history

Market makers and sellers

The model predicts that the historically observed grouping of similar product is driven both by the sellers and by the social planner, who maximizes aggregate welfare. Consequently we should find evidence of such forces at work on the micro level.

Sources that identify any behaviour on the micro level, are rare. However, sources from the fairs of Bergen op Zoom give detailed evidence of the behaviour of town officials and sellers (Slootmans, p. 270- 280). We want to use them to make a case study.

Many sources document that the town officials were busy organizing the stalls for the merchants in such a way that merchants with similar products were grouped. In 1432 the town officials ordered the merchants from Namen to locate next to the merchants from Luik. Both groups of merchant sold mead goods. Another order from 1479 says that all “galootssen,” “roode schoenkens” and “platijnmakers” have to be placed to the north of the “St. Jacobsbrug.”

Sources from Bergen indicate that the town officials were busy with enforcing such an order in a changing market environment. A typical problem was that the market space for a specific product genre was no longer large enough. When the “Lakenhal” was too small to fit all cloth merchants, the “gewantsnijders” from Dordrecht, Leiden, Gouda and Delft were located in the Hoogstraat. In such cases either the space was enlarged if possible or the whole group of merchants was relocated to a new place or street. In 1468 the furriers were moved from the “Antwerpse kerkhof,” because it could not be used and documents indicate that town officials tried to move them somewhere else. Also the “Huidenmarkt,” where skins were sold, was relocated to the “Korenmarkt.” More evidence of such relocations gives an ordinance for the moquette merchants and fur sellers from 1479.

We also can find evidence that merchants wanted to be grouped. Documents from the end of the 15th century indicate that the furriers from Antwerp and Bergen had the right to be placed together. Related to this right, the town officials passed more laws about the distribution of stands for other furriers, because they expected protests. They guaranteed the merchants from Dordrecht and Vlaanderen the right to have first choice of assigned places for the next two fairs.

Another note on the interest of merchants to be assigned to an certain place for a specific product genre reflects an agreement between the town officials and the English community. Although the English had their own trading house in Bergen, they received their own linen stand at the “Groote markt”, probably to be closer to other linen merchants.

Although the merchants wanted to be located in close proximity, they also had an interest in choosing the best spots on the assigned market place. Detailed rules existed on the specific distribution of stands. A hierarchy dictated who would have first choice, or the collective decided who could have which stand.

How can we interpret such a behaviour on the basis of our model? In general, as the model predicts, the agglomeration is driven by the market maker and the sellers. Profit maximizing merchants expected a higher gain when they were grouped. A decrease in search costs on the demand side and a drop in uncertainty on the supply side based on heterogeneity of tastes and fluctuation of trading partners, led the seller to expect more sales. Market makers had an interest in maximizing aggregate profit, therefore grouping sellers was in their interest and an ongoing challenge in a changing market environment.

However if we leave the argument of the changing environment aside, we need to ask, why we observe rules of an agglomerating market design if such a design is self-enforcing by the supply side.

There are several explanations for this. First, we can think of a bounded rational behaviour of market participants. Although they try to maximize their profits, they only have a partial perception of how to do so and the market maker has a more complete picture of the whole market process. Therefore we can interpret the pushing towards agglomeration as a slow process of adaptation, which was only recognized by all parties as time passed.

Another way to interpret this is to assume that the agglomeration point is one of several equilibrium points. In our model the equilibrium is unique, because the only point on

the one-dimensional space, which minimizes aggregate transportation/ search costs is in the middle. However if we assume that search costs are minimized because sellers agglomerate as long they are in the centre of the town, then sellers face a problem of multiple equilibrium selection. The market maker can solve this problem by making a choice. Sellers have no preference for location as long as all merchants with the same kind of products agglomerate.

Finally we can interpret this as a situation in which sellers and town officials have opposing interests . The model predicts such a state for a low enough heterogeneity if we have price competition. However the parameter range is very narrow for such a separated equilibrium. Hence, we can think of alternative forces. Let us assume that heterogeneity falls. This can be because of the change of information flow over time. Then sellers have an interest in dispersion. From a social perspective, the market maker should support this behaviour. However, town officials established many logistical mechanisms as quality control and fees around such grouped sellers. Hence, the bureaucratic apparatus is less adaptable. As a consequence the town officials enforce an inefficient grouping.

