Working Papers No. 132/09

Money, States and Empire: Financial Integration Cycles and Institutional Change in Central Europe, 1400-1520

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December 2009

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Abstract
By analysing a newly compiled database of exchange rates, this paper finds that Central European financial integration advanced in a cyclical fashion over the fifteenth century. The cycles were associated with changes in the money supply. Long-distance financial integration progressed in connection with the rise of the territorial state, facilitated by the synergy between princes and emperor.

1. Introduction

Traditionally, research paints a gloomy picture of trade in the late Middle Ages. Pirenne (1936/61: 192) saw medieval economic expansion coming to an end early in the fifteenth century. Lopez and Miskimin (1962) coined the 'economic depression of the Renaissance'. Mainly drawing on English export and import data, Postan (1952/87: 240 ff.) called the second half of the fourteenth and the first of the fifteenth century 'a period of arrested development'. Analysing customs records from Genoa, Marseilles and Dieppe, Miskimin (1969: 129) arrived at a similar conclusion: According to him, trade experienced a downward trend throughout the greater part of the fifteenth century. As recently as the 1990s, Nightingale (1990; 1997) claimed that in the middle decades of the fifteenth century English commerce ran into serious difficulties, with London merchants suffering a liquidity crisis. The most far-reaching

[*] We would like to thank Giovanni Federico, Ling-Fan Li, Klas Rönnbäck, Patrick Wallis and the participants in the Thesis Workshop in Economic History at the LSE and the 'Keeping your Distance' session at the 8th EHES conference at the Graduate Institute in Geneva for valuable comments on a draft of the paper. The research on this project was supported with a grant by the Deutsche Forschungsgemeinschaft.

consequences of such conditions were probably seen by Wallerstein (1989). For him, shrinking economic opportunities within late medieval Europe triggered the expansion of European trade to other continents, whose exploitation allowed the development of industrial capitalism in the core of the new World System.

Voices dissenting from this view, however, appeared early (the older debate is reviewed in Lopez and Miskimin, 1962; and Day, 1987a) and have become stronger in recent years. Already in the 1980s, Day (1987a) argued that some sectors of trade and industry may have prospered in a period of general contraction. Other historians have pointed out that the rise in average real incomes caused by the shifting land-labour ratio in the decades following the Black Death triggered an increase in demand for high quality agricultural and manufactured goods. In addition, it is claimed that emerging centralized states helped commercial growth by protecting property rights with increasing effectiveness. As a result of these developments, the declining trade in staples such as cereals was offset by a rise in long-distance commerce of higher-value commodities not only per capita but also in absolute terms (Dyer, 2005: 177; Britnell, 1996: 179 ff.; Epstein, 1994: 462 f.). Munro (2001: 25, 31 f.) argues in a similar vein, claiming that the fifteenth century was characterized less by commercial depression than by restructuring. Drawing on work done by van der Wee (1990), he stresses the emergence of new overland trade routes between Northern Italy and the Netherlands that began in the early fifteenth century and received its most powerful stimulus from the South-German silver and copper mining boom, which commenced in the 1460s. Blanchard (2009), too, stresses the role of the mining industry in the development of trade networks in fifteenth-century Central Europe. For him, this led to developments analogous to those experienced by Northwestern and Southern Europe during the ‘commercial revolution’ of the high Middle-Ages.

A problem with these hypotheses is that data on late medieval trade flows are extremely rare: Most of them stem from fragmentary customs records. The actual importance of commercial developments and the relative contribution of the underlying factors are accordingly hard to assess. In order to identify pre-modern patterns of trade, scholars have in recent years turned to the quantitative analysis of grain price data, which are comparatively well-preserved (Persson, 1999; Jacks, 2004; Özmucur and Pamuk, 2007; Bateman, 2007). The approach is based on the Law of One Price: extending commercial networks lead to converging prices that develop stable relationships. Analysing price structures therefore allows conclusions on trade flows.

For the fifteenth century, this research has concentrated on markets in relatively well-documented parts of Europe, i.e. in England, Italy and the Netherlands. However, the results are so far contradictory. Thus, Gras (1915), who pioneered the quantitative analysis of market integration through price data, and Clark (2001) offer sharply contrasting accounts of the extent to which the late medieval English grain market was extensive, as opposed to being local, but they agree in claiming that there was no market integration at the time. Galloway (2000), too, stresses the existence of a national market for grain in late medieval England. However, he finds that markets did integrate between the 1430s and the 1520s at least in some cities. In fifteenth-century Italy, Epstein (2000: 147 ff., 2001) sees consistent evidence of market integration. Unger (1980; 1983) initially suggested that technological advances and improvements in ship design contributed to intra-European long-distance integration in the fifteenth century. However, in his later work he finds little to confirm this, arguing that while there is some evidence that the Dutch and the Polish markets did integrate, within the Netherlands grain price integration was ‘well under way before 1500’. He concludes that there was no major change between the beginning of the fifteenth and the end

of the sixteenth centuries (Unger, 2007: 356, 362). Bateman (2007), finally, does not see any progress in European grain market integration at all between the fifteenth and the eighteenth centuries.[1]

In sum, even if most scholars today agree that the development of European trade resumed at least from around the 1460s, quantitative analyses of market integration have so far failed to corroborate the claim. There is as yet little clarity about whether markets integrated and commerce grew in parts of the developed western and southern core regions of fifteenth-century Europe, let alone in other areas of the continent. The almost exclusive focus on grain markets is partly responsible for this situation. Grain prices are, in fact, far from ideal for analyses of this kind. Under pre-modern conditions, they were subject to violent seasonal fluctuations. In consequence, where only a few price observations per year exist, which is the case for most places before the sixteenth century, their informational value is limited. Most of the relevant literature is therefore forced either to exclude the fifteenth century altogether, or to focus on a few relatively small regions. Moreover, grain is a typical staple with a low value per unit of weight. Hence, transport costs play a large role in the integration of grain markets, which makes it hard to infer from their analysis how markets for goods with more favourable weight-value ratios developed – i.e. markets for luxury agricultural and industrial products such as some types of cloth, which were the main object of development of fifteenth-century trade.

In these respects, late medieval financial markets exhibit distinctive advantages. To be sure, de Roover (1948: 67) argued on the basis of qualitative sources that money markets were subject to seasonal fluctuations too, but quantitative evidence of such fluctuations is weak even for well-documented centres of international finance such as Bruges

[1] Where the earlier period is concerned, her analysis is limited to the Southern Netherlands and England.

and Florence (cf. de Roover, 1968: 106 ff.; Bernocchi, 1976: 92 ff.; Molho, 1971: 209 ff.). Also, the costs of transporting money were comparatively low – indeed, its weight-value ratio was more favourable than that of nearly any other commodity. Financial markets therefore show the optimum of what could be achieved in the field of market integration at any given place and point in time. They are an ideal benchmark that allows us to assess the maximum extent to which other markets could be integrated. In addition, insofar as they were influenced by similar factors, it is likely that dynamics of financial integration mirror those of other goods with favourable weight-value ratios.

Scholars often assume that there is insufficient data for the quantitative analysis of financial market integration before the late seventeenth century (Denzel, 1996). With few exceptions (Volckart and Wolf, 2006; Keene, 2000; Kugler, 2008), the relevant literature therefore concerns the eighteenth century and later periods (Neal, 1985; 1987; Schubert, 1988; 1989; Lothian, 2002). In fact, however, there are abundant primary sources from the late fourteenth to early sixteenth centuries where financial transactions and monetary conditions were recorded. On their basis, we compiled a new data-set that allows the quantitative analysis of financial integration. Specifically, we collected two types of data: on the one hand, c. 13,000 observations of exchange rates from a number of places in Central Europe, where monetary fragmentation was so pronounced that currencies constantly needed to be exchanged – a process that unavoidably left its mark in the sources. On the other hand, the dataset contains information on the bullion content of coins from the currencies that were exchanged. Our core idea is that combining these two types of data allows us to calculate local gold-silver ratios; spreads, i.e. differences between these ratios, indicate deficiencies in market integration. Using this method we investigate whether and how the integration of the money market changed in the six decades to either

side of the resumption of trade development in about 1460. We also provide an explanation of the process by analysing patterns of integration in the context of developments in fields like bullion, transport technology and institutions.

The following section (2) presents our data. The results are discussed in sections 3, 4, 5 and 6. Our analysis of overall trends (section 3) finds that there was financial integration and that this advanced in a cyclical fashion – in Kodratieff cycles, to be precise. The timing of these cycles was more directly related to changes in the money supply than to the availability of bullion. Specific trends in convergence and stability (section 4) show that financial integration was widespread but uneven. In particular, the data evidences two parallel processes of integration: one at the local level between relatively well-integrated localities; and a somewhat stronger process of long-distance integration between weakly integrated places. While the uneven patterns are compatible both with changes in trade flows and declining costs, threshold autoregressive analysis (section 5) suggests that financial integration was due mainly to declining transport and transaction costs. In some cases, the level of integration between close localities was comparable to that of nineteenth-century grain markets. Panel data analysis (section 6) finds strong evidence that institutions mattered for the dynamics of long-distance financial integration. Surprisingly, the rise of territorial states contributed less to promoting intra-territorial integration than to long-distance integration. This result can be traced to a synergy between territorial and imperial rule. The concluding section (7) summarises the results and discusses their implications for future research.

2. The Value of the Rhinegulden

In order to analyse trends in late medieval Central European financial markets from the perspective of the Law of One Price, we compare gold-silver ratios across cities and time. Such ratios are a measure of the value of bullion often employed in the study of late medieval bullion flows (Miskimin, 1983; Spufford, 1991: 267 ff.). In the present study, it indicates how many units of silver were paid for one unit of gold when silver coins were exchanged with the Rhinegulden. We chose these ratios as unit of analysis because they allow us to compare exchange rates involving a large number of silver currencies over a long period of time. The gold currency, i.e. the Rhinegulden, was minted by the electors and other Rhineland princes from 1386, and was the most popular gold coin in fifteenth-century Central Europe (Weisenstein, 2002). As explained in greater details at the end of this section, limiting the analysis to the Rhinegulden ensures that the figures are more directly comparable. The basis is the dataset of exchange rates mentioned in the previous section. Table 1 gives an overview of the types of exchange rates and sources we used.

Table 1: Observations by Exchange Rate and Source Type

Source type:	Merchant	Merchant	Non-	Non-merchant	Notarial	Historian
Exchange Rate type:	account book	corres-pondence	merchant account book	correspond ence	Register	
Manual exchange	21	0	10	1	0	1
Loan	2	1	123	1	60	0
Bill of exchange	15	32	5	0	9	121
Not known	851	107	9,000	148	43	2,541
Total	889	140	9,138	150	112	2,663

We found the majority of the data (about 70 percent) in urban, princely and ecclesiastic account books that are comparatively well

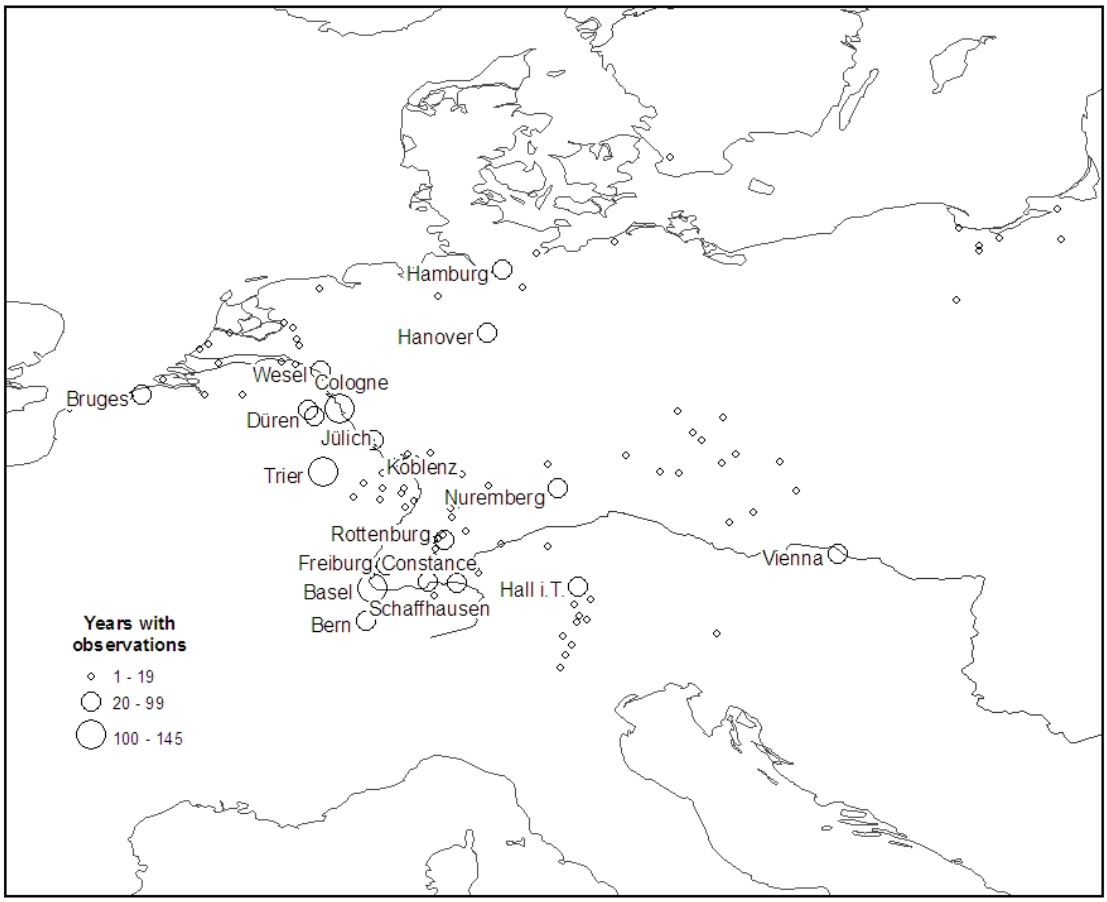
preserved. Exchange rate notations appear on almost every single page of these sources – a fact that is not surprising considering the large number of silver currencies used in Central Europe. There, in the fifteenth century about 500 mints were in operation (Sprenger, 2002: 81), which supplied at least 70 major and many more minor currencies. Merchant account books would probably be equally fertile sources, if more of them were preserved. As it is, only about 7 percent of the exchange rates used here are from commercial accounts. Commercial and non-commercial correspondence each yield another c. 1 percent of the data, and c. 1 percent was found in notarial registers and similar sources. We also use rates mentioned by historians. Including the material provided by Spufford's (1986) *Handbook of Medieval Exchange*, they amount to c. 20 percent of the total dataset (see table 1).

Exchange rates can also be found in political ordinances and official valuations. There is a broad literature that uses such rates as a basis for calculating gold-silver ratios (e.g. Watson, 1967; Lane and Mueller, 1985: 324 f.). However, as argued by Miskimin (1985/89: 148 ff.), late medieval rulers were seldom able to enforce the circulation of their gold at its nominal par value, and there is evidence of this from the area we study, too. For example, in 1490 the official exchange rate of the Rhinegulden in Hamburg was 22 shillings, but even the revenue office of the city itself used a rate of 24 shillings (Bollandt, 1960: 197; Koppmann, 1880: 209). In view of such circumstances, we exclude politically imposed exchange rates from the analysis, focusing on market rates only. This, admittedly, takes care only of the most obvious form of intervention in the money market. The bare existence of political rates must have influenced rates paid on the open, i.e. 'black' market. In addition, there were institutions such as restrictions on the export of bullion or the number of money changers (Stromer, 1970: 342 ff.; 1979), which also influenced exchange rates. We are aware of these problems and must, at present,

accept that they constitute a source of imprecision in the analysis for which we can not yet control.

The following map shows the spatial distribution of our exchange rate observations. They are a sample of the transactions concluded on the late medieval money market, whose composition is determined by the survival and accessibility of the sources. The drawbacks of this are obvious: Records in some cities are better preserved than in others, and observations are concentrated in the western part of the area under study, which as a whole is therefore imperfectly represented. However, the resulting bias has one important advantage: Most observations are found along the main artery of late medieval transcontinental trade, which linked Northern Italy and the Netherlands. This implies that the assumption of on-going trade, needed to carry out analyses based on the Law of One Price, is not very demanding in our context.

Figure 1: Exchange Rate Observations, 1350-1560: Spatial Distribution



Exchange rates were based on several types of transactions, three of which are relevant here (cf. Spufford, 1986: I f., cf. table 1). First, there was the most elementary one, manual exchange, i.e. the simultaneous and on the spot exchange of coins of different currencies. Second, some exchange rate notations appear in loans where the creditor agreed to repay the sum he borrowed in a different currency. And finally, there was the most sophisticated kind of exchange, which made use of bills of exchange.

The Canonical ban on usury implies that lending money at interest was illegal. Accordingly, rates mentioned in loans and bills of exchange may have contained a hidden interest rate. For those found in bills, this

applied if these were primarily used as credit instruments and not as a means to transfer money between localities (in which case the exchange rate probably contained a transport cost component, cf. de Roover, 1948: 62; Mueller, 1995; Munro, 2003: 543 ff.). Loans, at any rate, presumably did conceal such an interest rate. Hence, there may have been a systematic difference between these types of exchange rates and those paid in manual exchange. Unfortunately, the sources specify the underlying kind of contract in only about four percent of the cases – too few to allow us to identify a systematic difference between exchange rates based on bills and loans and those based on manual exchange.

In order to determine the actual share of such transactions in the late medieval money market, we would need to know how many of those rates where the sources do not record the type of underlying contract were based on loans and bills, too. While there is no way to answer this question precisely, we can assume that in most cases the authors of the sources were not interested in recording if a transaction was based on manual exchange, as this was the most simple and straightforward type of exchange. Bills and loans, however, i.e. transactions over time and possibly space, needed to be carefully noted. We can therefore assume that the sources do explicitly mention such bills and loans as there were. Moreover, we need to take regional variations into account. Bills were often employed in some Western European markets such as Bruges, but though they were known in Central and Northern Europe, merchants rarely made use of them there (de Roover, 1948: 55, 60; Spufford, 1991: 254 ff.). Out of the c. 600 observations from merchant account books and areas outside England and Flanders that we have, only 1 refers to a bill of exchange (from Cologne to Bruges: Lesnikov, 1973: 13). Even in Flanders, non-cash means of payment made a negligible contribution to monetary circulation overall (Blockmans, 1990: 26; cf. Murray, 2005: 123).

The question of how the fine gold and silver content of the coinage developed involves difficulties of its own. Apart from the fact that late medieval sources are often ambiguous because their authors did not clearly identify the coins they were exchanging, there are four issues that need to be highlighted. First, the documents containing information on the bullion content of the late medieval coinage, that is primarily ordinances and contract between political authorities and the mint personnel, are difficult to interpret. On the one hand, in some cases one cannot be certain about the exact metric equivalents of the many local or regional units of weight used in the mints. On the other hand, the ability of medieval and early modern mint technicians to make chemically pure gold and silver has been questioned (Miskimin, 1963: 31; Jesse, 1928: 160). This latter problem is important because in some cases it is not clear whether the documents talk of 100 percent pure precious metals that were to be alloyed with specified quantities of base metals such as copper, or if what they mean is gold and silver of the highest purity that could be manufactured (e.g. '*argent le roi*' of 95.7 percent purity), to which the copper was to be added (cf. van der Wee and Aerts, 1979: 61 f.; 1980: 234 ff.). We assume here that, if not explicitly stated otherwise, the sources presupposed *argent le roi* and gold of corresponding purity as raw materials.

A second difficulty is posed by the fact that usually – the Pound Sterling being the most important exception – the bullion content of different denominations belonging to the same currency was not proportional: Small denominations contained proportionally less silver than larger ones (de Roover, 1948: 222). Here, we assume that most people did not pay for high-purchasing-power gold coins with small change, but used the largest silver denominations available.

Debasements and re-enforcements pose a third difficulty because there is no first-hand information on how long it took to replace old coins

in circulation with new ones. This depended on several circumstances, most importantly on whether the bullion content was reduced or increased. If, in the first case, the nominal value of the monetary units remained the same, it was in everybody's interest to exchange old coins for new ones as quickly as possible. In contrast, if the coinage was re-enforced, we can, in line with Gresham's Law, assume that old coins tended to stay in circulation for longer. The distance to the mint is also relevant: the larger it was, the longer would it take for new coins to replace the old ones. This, finally, also depended on the mint output in the period after the change in the standard. As with few exceptions – notably England and Flanders – relevant data are almost entirely lacking. As we work with yearly means, which obscure potential adjustments that took place within weeks or months after changes in the monetary standards, we focus on the distance to the mint, which we take into account after monetary reforms (cf. Volckart and Wolf, 2006). Specifically, we assume that within the home territory, new money replaced old coins within one year, whereas abroad, adjustment entailed a time lag of one year.

A final difficulty is caused by the fact that, once in circulation, money became worn down. For silver, losses due to wear and tear have been variously estimated at between 2 and 2.75 percent per decade (Mayhew, 1974: 3) and between 0.25 and 0.87 percent per year (North, 1990: 108; cf. Patterson, 1972). The higher purchasing power of gold suggests that its velocity of circulation was lower than that of silver, so that gold coins may have been exposed to less wear and tear. Nonetheless we assume that coins made of both metals suffered alike from defacement, so that its effects on gold and silver cancelled each other out. This assumption is realistic, as silver was more often alloyed to a higher degree with base metals; a process that increased its hardness. To be sure, given that mint outputs varied, the average age of coins in circulation must have varied, too. In this respect, our assumption that all

coins were equally defaced is therefore unrealistic, but as in most cases data on the output of mints do not exist, it is an acceptable simplification.

To reduce the noise caused by these factors, we rely on the results of chemical tests conducted on the coins either by late medieval authorities or by modern researchers (cf. e.g. Munro, 1972: 212 ff.; Grierson, 1981; Kubiak, 1986). This helps us to determine how much gold and silver changed hands when money was exchanged. In order to use these data for the calculation of local gold-silver ratios, we finally need to take into account the fact that on the market some gold currencies were more popular than others. In consequence, gold-silver ratios that are determined for one place, but on the basis of different types of coins are not necessarily alike. As the great majority of transactions involve the Rhinegulden, we examine only rates based on this coin. In addition, we included only rates based on the most popular silver currencies used in each locality.

3. Kondratieffs of Integration

The most common way of examining trends in market integration is to consider the coefficient of variation, which is a dimension-less measure equal to the standard deviation divided by the mean (Jörberg, 1972; Toniolo et al., 2003; Jacks, 2004; Dobado González and Marrero, 2005; Federico, 2007; Özmucur and Pamuk, 2007; Rönnbäck, 2009; Mitchener and Ohnuki, 2009). The smaller it is, the lower is the level of 'price' dispersion and the greater that of market integration. As well as examining the coefficient's linear trend we use the augmented Dickey Fuller test, which signals the presence of a permanent trend, to determine whether there is evidence of a unit root (Özmucur and Pamuk, 2007; Klovland, 2005). In addition, like Federico (2007) and Federico and Persson (2007), we estimate the trend through the Epanechnikov kernel.

This non-parametric technique permits the investigation of non-linear behaviour. For the same reason, we estimate the trend also through panel data analysis of the spreads (cf. Bateman, 2007).

As our data covers the years between 1400 and 1520 comparatively well, the yearly samples are based on relatively homogeneous sets of cities.[2] There is only one year with fewer than four observations, the yearly average being almost ten. While in the first half of the sample there are on average fewer yearly means than in the second, the difference is small: 8.85 as compared to 10.58. Low seasonality means that the observations show hardly any variability within years, so that the bias ensuing from examining annually-grouped data from each city is limited. If anything, this bias should understate the degree to which markets integrated, as the yearly averages are based on more observations in the earlier part of the fifteenth century than in the later period.