Finally, a remark must be made about the distribution of stands at an agglomerated place. Since this is no deviation from the agglomerative equilibrium, we must interpret these rules just as an extra dimension of the same problem. Given that the merchant knows that all sellers will be agglomerated and that all potential buyers will show up, it is good to have the stand at the entrance of the hall. This means that the location of the stand can bring the seller a small extra benefit [or perk], in form of a small monopoly rent, because he is the first to offer his product. Consequently this behaviour only supports the general forces at work in our model, which is also applied to the location of a specific sub-market.

The evolution of agglomeration

The history of the market microstructure of fairs and the theory of product differentiation indicate that the evolution of the agglomeration of similar products can be explained by a

profit maximizing seller and by the interest of a social planner. However it is important to recognize that such a market organization only evolved over time and was not the most natural way to start.

The timely differentiation of products on the Champagne fairs and maybe also on other fairs earlier in time, can be understood as a first step in which the economic forces were at work. The idea of a timely grouping was probably taken from local weekly markets, where different goods were sold on different days.

The topographic agglomeration only as a later effect can be explained by the organization of the travelling merchants. The merchants arrived at the fairs in caravans and were grouped by their place of origin.¹⁰ Each merchant community rented its own house, where the members lived and traded during the market period. This was not only convenient, but was also guided by legal aspects. Merchants from different communities brought their own laws with them. Fair officials respected the laws of the different merchant communities as long as they solved their own problems and settled their own differences.¹¹ When legal disputes between merchants of different communities could not be resolved, the community was responsible or liable for the damage to an individual merchant. Therefore it was practical for merchants from the same community to reside in the same house or street, since this enforced transparency within their own community. Sources from the fairs of St. Ives amply document this (Wedemeyer-Moore, p. 152f.)

The adaptation to the product grouping is evident the fact that some merchant communities kept their own trading halls or that the name of a lodging house or selling hall showed that it was originally the residence or selling place of a particular trading community.

¹⁰ Beside the already quoted literature on medieval fairs and trade see also on merchant community and trade Face (1957); (1959).

¹¹ On the legal aspect of community and inter community responsibility of merchant communities see Greif (2002) on a sovereign debt perspective Boerner and Ritschl (2002).

The Trierer Hof in Frankfurt, for instance, suggests that merchants from Trier had originally lodged and traded there. Later this place was used for trading all types of leather products. Other houses that still bore the name of a specific merchant community, eventually offered lodging to merchants from other towns. By the end of the 16th century, 33 out of 161 merchants from Nürnberg lodged in the “Nürnberger Hof.“ . The others hailed from Breslau, Danzig, Posen, Leipzig, Milan or Zurich (Bauer 1991, p. 301).

Town officials solved such trade-offs between legal and allocation aspects in such a way that street stalls from the same merchant community were located together, but grouped again with other merchant groups, who sold similar products. A functioning legal enforcement system and the recognized economic gain from the grouping of products led them to continue modifying the market organization.

Finally, there was also need to shorten the duration of the fair. The timely differentiation of different product genres on the Champagne fair made each fair rather long . If we compare the length of a Champagne fair to that of the successor fair of Chalon-sur-Saone, we find that it was shortened from 45 to 28 days. This also allows greater product and geographical differentiation.

A comparison of these two fairs proves that the different organizational forms were not a phenomenon that can be explained by geographical or other differences. The fair of Chalon-sur Saone shows a nearly perfect product grouping. The fact that Chalon-sur-Saone is recognized as the direct successor of the regional Champagne fairs , indicates that the change of the system was deliberate. The fairs of Chalon were built from the scratch outside the town. Therefore town officials had the freedom to construct an economic efficient market.