We test the robustness of the results against four sub-samples. The first one is restricted to those cities for which at least 20 yearly observations are available. This restriction entails a loss in terms of representativeness, but offers gains in terms of homogeneity. The second sub-sample consists of the three cities for which we have more than 100 yearly observations and of those years for which we have observations from all of these cities. In this case, the cities covered do not vary from year to year, but only some years are represented. In the third sub-sample we exclude these cities in order to examine whether results are influenced by their over-representation in the other samples. Finally, our fourth sub-sample excludes all cities on the river Elbe or east of it, since it is often assumed that due to late medieval trade patterns, financial

[2] As differences in the sample composition across periods may affect patterns, a homogenous panel of data is desirable to carry out this analysis. Still, analyses of the coefficient of variations based on unbalanced panels are known in the literature (Jörberg, 1972).

markets exhibited persistent differences between gold-silver ratios in the west and east (Watson, 1967; Flynn and Giraldez, 1995). This could distort our results.[3]

[3] We owe this point to Sevket Pamuk. Interestingly, however, even if the analysis presented in section 4 supports the claim that there were limited exchanges between Western and Eastern Europe, our data gave rise to little or no evidence of systematic variations of the gold-silver ratios between the two areas. The average gold-silver ratios varied very little: 11.81 in the cities located at West of the Elbe, as compared to 11.85 in the others.

Figure 2: Financial Integration in Central Europe: Coefficient of Variation of the Gold-Silver Ratio, 1400-1520

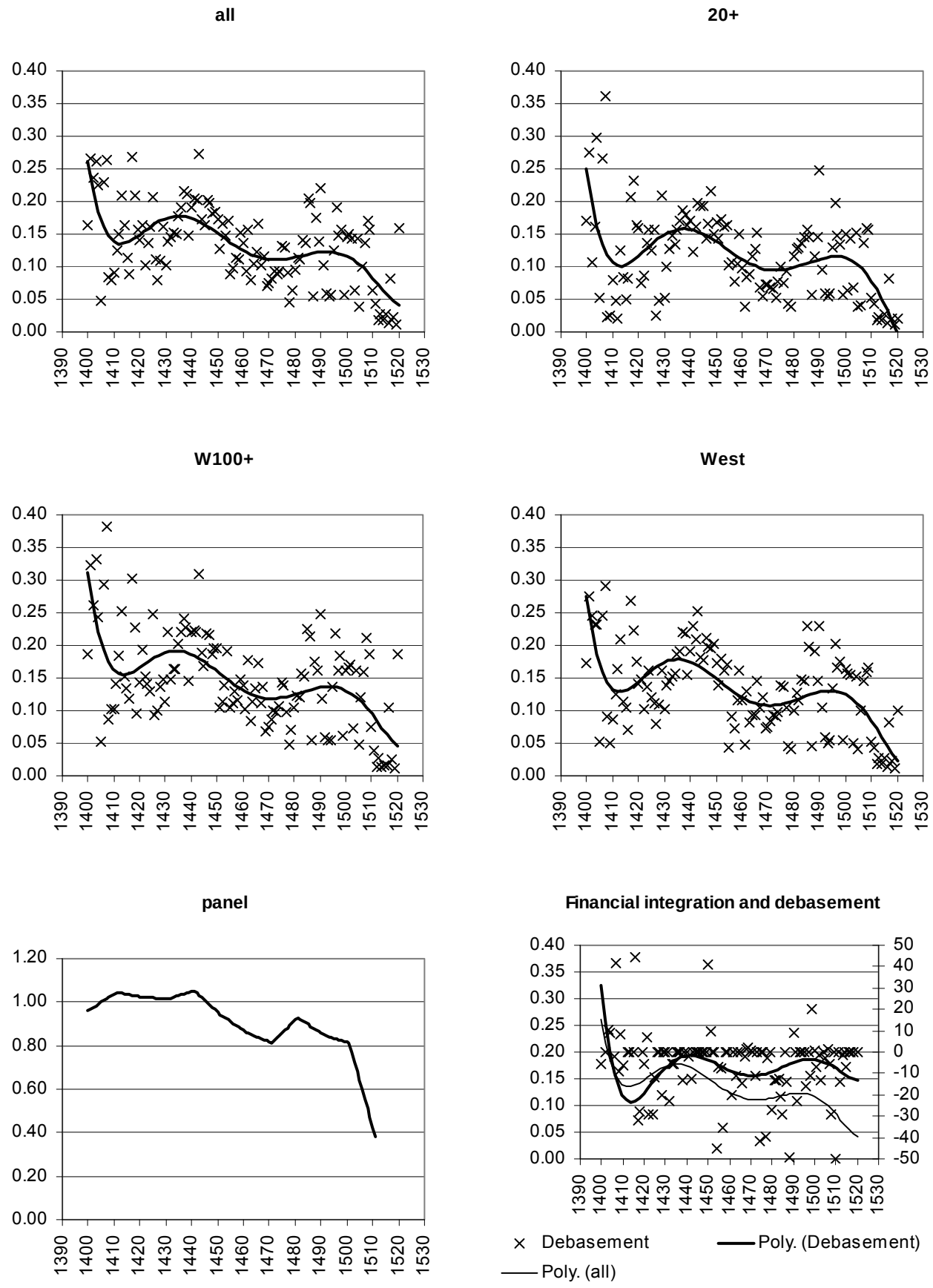


Table 2: Financial Integration in Central Europe: Yearly Rates of Change of the Coefficient of Variation of the Gold-Silver Ratio, 1400-1520 (in percent)

Sample	Years	N	Rate	Unit root test
All	1400-1520	121	-0.087***	10 per cent
20+	1400-1520	121	-0.070***	Not rejected
100+	1404-1520	84	-0.093***	
W 100+	1400-1520	120	-0.102***	Not rejected
West	1400-1520	121	-0.084***	10 per cent

Key: N=sample size; 20+, 100+, W 100+, West=see text; ***=significant at the 1 percent level

The data show that overall the fifteenth century was a period of financial convergence for Central Europe (fig. 2). By 1520, gold-silver ratios tended to be considerably more uniform across cities than in 1400. The robustness checks corroborate this result (table 2). In all samples – even in the third, which is comparatively small – the yearly rate of change of the coefficient of variation is negative and significant at the 1 percent level. The speed of convergence is also estimated to be in the same order of magnitude,[4] regardless of the sample. Moreover, in no case the augmented Dickey Fuller test is able to reject non-stationarity at low levels of significance, thereby providing support to the presence of a trend.[5] In sum, there is strong evidence that the variability of the gold-silver ratio tended to decrease over time.

[4] The magnitude of the coefficient of variation is in the same order as that found by Federico (2007) in the nineteenth-century Italian grain market, and considerably higher order than that found in financial markets in the same place by Toniolo et al. (2003). The comparison, however, can only be taken so far. Even if it is dimension-less, the coefficient's value does depend on the unit of measure. It is sufficient, for example, to take the logarithm to obtain rather different results.

[5] In the case of the 'W 100+' sample, one figure was interpolated.

The rejection of the hypothesis of a unit root at the 10 percent level in two instances can be traced to the fact that convergence, as the kernel shows, was a discontinuous process. Again, the robustness checks support the findings of the basic analysis. Almost identical cyclical patterns emerge when using the unbroken sub-samples. The trend detected by the random effects panel data analysis of the absolute value of the gold-silver ratio difference is based on a comparison of the time dummies coefficients with that of the first decade. Therefore, the initial pattern differs. However, in subsequent years a similar pattern emerges.

The graphs signal a basic asymmetry between the 1410-1465 cycle and the 1465-1520 one: In the second phase, long-term integration advanced significantly more rapidly than during the earlier cycle. This asymmetry fits both Munro's (2001: 25) claim that the revival of late medieval trade began in the early fifteenth century, and the widely held view that trade experienced an upswing in the 1460s. The graphs also clearly indicate cycles of integration about half a century long, i.e. Kondratieff cycles (Kondratieff and Stolper, 1935). A number of scholars (van der Wee, 1963; Abel, 1980; Tits-Dieuaide, 1975) have found waves of similar duration in late medieval grain markets. The peaks of Abel's (1980: 64 f.) cycles of agricultural yields and prices in Central Europe (1430s/1440s, late 1480s/90s) closely correspond to those of our waves of integration, pointing to possible connections between agricultural and financial dynamics.

The timing of the cycles of financial integration suggests that the late medieval 'bullion famines' (e.g. Day, 1980/87; Day, 1981/87; Spufford, 1991) are insufficient to explain them. One might argue that under a commodity money system, where a scarcity of gold and silver implied monetary contraction, a lack of coins should have increased transaction costs and restricted opportunities for arbitrage in the money market. It therefore should have had a direct impact on the dynamics of

financial convergence. Yet, although particularly rapid convergence in the early part of the fifteenth century did coincide with the end of a period of bullion scarcity, there was no divergence during the mid-fifteenth century bullion famine. On the contrary, between the 1440s and the 1460s local gold-silver ratios markedly converged. There is, however, a strikingly close correspondence between cycles of convergence and cycles of debasement.[6] In the late Middle Ages as in modern times (van Duijn, 1977: 548 f.), Kondratieff cycles were associated with changes in the money supply.[7]

4. Uneven Integration

How far does this tendency towards financial integration apply to all Central Europe? To answer this question, we examine financial integration between pairs of cities basing ourselves on the following measures: (1) the yearly rates of change of the absolute value of the percentage gold-silver ratio difference; (2) the correlation rates of the gold-silver ratios; and (3) the five years rolling coefficients of variation.[8] Yearly rates of change of the absolute value of the percentage gold-silver ratio difference indicate whether and to what extent a locality was integrating with others. A negative sign signals integration, a positive disintegration. The higher the absolute value of the coefficient, the more rapid the process was. The same interpretation applies to changes in the coefficient of variation, where greater stability signals a less isolated

[6] The cycles of debasement are based on the aggregate percentage reduction in the bullion content of the most popular silver coins of the area: the Flemish Pound Grote, the South-West German Pound Rappenmünze and the Pounds of Constance, Württemberg and Nuremberg, the Albus of Cologne, the Penny of the Palatinate, the Mark of Prussia, the Bohemian Groschen and the Kreuzer of Tirol.
[7] Even if late medieval debasements are often treated as fiscal measures used in times of war (Spufford, 1991; Munro, 2009), it needs to be kept in mind that debasing the coinage was a means through which late medieval mints increased the money supply.
[8] The last measure involves limited interpolation.

market. Correlation rates, by contrast, provide a measure of the extent to which gold-silver ratios developed stable linear relationships and thus of how well two localities were integrated, with higher values signalling greater levels of integration.[9] By combining the analysis of overall levels and dynamics of integration, it is possible to gauge if integration improved among weakly integrated markets.

To make a good use of the available data, we include observations from before 1400 and after 1520. We limit the bias ensuing from working with broken series by examining only those cities for which at least thirty yearly observations are available. Specifically, the focus is on the seven best-represented cities: Basel, Cologne, Düren, Hamburg, Koblenz, Jülich and Trier.[10] In this way, we construct series whose size varies from a minimum of 14 observations in the case of the pair Hamburg-Rottenburg between 1396 and 1459, to a maximum of 124 for the pair Basel-Cologne between 1396 and 1535. The average sample size is 52. Most of the cities in the sample are in the Rhineland, with Cologne, Düren, Koblenz and Jülich being relatively close to each other. Düren, Koblenz and Jülich were also much smaller than Basel, Cologne and Hamburg, and somewhat smaller than Trier.[11] The sample allows us to explore patterns of long- and short-distance integration between centres of varying size within the Rhineland, as well as of integration between the Rhineland and other parts of the Empire.

[9] Spurious correlation can arise in the presence of similar inflationary movements across cities (Studer, 2008). However, as the series are not unbroken, in our case it was not possible to differentiate them. In any case, given that the gold-silver ratio was remarkably stable in the fifteenth century (Watson, 1967), this does not constitute a serious problem.

[10] This sampling implies that the correlation matrix is not symmetric, and thus factor analysis could not be applied to identify underlining structures.

[11] In our sample, Cologne is by far the largest city with c. 40,000 inhabitants in 1400 and 45,000 in 1500. Hamburg's population is assumed to have shrunk from c. 22,000 to 15,000 over the period. Basel stayed overall constant (with intermittent fluctuations) at c. 10,000 inhabitants, while Trier's population fell from this level to about 8,000. Düren, Jülich and Koblenz where much smaller places with under 5,000 inhabitants each (Bairoch et al., 1988).

Table 3: Financial Integration Between Cities in Central Europe: Yearly Rates of Change of the Absolute Value of the Percentage Gold-Silver Ratio Difference, Average Correlation Rates and Five Years Rolling Coefficient of Variation (in percent)

	Basel	Cologne	Düren	Hamburg	Jülich	Koblenz	Trier
Basel		-0.08***	-0.11***	0.03*	-0.12***	-0.03**	0.01
Cologne	-0.11***		-0.04***	-0.04*	-0.02*	-0.09***	-0.14***
Constance	0.10*	-0.16***	-0.26	0.27**	-0.18	-0.10**	0.05
Düren	-0.13***	-0.04***		0.07**	-0.10***	0.04	0.07
Freiburg	-0.02	-0.03	-0.26	0.20***	-0.09*	0.06	0.02
Hall	-0.28**	-0.15	0.07	-0.06	0.40	-0.29**	-0.03
Hamburg	0.04**	-0.01	0.11***		0.10**	0.07***	-0.02
Jülich	-0.10***	-0.02*	-0.08***	0.09***		-0.05***	0.08
Koblenz	-0.04**	-0.09***	0.04***	0.05**	-0.06***		0.06**
Nuremberg	-0.07	-0.18	-0.63***	-0.10	-0.88***	-0.44**	0.04
Rottenburg	0.69***	-0.02		0.40**			0.38**
Trier	0.01	-0.09***	0.12**	0.00	0.12**	0.08**	
Vienna	-0.11	-0.25***	-0.08***	-0.04	-0.25***	-0.24***	-0.01
Wesel	-0.16*	0.01	1.00	0.07***	1.10***	0.75***	-0.27***
Average	-0.01	-0.09	-0.01	0.07	0.00	-0.02	0.02
Correlation	0.23	0.31	0.38	0.06	0.24	0.33	0.20
Stability		-0.03***	-0.04***	0.02*	0.04**	0.03***	0.00

Key: *=significant at the 10 per cent level, **=significant at the 5 per cent level, ***=significant at the 1 per cent level

The first fourteen rows of table 3 show the yearly rates of change of the absolute value of the percentage gold-silver ratio difference. The last three rows show the averages of the same figure, the averages of the correlation rates, and the yearly rates of change of the coefficient of variation. According to our results the process of financial integration was uneven but widespread. In 52 out of 88 cases the absolute value of the percentage difference of the gold-silver ratios tended to decline over time. However, whereas in Basel, Cologne, Düren and Koblenz the average yearly rate of change was negative, this was not the case in Hamburg, Jülich and Trier. A tendency towards financial integration with the area is

particularly marked in Basel and especially in Cologne. The sign of the yearly rate of change of the absolute percentage gold-silver ratio difference is negative in 9 cases out of 13 in Basel and in 12 out of 13 in Cologne, as compared to, for example, 8 out of 12 cases in Jülich and 4 out of 13 in Hamburg. Even more clearly, the gold-silver ratios tended to become more stable only in Basel and Cologne. The small centres tended to be relatively well-integrated, but the evidence of progress is not as strong. At the negative end of the spectrum, Hamburg shows very weak integration and hardly any increase.

Table 4: Financial Integration Between Cities in Central Europe: Average Correlation Rates and Yearly Rates of Change of the Absolute Gold-Silver Ratio Difference (in percent) by Distance (in kilometres)

Distance	Corr	Trend	N
<70	70.1	-10.3	4
70-150	38.8	3.1	12
150-300	31.2	0.2	10
300-600	13.6	-12.4	30
>600	9.5	-0.5	11

Key: Corr=correlation rate, N=sample size.

These observations conform to a wider pattern: Whereas, as expected, the average correlation rate declines monotonically with distance, the average yearly rate of change of the absolute gold-silver ratio difference does not (table 4). Specifically, the figures evidence two parallel processes of integration: One at the local level, between well-integrated cities; and another somewhat stronger of long-distance integration between weakly-integrated localities. Medium and very distant cities did not tend to integrate.

Late medieval land transport was quicker than water transport, but also more expensive and inconvenient for moving bulky loads (Bernard, 1972: 285). Conversely, it was well-suited to small-scale, quick and short-

distance arbitrage. Still, potential improvements in land transport do not explain why the process broke off beyond the very local level. Given the Empire's political fragmentation, the pattern might be consistent with a role for intra-state integration (cf. Epstein, 1994: 475; 2000: 147 ff.). However, inspection of the sample reveals that none of the city-pairs in the group of very close cities experiencing integration – Basel-Freiburg, Cologne-Düren, Cologne-Jülich and Düren-Jülich – were ruled by the same lord. Indeed, Cologne was autonomous. All these pairs, on the other hand, were linked by an either official or *de facto* monetary union. By contrast, all city-pairs in the group of cities which were at a comparable distance (70 - 150 kilometres instead of < 70 kilometres), but which on the whole did not experience integration, were not part of the same monetary union. Thus, it seems that monetary unions tended to develop between well-integrated financial markets and favoured further financial integration (Boerner and Volckart, 2008).

The correlation rates indicate that Basel was integrated comparatively well with most of the cities in South Germany (Constance, Freiburg, Hall, Nuremberg and Rottenburg), but there is strong evidence of advances in integration only in the case of Hall in Tirol, in whose neighbourhood large deposits of silver ore were discovered in the 1460s, and where most South German mints purchased their bullion (Bissegger, 1917; Schüttenhelm, 1984; Palme, 1984). Hence the rise of South German cities in the wake of the mining boom of the 1460s seems to have had a limited direct effect on the dynamics of financial integration.

The rise of these cities, however, may have had also an indirect impact, as it led to the development of an important trade route along the Rhine that connected the region with Flanders and Brabant (Cipolla, 2002: 323; Spufford, 2002b: 391 f.). Comparatively strong evidence of financial integration between Basel and Cologne, by far the largest city in the sample, suggests that long-distance financial integration may have

been linked to the growth of inter-regional financial centres in the Rhineland.[12] In this area the concentration of financial services began later than in Italy and the Flanders and involved, among other things, the emergence of Basel as an important source of credit for neighbouring rulers (Meyer, 2000: 46; Scott and Scribner, 1997). Qualitative evidence also points to Cologne's importance as a centre of the bullion trade and to links to cities further south, in particular to Frankfurt and Basel (Irsigler, 1971: 371 f.). The process could have contributed to integration also in Trier, but a declining population suggests that the city failed to benefit from its situation on the Mosel, a major tributary of the Rhine. Indeed, the older view that Trier was a commercial centre of supra-regional importance has been revised by recent research (Clemens and Matheus, 1996: 503, 523 f.). Trier was also characterised by the relatively late establishment of a university (1473) and a printing industry with a comparatively low output (1481). In these respects, it differs from Basel and Cologne, where universities were founded in 1459 and 1396, and where considerably more productive printing presses were established in 1466 and 1469. Hence, declining information costs may have played a role in explaining the difference.

In the same way as land transport is expected to affect mainly short-distance financial integration, long-distance financial integration among previously weakly integrated places in the Rhineland is consistent with an explanatory role of river transport and shipping technology. We mentioned in the introduction how, according to Unger (1980), shipping technology had a key role in promoting fifteenth-century long-distance market integration. Melis (1967) also detects a widening in the scope of fifteenth-century waterborne trade in the wake of changes in the cost structure. In Central Europe, river traffic specifically was facilitated by the

[12] This contrasts with Scott's (1987) assessment on the economic decline of big Central European cities in the fifteenth century amidst competition from the country-side.

widespread creation of towpaths in the late Middle Ages (cf. Ellmers, 2007: 175) – a development that fits asymmetric patterns of convergence: While per unit costs of water transport were always lower than those of land transport, shipping goods upriver, where barges needed to be stoked or towed, was still more expensive than downriver transport (Ellmers, 2007: 166). Thus, the flow of the Rhine explains asymmetries in long-distance financial integration in almost all cases where this yardstick can be applied: Basel integrated more rapidly with Cologne than Cologne with Basel, and the same applies to Basel and Düren, Basel and Koblenz, and, on the Mosel-Rhine route, to Trier and Cologne. Likewise, disintegration was less rapid between Trier and Düren, Koblenz and Jülich than between Düren, Jülich[13] and Koblenz and Trier.

The absence of financial integration between cities further apart than 600 kilometres reflects the lack of integration between the Rhineland and Eastern Europe: city-pairs that cover this divide always include Hamburg and Vienna. Direct trade between the upper and middle Rhineland, where the observations are concentrated, and those parts of the East from where we have data does not seem to have been very important. Thus, for instance, Hamburg participated less in inland trade than in commerce between the North Sea and the Baltic (Lüders, 1910). Moreover, Hamburg was a leading member of the Hanseatic League, whose importance peaked in the late fourteenth and began to decline in the fifteenth century (Dollinger, 1981: 364 ff.). In short, both trade flows and declining costs may have played a role in explaining uneven financial integration in the Rhineland.

[13] To be precise, Düren and Jülich were located on Roer, a tributary of the Maas. They were, however, also close to the Rhine.

5. Adjustment and Costs

To gain a more precise impression of how far markets were integrating, and to investigate if financial integration in the Rhineland was mainly due to declining costs as opposed to an increasing volume of exchange, we examine seven pairs of cities (Basel-Cologne, Cologne-Düren, Cologne-Jülich, Cologne-Koblenz, Düren-Jülich, Düren-Koblenz and Jülich-Koblenz) through a threshold autoregressive (TAR) analysis of the spread. The main features of the TAR-model are as follows: The difference between the gold-silver ratios of two cities follows a random walk when it lies within the thresholds of inaction determined by transport and transaction costs. If the difference falls outside these thresholds, however, arbitrage implies that the spread tends to converge back towards equilibrium in a non-linear manner, so that the adjustment process is faster the further away from the threshold the spread lies. A greater volume of exchange implies a higher speed of adjustment.

TAR analysis has been extensively employed in recent market integration research. Still, scholars have criticised it for the underlying assumption that trade conditions are stationary and for the neglect of the impact of indirect arbitrage (a point of criticism that applies to most other techniques, too, cf. Fackler and Goodwin, 2001; Trenkler and Wolf, 2005; Coleman, 2007; Federico, 2007; Özmucur and Pamuk, 2007; Ejrnæs et al., 2008). Others have raised the objections that the results of the analysis are not reliable when institutions like national banks interfere with the market (Esteves et al., forthcoming 2009), and that the reliability of TAR estimates depends crucially on the assumption of 'weakly efficient' markets (i.e. markets where agents use all the information available, which is exclusively embodied in prices). Otherwise, violations of the commodity points may not result in adjustment or adjustment may occur before the commodity points are reached (Federico, 2008).

To address the first issue, we relax the assumption of stationarity and allow the estimated thresholds and speed of adjustments to follow a linear trend and to experience a structural break (cf. van Campenhout, 2007). We limit the positive bias provoked by indirect arbitrage by focusing on cities connected by on-going trade (cf. Federico, 2007). Basel and Cologne were major commercial centres linked by an established and increasingly important trade-route. As mentioned earlier, Düren, Jülich and Koblenz were relatively small, but located in the vicinity of Cologne to whose hinterland they belonged (Eiden and Irsigler, 2000: 48). It should be stressed, however, that our approach can only limit the bias rather than eliminating it. As it is typically the case in TAR analyses we make the mutually contradicting assumptions that the price movement in locality A at time t is on the one hand explained by trade with locality B when measuring market integration between A and B, and on the other hand by trade with locality C when examining integration between A and C. Since networks of trade are typically complex and uneven, the bias does not need to be equal across pairs. Hence, inaccuracies are bound to influence comparisons as well as estimated levels.