V. Market dispersion and forces of de-centralization

The creation of market platforms allows the establishment of efficient market clearing in case of individual uncertainty about customers' tastes. The existence of such a market structure also opens the opportunity to directly compete for market shares. The introduction of trademarks during the 13th century all over Western Europe is an excellent example. Manufacturers from different regions of Europe, who produced for the far trade and specifically for these big fairs, used this strategy. The creation of standards and labelling of goods was especially popular among textile producing towns (Eberstadt 1899; Espinas 1923; Posthumus 1908). The existence of a market platform also facilitated the introduction of new products, because the problem of individual uncertainty about tastes could be circumvented.

However the standardization and labelling of products also reduced the uncertainty on the supply and search costs on the demand side of the market. Hence, it reduced the need for agglomeration. A change of buyers behaviour on the fairs at the end of the Middle Ages documents this. Woollen products were ordered in advance on the fairs of Brabant during the 16th century (Stabel 1998, p. 29). In Frankfurt, fine wine was already traded well before it arrived. Frankfurt was Germany's leading wine market. The deals were set up in advance and the wine was only delivered during the fair period when the financial transactions were processed (Rothmann 1998, p. 167-96). During the Bergen fairs, certain dyes were sold as much as a year in advance (Slootmans I 1985, p. 397f.).

A reduction in individual uncertainty lowers the utility of the agglomeration of certain product genres and obviates the need for fairs. Hence, we can understand the agglomeration as a fractal of the evolution of fairs. Merchants could no longer make their deals not on specific assigned markets, but in merchant houses or in privacy as the fairs began to disappear.¹² Evidence on the timely dispersion of fairs also documents such tendencies. Whereas in Frankfurt at the beginning of the 15th century a fine had to be paid when

¹² The classical argument that merchants wanted to make deals in secrecy to avoid extra taxes does not need to be excluded, but can be used complementarily and independently.

merchants traded after the ending of the trade week, in the 17th century the ending was regularly extended (Brübach 1994, p. 133f.).

Consequently, the merchant, who exactly knows what kind of product he wants and knows where to purchase it, can go right to the seller, who could be located anywhere at the fair. If we think in terms of standardization, then the selling merchant only needs to show his customer a sample and can deliver at any time. The merchant could also place an order and not go to the market at all. It is then possible for trading companies to establish their permanent factories in towns in which there was demand for the product. Such developments, of course, accompanied the rise of literacy in commercial trade.¹³

The disappearance of good markets can be explained along this line. What often remains on the classical fairs is the financial clearing. Liability issues might have hindered the earlier decentralization of financial markets.

VI. Conclusion

This paper has studied the effects of agglomeration of specific product genres in medieval fairs. This market structure could be observed at all large medieval fairs. Based on a model of product differentiation we showed that the agglomeration of similar products maximized the profits of sellers and the aggregate welfare of a social planner.

The argument hinges on the fact that individual merchants could not precisely forecast who their customers were, because of the heterogeneity in taste and fluctuation of demand. Buyers were faced with search costs to find their desired products. Price competition did not drive down the prices to a “zero” profit level, because the heterogeneity of the demand side permitted monopolistic pricing. The seller’s optimal outcome is consistent with the social

¹³ See business histories on late medieval and early modern firms, i.e. de Roover (on the Medici, Kellenbenz (1990) on the Fugger company or the history of super companies Hunt (1994), Hunt and Murray (1999).

optimum, because the supply side only minimizes transport/search costs of the demand side. This is a result of the individual uncertainty about customers' taste.

The predicted interest of both sellers and market makers to group could be documented by sources on the micro level. Ordinances from Bergen-op-Zoom show that the agglomerated equilibrium was driven by town officials and sellers alike. Furthermore we showed that this agglomeration on evolved gradually. Finally we linked this market design to decentralization. We showed that the creation of such a market platform increased the competition for market shares and promoted the segmentation of the market. This led to a drop in uncertainty at the individual level and promoted decentralization.

This analysis sheds light on the efficiency of markets and their relationship to specific market regulations. Medieval markets are often depicted as “over” regulated. In particular the agglomeration of products is often only explained by the need of the town officials for control and efficient exaction of fees from the merchants. This study showed that medieval markets were competitively and efficiently designed.

The grouping of different product genres is of course only one element in the evolution and inner design of markets. Many other elements still merit exploration.

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