We will see in relation to debasements that the results can indeed be distorted by the intervention of non-market actors. Still, the model is flexible enough to take such factors into account. Specifically, we use dummy variables to control for the effect of monetary debasements on adjustment, and we allow costs to experience a structural break after a significant episode of debasement in order to control for its effect on stability. In fact, the gold-silver ratio series often do come closer to each other after debasements as a result of level shifts analogous to those provoked by a sudden fall in transaction costs. An explanation of this dynamic is that rulers frequently resorted to debasements in order to drive out ‘bad’ money, i.e. worn-out and defaced coins or foreign coins of similar nominal but lower intrinsic value (Cipolla, 1963; 1983). The

circulation of such coins was bound to increase uncertainty and therefore transaction costs in the money market. Debasements also eased conditions by stimulating minting and increasing the money supply, thus reducing transaction costs. As for efficiency, we excluded strong inefficiencies by testing for stationarity before estimating the model through conditional least squares; violations of the assumption of weak efficiency are likely to be relative. Hence, we expect them to introduce a bias into our results rather than to invalidate them.

Table 5 summarises the results of the analysis. The simple specification is a conventional BAND-TAR (Lo and Zivot, 2001) with dummies to control for the contribution of debasements to the adjustment process. The second specification allows the threshold and the speed of adjustment to follow a linear trend. The last one includes both trends and a downward shift of the threshold in connection with the most significant episode of debasement. Alfa is the speed of adjustment; we expect it to lie between -1 and 0, with -1 signalling perfect and 0 no integration. The half-lives, which denote the time it takes to reduce a shock by a half,[14] are measured in months. Tau is the threshold. As its estimation was carried out through grid search based on twenty-one quantiles of the absolute value of the spread, we did not compute its significance level. 'Tau change' is the slope of the trend followed by the threshold. 'Shift' is the downward shift experienced by the threshold as a result of debasement.

[14] Equal to twelve times the logarithm of one half divided by the logarithm of one plus the speed of adjustment.

Table 5: Threshold Autoregressive Analysis Results

City-pair Model/Years		Basel-Cologne 1467-1532	Cologne-Düren 1468-1551	Cologne-Jülich 1470-1551	Cologne-Koblenz 1467-1547	Düren-Jülich 1470-1551	Düren-Koblenz 1468-1547	Jülich-Koblenz 1470-1547
Simple	Alfa	-0.27***	-0.91***	-0.87***	-0.79***	-0.15**	-0.74**	-0.19
	Tau	0.24	0.36	0.41	0.24	0	0.05	0
	Half-life	26	3	4	5	50	6	37
Trend	Alfa 0	-0.31*	-1.62***	-0.89**	-1.50***	-0.23	-0.86**	0.88
	Alfa T	-0.21	-1.00**	-0.73**	-0.95***	-0.71***	-0.69***	-2.25
	Tau 0	0.32	0.88	0.60	0.77	1.13	0.05	1.16
	Tau T	0.09	0.28	0.06	0	0.22	0.05	0.33
	Half-life 0	22	Weeks	4	Weeks	21	4	∞
	Half-life T	36	1	6	3	7	7	Weeks
Shift	Alfa 0	-0.50**	-1.37***	-1.04***	-1.22***	-1.22**	-0.86**	0.25
	Alfa T	-0.32	-0.98***	-0.66**	-0.71***	-0.53***	-0.69***	-1.80
	Tau 0	0.50	0.75	0.53	0.52	1.06	0.05	0.83
	Tau T	0.24	0.25	0.11	0.10	0	0.05	0.41
	Tau change	0.79	-0.59	-0.19	0.43	0	0	0.70
	Half-life 0	12	Weeks	Weeks	Weeks	Weeks	4	∞
	Half-life T	22	2	8	7	11	7	Weeks
	Shift	0.51	0.15	0.34	0.59	1.06	0	0.86

Key: *=significant at the 10 per cent level, **=significant at the 5 per cent level, ***=significant at the 1 per cent level

In the basic model, the order of magnitude of the speed of adjustment is in line with that estimated by Volckart and Wolf (2006) for financial markets between late medieval Flanders, Lübeck and Prussia, and thus considerably higher than in late nineteenth-century financial markets that adjusted in days (Canjels et al., 2004). However, when allowing for trends, adjustments between close cities (which Volckart and Wolf did not examine) could occur in a matter of weeks, as in nineteenth-century grain markets (Federico and Persson, 2007), which confirms that close places were well-integrated. For Düren-Jülich and Jülich-Koblenz particularly high estimates of the threshold shift signal that the results are heavily distorted by debasement. These pairs therefore constitute exceptions under the simple specification; otherwise, as expected, the estimates of the half-lives are considerably and consistently lower among close cities than for Basel-Cologne. The absence of adjustment between Jülich and Koblenz at the beginning of the period corresponds to what van Campenhout (2007) found in the contemporary Tanzanian maize market. In our case, it reflects the fact that the 1510 debasement of the Albus of Cologne introduced an unaccounted-for structural break that triggered a significant increase in the volume of exchange. This is, however, the only city-pair for which there is evidence of increased exchanges over time. In the cases involving Cologne, declining speeds of adjustment are partly produced by influential observations at the beginning of the period.

Most of the estimates of the threshold are in line with those of Volckart and Wolf (2006), who estimated the silver points to lie between 0.12 and 0.98, and of Kugler (2008), according to whom arbitrage in late fourteenth century Basel began after a 7 percent threshold was crossed. By comparison, our thresholds lie between 0 and 1.16. The latter is about 10 percent of the gold-silver ratio. This is in the order of ten times the threshold Flandreau (1997) computes on the basis of direct estimation in

nineteenth-century France. Given that Kruger's and Flandreau's estimates are based on single localities, the results suggests that neglecting indirect arbitrage does not necessarily result in heavily biased estimates. The lowest estimates are found among close cities, again confirming that these tended to be well-integrated. However, unlike the speed of adjustment, the estimated thresholds were not invariably lower among close cities than between Basel and Cologne. This can be traced to the comparatively small influence of transport costs on the bullion market. Although a positive slope signals that in half of the cases transaction costs tended to increase as the effect of debasement waned, in all cases but one the threshold tended to be considerably lower at the end of the period than at the beginning. This, together with the lack of similar dynamics in the field of adjustment, indicates that financial integration was mainly due to a fall in costs rather than to a growth in the volume of exchanges. But why exactly did costs decline? The next section takes us to the roots of the progress that the integration of Central European financial markets experienced in the course of the fifteenth century.

6. The Roots of Progress

Following the typical approach employed in the literature on market integration (Parsley and Wei, 2001; Toniolo et al., 2003; Trenkler and Wolf, 2005; Federico, 2007; Jacks, 2005), we investigate the causes of financial integration through panel data analysis. The dependent variable is the logarithm of the absolute value of the spread of the gold-silver ratios between two cities plus one.[15] Since all the dependent variables are more or less strictly exogenous and we are working with a sample, we control for unobservable city-pair specific factors through random-effects.

[15] We added one to include those observations for which the spread is equal to zero.

We estimate the coefficients with a feasible generalised least squares estimator since, with heteroskedasticity and positive correlation of the disturbances across observations, the ordinary least square estimator produces inefficient estimates of the coefficient and biased estimates of the standard errors (Baltagi, 2005). In the context of market integration analysis, cross-correlation and heteroskedasticity are, in fact, expected; they reflect common shocks and different levels of transaction costs, respectively (Federico, 2007). Like Federico (2007), we take the logarithm to all controls except the estimate of the volume of trade, so that each estimated coefficient denotes pure elasticity.[16]

Apart from eleven time-dummies, the dependent variables belong to five categories: monetary, geopolitics, transport, information and institutions. There are three monetary variables: DEBASEMENT is equal to the kernel trend of the sum of monetary alterations of the principal silver currencies used in the area that, as shown earlier, is closely associated with cycles of integration. AUT_BOTH signals whether the governments of both cities were autonomous with regard to monetary policies, as opposed to being subject to a prince or ecclesiastic lord. We expect this variable to be associated with fewer fiscal debasements (Volckart, forthcoming 2009). UNION refers to whether the city-pairs were part of the same monetary union. The geopolitical variables are: WAR_BOTH, which indicates whether both cities were involved in a military conflict; KM_DIST, which is the distance in kilometres between the two cities; TRADE, which is an estimate of the volume of trade between the two cities based on the gravity model of trade, and is equal to the sum of the logarithms of the populations of the two cities minus the logarithm of their distance; and BIG_BOTH, which signals whether both cities had a population of 10,000 or more. As well as by distance,

[16] As with the dependent variable, in the cases of the dummies and CIRCULATION, we added one before taking the logarithm.

transport costs are proxied by whether the two cities are linked by a direct roadway (ROAD_LINK), whether they are on the same river (SAME_RIVER) or sea (SAME_SEA), and whether they have access to any river or sea port (RIVER_PORT and SEA_PORT). Information costs are accounted for by whether in both cities the same dialect was used (SAME_DLCT), whether they both had a university (UNI_BOTH), whether they both had a printing press (PRINT_BOTH), and by an estimate of the volume of circulation of the added printing output (CIRCULATION).[17] The last three variables should proxy for human capital. Finally, we explore the effect of institutions by controlling for whether the two cities were rules by the same lord (SAME_LORD) or were part of the same city-league (CITY_LEAGUE), and whether they were both ruled by a lord (LORD) or were both autonomous (CITY_STATE).[18] To investigate whether there is evidence of declining transport and transaction costs in the various fields, we examine how a number of variables interact with time (YEAR). To avoid problems of multicollinearity (Aiken and West, 1991), we centre the variable YEAR before carrying out the interaction analysis.

[17] The estimate of circulation is equal to the number of book-editions per capita published in the year, plus ninety per cent of those published in the previous year, and so on. We drew the data from the British Library Incunabula Short Title Catalogue (http://138.253.81.72/~cheshire/istc/advanced.html), which contains the most comprehensive database of printed editions until the end of the fifteenth century currently available. As there is uncertainty about the number of publications edited in 1500, the analysis of circulation ends in 1499.

[18] With urban autonomy we here refer to a state of relative independence of feudal overlords. In the Holy Roman Empire, such autonomy was enjoyed first by the so-called 'Imperial' cities that had no lord apart from the Emperor, whose control was in most cases purely nominal. Ulm is an example. Second, 'Free' cities were cities that, like e.g. Cologne, had gained their independence by driving out their lord, who usually was a bishop or archbishop. Third, there was a more vaguely defined group of cities whose autonomy was still contested. Some of these, e.g. Hamburg, eventually gained full recognition as free cities; others, such as Lüneburg, were integrated into the emerging territorial states. Generally, our period saw towns losing their autonomy, with e.g. Berlin and Stettin being subjugated by princes in the 1450s and 1480s, respectively (cf. Johanek, 2002).

Table 6: The Causes of Financial Integration: Panel Data Regression Analysis

	1	2	3	4	5	6	7	8
DEBASEMENT	0.008***	0.007***	0.009***	0.009***	0.008***	0.007***	0.010***	0.009***
AUT_BOTH	-0.162**	-0.127	-0.236***	-0.189**	-0.175**	-0.127	-0.233***	-0.182***
UNION	-0.629***	-0.651***	-0.780***	-0.815***	-0.630***	-0.644***	-0.897***	-0.958***
UNION*YEAR					0.001	0.004	-0.006*	-0.007***
WAR_BOTH	0.547***	0.555***	0.595***	0.569***	0.553***	0.555***	0.584***	0.550***
KM_DIST	0.032	0.04**			0.032	0.035		
KM_DIST*YEAR						0.001		
TRADE			0.023	0.033			0.030	0.037*
TRADE*YEAR							0.001***	0.001***
BIG_BOTH			-0.223**	-0.203**			-0.255***	-0.216**
BIG_BOTH*YEAR							-0.001	-0.003**
ROAD_LINK	0.023		-0.075		-0.027		-0.313	
ROAD_LINK*YEAR					-0.000		-0.001	
SAME_RIVER	-0.012		0.057		-0.017		0.008	
SAME_RIVER*YEAR					-0.003**		-0.004**	
RIVER_PORT		0.007		0.042		0.000		-0.037***
RIVER_PORT*YEAR						-0.001		-0.005
SAME_SEA	-0.387**		-0.439**		-0.359**		-0.566***	
SAME_SEA*YEAR					0.003		-0.007	
SEA_PORT		-0.316**		-0.488***		-0.295**		-0.542***
SEA_PORT*YEAR						0.007**		-0.001
SAME_DLCT	0.070	0.094**	0.012	0.038	0.070	0.086*	0.036	0.069
SAME_DLCT*YEAR					0.000	-0.000	0.000	0.000
UNI_BOTH	-0.091	-0.098	-0.140	-0.159	0.266**	0.189*	0.448***	0.317**
UNI_BOTH*YEAR					-0.009***	-0.009***	-0.024***	-0.020***
PRINT_BOTH	0.062	0.065			0.104	0.045		

CIRCULATION			-0.027**	-0.027**			-0.031**	-0.050***
SAME_LORD	-0.047		0.042		-0.040		-0.056	
SAME_LORD*YEAR					-0.001		-0.007	
LORD		0.024		0.190***		0.032		0.033
LORD*YEAR						-0.005***		-0.008***
CITY_LEAGUE	0.116		0.090		0.121		0.029	
CITY_LEAGUE*YEAR					-0.001		-0.005*	
CITY_STATE		-0.046		-0.095		-0.058		-0.016
CITY_STATE*YEAR						0.004***		0.007***
N	5606	5606	2408	2408	5606	5606	2408	2408
Adj R^2 (in percent)	10.382	10.413	5.375	6.021	10.707	11.383	6.915	8.836

Key: N=sample size; *=significant at the 10 per cent level, **=significant at the 5 per cent level, ***=significant at the 1 per cent level

Table 6 presents the results of the analysis. For reasons of space, we do not present the constants and the coefficients of the time dummies. The eight columns correspond to alternative specifications, with the first four showing the statics of financial integration, while the following four include the analysis of interaction with time. The smaller samples include population data and refer to the fifteenth century only, as the measure of CIRCULATION is not available for the years between 1500 and 1520. The exclusion of observations comes at a cost in term of goodness of fit. Nonetheless, given that the panels are heavily unbalanced, we expect measurement errors and rely heavily on proxies, overall the adjusted R-square values are satisfactory. Moreover, almost all coefficients have the expected sign.

This holds for all monetary coefficients, which have the expected sign across specifications. There is a positive and highly significant relationship between debasement and financial convergence. Whenever the debasement index tended to become more negative, signalling a round of debasements, the spreads between cities tended to shrink. Yet fewer fiscal debasements, as proxied by AUT_BOTH, tended to produce smaller spreads; in a number of cases the association is significant. Furthermore, there is strong evidence that monetary unions produced smaller spreads, with the coefficient being consistently negative and the association highly significant. Still, monetary variables can explain the dynamics of financial integration only to a limited extent. Thus, neither DEBASEMENT nor AUT_BOTH explain changes over time, as they did not become more frequent. On the contrary, reflecting a wider decline in the scope of urban jurisdictions, there are twice as many cases of AUT_BOTH in the first half of the period as in the second one (912 as compared to 456). Consistent with Boerner and Volckart's (2008) findings, UNION helped increased financial integration only in the early

phase. When the whole sample is examined, the interaction coefficient is no longer negative or significant.

War provides another key. As expected, military conflict tended to produce financial disintegration. The coefficient is positive and highly significant across specifications. As the fifteenth century progressed, the area underwent a process of pacification beneficial to trade (van der Wee, 1990; Munro, 2001: 25, 31 f.): There were only 2 cases of WAR_BOTH in the second half of the period, as compared to 39 in the first one. Nonetheless, the smallness of these figures shows that in both periods, war was a phenomenon of limited regional importance that can explain disintegration between a few places, but has a limited explanatory power with respect to overall trends. Albeit significant only in one instance, KM_DIST performs better than TRADE, which does not even have the expected sign. Neither does TRADE seem to have become more important in the course of the fifteenth century. This may be partly due to the crudeness of our estimate of trade flows. Still, the result is consistent both with the limited regional impact of war in restricting trade opportunities, and with our previous finding that financial integration was mainly due to decreasing costs rather than to an increasing volume of exchange. Large centres tended to be better integrated. However, while there is some evidence of size becoming more important as time went by – suggesting the concentration of financial services –, the interaction coefficient is only in one case significant at the 5 percent level.

Other things being equal, distance did not become less of an obstacle in the course of the fifteenth century. The evidence of improvement in land transport is weak, with no general advances in road quality or land transport technology in the period under study (Schwinges, 2007: 13). In three cases out of four, road links were associated with better financial integration, but the association is nowhere significant. Moreover, while being negative, their interaction coefficients are not

significant and their magnitude is small. Both types of specification of water transport show that access to the sea was more important than access to a river. While SEA_PORT and SAME_SEA consistently produce negative and significant coefficients, the same does not hold for RIVER_PORT and SAME_RIVER. These results support our earlier contention that water transport mainly influenced long-distance financial integration. Nonetheless, there is evidence that the cost of river transport, rather than sea transport, declined over time. This suggests that a decline in the cost of water transport was linked to investment in infrastructure, rather than to technological change (cf. the creation of towpaths, Ellmers, 2007: 175). While the interaction coefficient of sea transport does not have a consistent sign, in the case of river transport it is always negative, and is in two cases out of four significant at the 5 percent level. In other words, increased financial integration along the Rhine was representative of a general Central European trend.

Turning to information costs, the use of the same language did not have the expected effect on financial integration, and had no effect on its progress. This may be because the mercantile upper class of most of the cities spoke German dialects; at least long-distance merchants probably understood each other. The evidence that places with universities were better integrated is mild and inconsistent. However, there is strong evidence that their importance increased over time. In all cases the interaction coefficient is negative and significant at the 1 percent level. This can be traced to a synergy with printing. Printing should have favoured financial integration from the very beginning in three ways: First, through the publication of merchants' manuals such as the *Libro di tucti echostumi, cambi, monete, pesi, misure* (1481), the *Aritmetica Mercantile* (1484) and the *Libro di Mercatanzia* (1498) (Spufford, 2002a: 54). As the first title announces, such publications typically offered information on currencies, weights and measures, taxes on trade, customs regulations,

commercial practices and transport costs (cf. Day, 1987b: 166 f.). Second, printing helped the development of more or less topical 'local knowledge' of distant places through the issuing of maps, chronicles, almanacs, calendars, pamphlets and political literature on foreign states, which typically included information on their economic and financial systems (cf. Westergaard, 1932: ch. 2). Third, printing was also employed to spread news about wars, natural disasters and occasionally financial issues, as in the case of the news about counterfeited money published simultaneously around 1482 in Augsburg, Basle, Magdeburg, Munich, Nuremberg, Reutlingen and Ulm (cf. Haebler, 1907-08; Griese, 1997; Füssel, 2005). Education was key in enabling merchants to exploit such resources. Although the presence of printing presses themselves does not explain financial integration, the story changes once we take their output into account. All our estimates of the effect of book circulation are negative and significant, underlining the importance of human capital and information costs for market performance.

Markets were not the only place where information costs were relevant: Setting up and running organisations involves such costs too, as the performance of subordinate members must be monitored (Alchian and Demsetz, 1972; Jensen and Meckling, 1976). In our context, one type of organisation – i.e. the state – is of particular interest (for the role of information costs in state formation cf. Volckart, 2000; 2002: 146 ff.). There is strong and consistent evidence that several types of polity-related institutions mattered for the dynamics of long-distance financial integration. Thus, highly significant interaction coefficients show that autonomous cities, though being comparatively well-integrated, were over time affected by a process of disintegration. Conversely, feudal territories

tended to be poorly integrated, but their integration improved over time.[19] This does not primarily indicate progress in intra-state integration: While negative signs of the corresponding interaction coefficients show that towns under the same lord did become progressively better integrated, the association is never significant. Moreover, city-leagues exhibit the same dynamic – if anything, the evidence of intra-organisational integration is stronger for them than for emerging territorial states.

The results invite a re-assessment of our understanding of the relationship between state formation and capitalism. This has been dominated by two perspectives, one of which focuses on intra-state developments, the other on dynamics that evolved between states. From the first perspective, it can be argued that territorial states provided more effective security for trade than city-states because the tendency to monopolise force implied that princes protected larger geographical areas in a more uniform manner. This does indeed seem to have been the case: the quality of princely escort and safe-conduct services improved and the importance of violent self-help, i.e. of feuding, as a mechanism of conflict settlement declined over the century (Hesse, 2007: 247; Volckart, 2004). Reducing the importance of feuding was impossible without establishing regular courts and judicial systems, and this, in turn, required the abolishment of the jurisdictional powers of feudal lords and towns (stressed by Epstein, 2000: 167) and merchant- and craft-guilds (stressed by Volckart, 2002: 146 ff.). Monopolising force and centralising the administration thus went hand in hand, both processes are supposed to have contributed to economic change.

By contrast, from the perspective of inter-state developments it was political fragmentation rather than centralisation that generated capitalist

[19] As the effect of the institutions varied over time, their static coefficients are not expected to be significant. Moreover, given that the interaction effects refer to yearly changes, their coefficient are expected to be comparatively small.

development. This is assumed to have been the case either because fragmentation gave capital a structural freedom to manoeuvre vis-à-vis political rulers, which allowed economic expansion (Wallerstein, 1989: 348), or because it caused military rivalries, thereby triggering social progress (Hall, 1995; cf. Crone, 1989: 161 f.), or because states competed for mobile factors of production, which provided incentives for tax-reductions and the improved protection of property rights (Chirot, 1985; Jones, 1987: 115 ff.; Landes, 1998: 36 ff.; Volckart, 2002: 180 ff.).

The view which sees capitalism as the outcome of developments within states implies that we should mainly expect intra-territorial integration. According to our results, however, evidence of progress in this field is weak. Moreover, where cities cooperated and formed leagues, investing in the protection of traffic between their members (cf. for Hamburg-Lübeck Gabrielsson, 1982), their security services could apparently keep up with the protection offered by territorial rulers. Hence, as far as the fifteenth century is concerned both the actual ability of princes to provide more effective institutions than cities, and its importance in explaining capitalist development may have been overstated.

As for the second perspective, it is difficult to reconcile it with our findings. Cooperation between princes rather than competition between them seems to have helped capitalist development. This is, in fact, where the Emperor and Holy Roman Empire come into the picture.[20] In the course of the fifteenth century, information costs fell, allowing a growth in the effectiveness of organisations such as the *Reichsta*g. From about the 1470s, the imperial diet developed from an infrequent and ineffectual gathering of princes and representatives of cities into a forum that became increasingly effective in harmonising law and coordinating law

[20] Research since the 1980s has fundamentally reappraised the political role of the Empire, cf. Press (Press, 1987).

enforcement. The ‘dualism’ between Empire and estates thus facilitated what has been described as a ‘densification’ of power (Moraw, 1989b; 1989a). Here, the role of the Emperor as coordinator and mediator was essential, as the first princely initiative to regulate feuding (1437) at a supra-territorial level highlighted. Such initiatives led to temporary bans of feuding in 1467, 1471 and 1474, and the indefinite prohibition of violent self help in 1495 (Fischer, 2007: 184). While feuds continued into the sixteenth century, their decline did evidently contribute to the decreasing frequency of wars, which the data shows to have been correlated with improved market integration. In fact, there is a theoretical basis for the view that the repression of feuds and the increase of security across princely territories on the one hand, and the improved cooperation between princes on the other were complements. As shown by Chilosi (1998), the provision of public goods which involve positive externalities between polities leads to sub-optimal prisoners’ dilemma-like outcomes if decisions are not coordinated at the inter-state level.

The improved provision of protection at the territorial and empire-wide level bypassed all but the most powerful cities and made their traditional security services redundant. The rest faced an increasingly effective Empire and better organised princely territories. Though formally equal partners, in actual fact the cities were reduced to the role of outsiders in a feudal structure dominated by nobility and princely courts. In the long run, they were left with the choice between stagnation and sub-ordination to the most powerful neighbour (Moraw, 1989a: 639; Johanek, 2002: 296, 308). Moreover, it was just the wealthiest cities whose mercantile upper classes began to provide the credits on which the emperors increasingly relied, buying financial support in exchange for economic privileges and monopolies. This gave merchants and bankers some political leverage, but at the same time it distorted markets and contributed to the worsening position of autonomous towns (Volckart,

2002: 166 ff.). State formation and the cooperation between emperors and estates thus simultaneously hindered integration where cities were concerned, and helped it with regard to the emerging territorial states. In fact, synergies between Emperor and princes at once solved coordination problems and contributed to the emergence of a 'state-system' where alternative forms of rule suffered increasingly declining legitimacy.

7. Results and future research

This paper examines two questions: Was there financial integration in fifteenth-century Central Europe? And if so, why? With regard to the first question, we found convergence of the value of bullion across cities, indicating increasing integration. The fifteenth century as a whole therefore saw an improvement in the conditions under which commerce operated – an improvement that can be observed from the very start of the period we analyse. Our results thus contribute to the revision of the traditional view, where at least the first part of the fifteenth century is seen as time of depressed commercial development. More specifically, our data shows that integration advanced in a cyclical fashion, with periods of expansion alternating with periods of contraction in a way that exhibited hitherto little noticed regularities: Like modern cycles, those that we found lasted about fifty years, i.e. they were Kondratieff cycles. We also found that integration advanced more rapidly from c. 1460 onward. This result agrees well with the widely held view that the 1460s mark a turning point in European economic development. Integration was uneven, but also remarkably common. In particular, our analysis highlighted two parallel processes: one at the local level between well-integrated localities, and a more marked one of long-distance integration between weakly integrated cities.

As for the causes of financial integration, the cyclical behaviour that we detected cannot be explained solely with the availability of bullion: The association between the timing of the cycles and the late medieval ‘bullion famines’ is weak. However, like under modern conditions, there was a close correspondence between Kondratieff cycles and changes in the money supply, which in our context were caused by cycles of debasement. Although uneven patterns of financial integration were compatible both with trade developments and declining transport and transaction costs, TAR analysis suggests that they were mainly due to the latter. In some cases integration between close localities was as advanced as in nineteenth-century grain markets. A combination of factors contributed to the fall in transport and transaction costs. Thus, transport costs declined because wars became less frequent and river navigation was improved. Monetary unions contributed to reducing transaction costs between close localities in the early phase. The advent of printing increased the relevance of human capital in reducing information costs. Finally, financial integration progressed in connection with the rise of the territorial state. The latter process, surprisingly, was more closely associated with long-distance, rather than intra-organisational, integration. This is a development that we can trace to the synergy between territorial and imperial rule that intensified in the course of the fifteenth century. Our analysis thus contributes both to the recent reassessment of the effectiveness of the Holy Roman Empire, and of the economic role of the emerging fifteenth-century states within it. It suggests that the actual effectiveness of fifteenth-century princely institutions as compared to urban ones and their role in explaining capitalist development at the time may have been overstated. Not competition but cooperation between princes favoured the growth of region-wide capitalist networks.

Our results raise three issues that need to be addressed by future research. Firstly, the relationship between cycles of debasement and cycles of integration needs to be unpacked. In particular, given that late medieval debasement is usually characterised as a paradigmatic example of pre-modern abuse of power, we need to clarify if, to what extent and why mints used debasements to promote financial integration. Secondly, was financial integration specific to Central Europe or was it part of a wider continental trend? The literature on Central European trade offers contrasting interpretations on whether fifteenth-century developments in the region were particular rather that typical. The asymmetry in the pace of integration between before and after 1460 supports the hypothesis that it was representative, as this conformed to a wider European trend in trade. On the other hand, given that integration was linked to Central Europe's peculiar institutional landscape, it is too early to reach a conclusion on this. The links between institutions, state formation and economic change require further analysis. One of the contributions of the paper has been to show how progress in illuminating fifteenth-century market integration can be made. Future comparative analysis will cast further light on medieval institutions and trade. Thirdly, to what extent did dynamics of financial integration reflect wider patterns of the real economy? Most of the factors responsible for financial integration can be expected to influence the integration of other markets for goods with favourable weight-value ratios. Medieval societies, where the contribution of other sources (such as investment or technology) to growth was limited, represent ideal settings to examine market integration and economic growth.

Appendix: Exchange Rate Sources

1. Edited sources

Alberts, W. J. (ed.) (1960). *Die Kämmereirechnungen der Stadt Münster über die Jahre 1447, 1448 und 1458*. Groningen: J.B. Wolters;

Albrecht, J. (ed.) (1850). *Conrads von Weinsberg, des Reichs-Erbkämmerers, Einnahmen- und Ausgaben-Register von 1437 und 1438*. Tübingen: Literarischer Verein;

Ammann, H. (1960). Untersuchungen zur Wirtschaftsgeschichte des Oberrheinraumes I.: Konrad von Weinsbergs Geschäft mit Elsässer Wein nach Lübeck im Jahre 1426. *Zeitschrift für die Geschichte des Oberrheins* 108, 466-498;

Biebinger, W. and Neukam, W. (eds.) (1934). *Quellen zur Handelsgeschichte der Stadt Nürnberg seit 1400*, vol. 1, Heft 1: 1400-1405. Erlangen: Palm & Enke;

Blendinger, F. (ed.) (1994). *Zwei Augsburger Unterkaufbücher aus den Jahren 1551 bis 1558: Älteste Aufzeichnungen zur Vor- und Frühgeschichte der Augsburger Börse*. Stuttgart: Steiner;

Blok, P. J. (ed.) (1896). *Rekeningen der stad Groningen uit de 16de eeuw*. 'S Gravenhage: Martinus Nijhoff;

Bruns, F. (1915). Lebensnachrichten über Lübecker Drucker des 15. Jahrhunderts. *Nordisk tidskrift för bok- och biblioteksväsen* 2, 220-260;

Buck, H. and Meier, O. (1935). *Die Münzen der Stadt Hannover.* Hannover: Selbstverlag der Hauptstadt Hannover;

Bulmerincq, A. v. (ed.) (1909). *Kämmerei-Register der Stadt Riga 1348-1361 und 1405-1474*, vol. 1: Die Kämmerei-Register. Leipzig: Duncker & Humblot;

Bunge, F. G. v. (ed.) (1867/1974). *Liv-, Esth- und Curländisches Urkundenbuch nebst Regesten*, vol. 5. Riga: Nikolai Kymmel;

Cahn, J. (1901). *Der Rappenmünzbund: Eine Studie zur Münz- und Geld-Geschichte des oberen Rheinthales.* Heidelberg: Carl Winter's Universitätsbuchhandlung;

ibid. (1911). *Münz- und Geldgeschichte von Konstanz und des Bodenseegebietes im Mittelalter bis zum Reichsmünzgesetz von 1559.* Heidelberg: Carl Winter's Universitätsbuchhandlung;

Castelin, K. (1973). *Grossus Pragensis: Der Prager Groschen und seine Teilstücke; 1300 - 1547.* Braunschweig: Klinkhardt & Biermann;

Ciesielska, K. and Janosz-Biskupowa, I. (eds.) (1964). *Ksiega dlugów miasta Torunia z okresu Wojny Trzynastoletniej*. Torun: Praca Wydana z Zasilku Polskiej Akademii Nauk;

Ciesielska, K. and Tandecki, J. (eds.) (1992). *Ksiega lawnicza starego miasta Torunia (1428-1456)*, vol. 1 (1428-1443). Torun: TNT;

Diehl, A. (1915). Wirtschaftliche Vorgänge in der Reichsstadt Eßlingen während der Kämpfe mit Württemberg 1372-1388. In *Forschungen und Versuche zur Geschichte des Mittelalters und der Neuzeit: Festschrift Dietrich Schäfer zum siebzigsten Geburtstag dargebracht von seinen Schülern.* Jena: Fischer, 222-267;

Doebner, R. (ed.) (1887-96). *Urkundenbuch der Stadt Hildesheim*, vols. 3, 5, 6. Hildesheim: Gerstenberg'sche Buchhandlung;

Dolch, M. (2003). Der Ausbau des Leyischen Hauses am Altenhof in Kaiserslautern 1483-1490. *Kaiserslauterer Jahrbuch für pfälzische Geschichte und Volkskunde* 2/3, 130-164;

Eberhardt, I. (1996). *Van des stades wegene utgeven unde betalt: Städtischer Alltag im Spiegel der Stadtrechnungen von Osnabrück (1459-1519).* Osnabrück: Selbstverlag des Vereins für Geschichte und Landeskunde von Osnabrück;

Ehmck, D. R. and Bippen, W. v. (eds.) (1886). *Bremisches Urkundenbuch*, vol. 4: Urkunden von 1381-1410. Bremen: C. Ed. Müller;

Ehmck, D. R. and Schumacher, H. A. (1866). Das Rathaus zu Bremen. *Bremisches Jahrbuch* 2, 259-443;

Elsas, M. J. (1936). *Umriss einer Geschichte der Preise und Löhne in Deutschland vom ausgehenden Mittelalter bis zum Beginn des neunzehnten Jahrhunderts*, vol. 1. Leiden: A.W. Sijthoff's Uitgeversmaatschappij;

Feger, O. (1963). Zur Konstanzer Finanzgeschichte im Spätmittelalter. *Zeitschrift für die Geschichte des Oberrheins* 111, 177-239;

Górski, K. and Biskup, M. (eds.) (1957). *Akta Stanów Prus Królewskich*, vol. 2 (1489-1492). Torun: Towarzystwo Naukowe w Toruniu;

Göttmann, F. and Nutz, A. (eds.) (1999). *Die Firma Felix und Jakob Grimmel zu Konstanz und Memmingen*. Stuttgart: Steiner;

Greiff, B. (1860). Tagebuch des Lucas Rem aus den Jahren 1494-1541: Ein Beitrag zur Handelsgeschichte der Stadt Augsburg. *Jahres-Bericht des historischen Kreis-Vereins im Regierungsbezirke von Schwaben und Neuburg* 24/25, 1-110;

Grote zu Schauen, J. (ed.) (1846). *Das hanöverische Stadtrecht*. Hannover: Hahn'sche Hofbuchhandlung;

Gümbel, A. (1913). Die Baurechnungen über die Erhöhung der Türme von St. Sebald in Nürnberg. *Mitteilungen des Vereins für Geschichte der Stadt Nürnberg* 20, 10-94;

Hach, E. (1892). Aus Paul Frencking's ältestem Testamentsbuche (1503-1728). *Zeitschrift des Vereins für Lübeckische Geschichte und Alterthumskunde* 6, 431-514;

Hanham, A. (ed.) (1975). *The Cely Letters 1472-1488*. London, New York, Toronto: Oxford University Press;

ibid. (1985). *The Celys and their World: An English Merchant Family of the Fifteenth Century.* Cambridge, London, New York et al.: Cambridge University Press;

Hanserecesse (1875-97). *Die Recesse und andere Akten der Hansetage von 1256-1430*, vols. 3, 5, 6, 8 (1. Abt.). Leipzig: Duncker & Humblot;

Harms, B. (1907). *Die Münz- und Geldpolitik der Stadt Basel im Mittelalter.* Tübingen: Verlag der H. Laupp'schen Buchhandlung;

ibid. (ed.) (1909-10). *Der Stadthaushalt Basels im ausgehenden Mittelalter*, vols. 1, 2. Tübingen: Kommissionsverlag der H. Laupp'schen Buchhandlung;

Hegel, K. (1862/1961). Münzverhältnisse. In *Die Chroniken der fränkischen Städte: Nürnberg*, vol. 1. Göttingen: Vandenhoeck & Ruprecht, 224-254;

Hildebrand, H. and Schwartz, P. (eds.) (1896). *Liv-, est- und kurländisches Urkundenbuch*, vol. 10. Riga, Moskau: J. Deubner;

Hirsch, T. (1858). *Danzigs Handels- und Gewerbsgeschichte unter der Herrschaft des Deutschen Ordens.* Leipzig: Hirzel;

Hoefer, F. A. (1895). De rekeningen der stad Hattem. *Bijdragen en mededeelingen van het historisch genootschap* 16, 94-284;

Hofmeister, A. E. and Röpcke, A. (eds.) (1993). *Bremisches Urkundenbuch*, vol. 7: 1442-1447. Bremen: H.M. Hauschild;

Jentsch, H. (1898). Das Rechnungsbuch der Stadt Guben auf das Jahr 1556-57. *Niederlausitzer Mittheilungen* 5, 276-329;

Jesse, W. (1928). *Der Wendische Münzverein.* Lübeck: Hansischer Geschichtsverein;

Joachim, E. (ed.) (1896). *Das Marienburger Tresslerbuch der Jahre 1399-1409*. Königsberg: Thomas & Oppermann;

Kamann, J. (1886). Aus Nürnberger Haushaltungs- und Rechnungsbüchern des 15. und 16. Jahrhunderts. *Mitteilungen des Vereins für Geschichte der Stadt Nürnberg* 6, 57-122;

Keitel, C. (2001). Eine Brackenheimer Rechnung von 1438: Edition der ältesten württembergischen Amtsrechnung. *Zeitschrift für Württembergische Landesgeschichte* 60, 89-138;

Kellenbenz, H. (ed.) (1974). *Das Meder'sche Handelsbuch und die Welser'schen Nachträge*. Wiesbaden: Steiner;

Kleijntjens, J. and Sormani, L. (eds.) (1916-19). *Rekeningen der Stad Nijmegen*, vols. 5-8. Nijmegen: Malmberg;

Klempin, R. (1859). *Diplomatische Beiträge zur Geschichte Pommerns aus der Zeit Bogislafs X.* Berlin: A. Bath;

Knipping, R. (ed.) (1898). *Die Kölner Stadtrechnungen des Mittelalters mit einer Darstellung der Finanzverwaltung*, vol. 2: Die Ausgaben. Bonn: Herm. Behrendt;

Köberlin, A. (1898). Reiserechnung und Gesandschaftsbericht Leonhards von Egloffstein aus dem Jahre 1499. *Zeitschrift für Kulturgeschichte* 5, 30-42;

Koczy, L. (1937). *Ksiega Theudenkusa.* Torun: Nakladem Towarzystwa Naukowe w Toruniu;

Koppmann, K. (ed.) (1869-94). *Kämmereirechnungen der Stadt Hamburg*, vols. 1-7. Hamburg: Hermann Grüning, Gräfe & Sillem;

Koreman, J. (ed.) (1968). *De stadsrekening van Maastricht over het jaar 1399-1400*. Assen: Van Gorcum & Comp;

Kraus, T. R. (ed.) (2004). *Die Aachener Stadtrechnungen des 15. Jahrhunderts*. Düsseldorf: Droste;

Kreil, D. (1967). *Der Stadthaushalt von Schwäbisch Hall im 15./16. Jahrhundert: Eine finanzgeschichtliche Untersuchung.* Sigmaringen;

Kunze, K. (ed.) (1899). *Hansisches Urkundenbuch*, vol. 5: 1392 bis 1414. Leipzig: Duncker & Humblot;

Kuske, B. (ed.) (1918-34). *Quellen zur Geschichte des Kölner Handels und Verkehrs im Mittelalter*, vols. 2-4. Bonn: Peter Hanstein;

Ladurner, J. (1868a). Nachtrag zum Aufsatze: Über die Münze und das Münzwesen in Tirol vom 13. Jahrhundert bis zum Ableben Kaiser Maximilians, 1519. *Archiv für Geschichte und Alterthumskunde Tirols* 5, 275-308;

Ladurner, J. (1868b). Ueber die Münze und das Münzwesen in Tirol vom 13. Jahrhundert bis zum Ableben K. Maximilians, 1519. *Archiv für Geschichte und Alterthumskunde Tirols* 5, 1-102;

Landolt, O. (2004). *Der Finanzhaushalt der Stadt Schaffhausen im Spätmittelalter.* Sigmaringen: Thorbecke;

Lanz, O. (1929). Münz- und Geldgeschichte von Isny. *Württembergische Vierteljahreshefte f. LG* N.F. 35, 99-203;

Leimus, I. (ed.) (1999). *Tallinna Mündiraamatud 1416 - 1526 = Revaler Münzbücher 1416 - 1526*. Tallinn;

Lesnikov, M. P. (ed.) (1973). *Die Handelsbücher des hansischen Kaufmanns Veckinghusen*. Berlin: Akademie-Verlag;

Lexer, M. (ed.) (1862). *Endres Tuchers Baumeisterbuch der Stadt Nürnberg (1464-1475)*. Stuttgart: Literarischer Verein;

Lindemann, E. (1962). Der Spitalhaushalt des Heiliggeistspitals zu Freiburg im Breisgau von den Anfängen bis zum Ende des 16. Jahrhunderts. In. Freiburg i.Br;

Loose, W. (ed.) (1877). *Anton Tuchers Haushaltungsbuch (1507 bis 1517)*. Tübingen: H. Laupp;

Luschin von Ebengreuth, A. (1881). Die Wiener Pfennige zu Zeiten Kaiser Maximilians I 1493 bis 1519. *Numismatische Zeitschrift* 13, 245-;

Lyell, L. and Watney, F. D. (eds.) (1936). *Acts of Court of the Mercers' Company 1453-1527*. Cambridge: Cambridge University Press;

Malden, H. E. (ed.) (1900). *The Cely Papers: Selections from the Correspondence and Memoranda of the Cely Family*. London: Longmans, Green, and Co;

Marsilie, J. W. (1985). *Het financiële beleid van Leiden in de laat-beierse en bourgondische periode ±1390-1477.* Hilversum: Verloren;

Mayer, T. (1909). Zwei Passauer Mautbücher aus den Jahren 1400-01 und 1401-02. *Verhandlungen des historischen Vereins für Niederbayern* 45, 1-190;

Meckelburg, F. A. (ed.) (1865/1976). *Die Königsberger Chroniken aus der Zeit des Herzogs Albrecht; darin die Chronik des Johannes Freiberg*. Königsberg;

Meerkamp van Embden, A. (ed.) (1913-14). *Stadsrekeningen van Leiden (1390-1434)*, vols. 1, 2. Amsterdam:

Johannes Müller; Metz, R. (1990). *Geld, Währung und Preisentwicklung: Der Niederrheinraum im europäischen Vergleich 1350-1800.* Frankfurt: Fritz Knapp;

Militzer, K. (1975). *Das Markgröninger Heilig-Geist-Spital im Mittelalter: Ein Beitrag zur Wirtschaftsgeschichte des 15. Jahrhunderts.* Sigmaringen: Jan Thorbecke;

Mistele, K.-H. (1973). Blick ins Kontor: Ein Bamberger Geschäftsregister aus dem Jahre 1501. *Bericht des Historischen Vereins für Pflege der Geschichte des ehemaligen Fürstbistums bamberg* 109, 253-259;

Moser, H. (ed.) (1989). *Urkunden der Stadt Hall in Tirol*, vol. 1: 1303-1600. Innsbruck: Tiroler Landesarchiv;

Müller, K. O. (1913). Das Finanzwesen der Deutschordensballei Elsaß-Schwaben-Burgund im Jahre 1414. *Historisches Jahrbuch der Görresgesellschaft* 34, 781-823;

Müller, K. O. (1918). Das Finanzwesen der Deutschordenskommende Althausen im Jahre 1414. *Württembergische Vierteljahreshefte für Landesgeschichte, N.F.* 27, 83-111;

Müller, K. O. (ed.) (1953). *Quellen zur Verwaltungs- und Wirtschaftsgeschichte der Grafschaft Hohenberg: Vom Übergang*

an Österreich (1381) bis zum Ende der reichsstädtischen Pfandschaft (1454), vol. 1. Stuttgart, Köln: Kohlhammer;

ibid. (ed.) (1955). *Quellen zur Handelsgeschichte der Paumgartner von Augsburg (1480-1570)*. Wiesbaden: Franz Steiner;

Nagl, A. (1906). Das Tiroler Geldwesen unter Erzherzog Sigismund und die Entstehung des Silberguldens. *Numismatische Zeitschrift* 38, 45-168;

Pauli, C. W. (1872). *Lübeckische Zustände im Mittelalter: Vorlesungen, gehalten in den Jahren 1850 bis 1868.* Lübeck: C. Bolhoevener;

Pelech, M. (1987a). Ein Rechnungsbuch über den Preußischen Pfundzoll der Jahre 1397-1404. *Beiträge zur Geschichte Westpreußens* 10, 139-193;

ibid. (ed.) (1987b). *Nowa Ksiega Rachunkowa Starego Miasta Elblaga: Novus Liber Rationum Veteris Civitatis Elbingensis (1404-1414)*, vol. 1 (1401-1410). Warszawa, Poznan, Torun: Panstwowe Wydawnictwo Naukowe;

Pfeiffer, F. and Haßler, K. D. (eds.) (1843). *Ott Rulands Handlungsbuch*. Stuttgart: Literarischer Verein;

Pitz, E. (ed.) (1961). *Die Zolltarife der Stadt Hamburg*. Wiesbaden: Steiner;

Poelman, H. A. (ed.) (1917). *Bronnen to de geschiedenis van den oostzeehandel*, vol. 1. S'Gravenhage: Martinus Nijhoff;

Pohl, H. (1968). Das Rechnungsbuch des Nürnberger Großkaufmanns Hans Praun von 1471 bis 1478. *Mitteilungen des Vereins für Geschichte der Stadt Nürnberg* 55, 77-136;

Posthumus, N. W. (1953). *De oosterse handel te Amsterdam: Het oudst bewaarde koopmansboek van een Amsterdamse vennootschap betreffende de handel op de oostzee.* Leiden: Brill;

Ramisch, H. (1998). *Die Freisinger Dom-Custos-Rechnungen von 1447-1500*, vol. 1. München: Verlag des Vereins für Diözesangeschichte von München und Freising;

Ranft, A. (1987). *Der Basishaushalt der Stadt Lüneburg in der Mitte des 15. Jahrhunderts: Zur Struktur der städtischen Finanzen im Spätmittelalter.* Göttingen: Vandenhoeck & Ruprecht;

Ropp, G. F. v. d. (ed.) (1876-88). *Hanserecesse von 1431-1476*, vols. 1-5 (2. Abt.). Leipzig: Duncker & Humblot;

ibid. (1887). Unkosten einer Lüneburger Romfahrt im Jahre 1454. *Hansische Geschichtsblätter* 16, 29-60;

Rowan, S. W. (1974). Die Jahresrechnungen eines Freiburger Kaufmanns 1487/88: Ein Beitrag zur Handelsgeschichte des Oberrheins mit einem Nachwort von Berent Schwineköper. In *Stadt und Umland: Protokoll der X. Arbeitstagung des Arbeitskreises für südwestdeutsche Stadtgeschichtsforschung Calw 12.-14. November 1971* (eds. Maschke, E. and Sydow, J.)*.* Stuttgart: Kohlhammer, 227-296;

Sarnowsky, J. (1987). Das Treßleramt des Deutschen Ordens in Preußen in der Zeit Ulrichs von Eisenhofen (1441-1446): Einige Dokumente zu seiner Amtsführung. *Beiträge zur Geschichte Westpreußens* 10, 195-222;

ibid. (1993). *Die Wirtschaftsführung des Deutschen Ordens in Preußen (1382-1454).* Köln, Weimar, Wien: Böhlau;

Sattler, C. (ed.) (1887). *Handelsrechnungen des Deutschen Ordens*. Leipzig: Duncker & Humblot;

Schäfer, D. (ed.) (1881-88). *Hanserecesse von 1477-1530*, vols. 1-3 (3. Abt.). Leipzig: Duncker & Humbot;

Schalk, C. (1879). Die österreichischen Goldgulden im 15. Jahrhundert. *Numismatische Zeitschrift* 11, 260-283;

Schindler, K. (1900). *Finanzwesen und Bevölkerung der Stadt Bern im 15. Jahrhundert.* Bern: Stämpfli & Cie;

Schlecht, C. (1908). [Edition der Rechnungsbücher der Ingolstädter Liebfrauenkirche 1512-1514]. *Sammelblatt des Historischen Vereins für Ingolstadt und Umgebung* 31, 3-30;

Schnyder, W. (ed.) (1937). *Quellen zur Zürcher Wirtschaftsgeschichte*, vol. 1: Von den Anfängen bis 1460. Zürich: Zürcher Handelskammer;

Scholler, E. (1916). *Der Reichsstadt Nürnberg Geld- und Münzwesen in älterer und neuerer Zeit (Ein Beitrag zur reichsstädtischen Wirtschaftsgeschichte.).* Nürnberg;

Schoop, A. (ed.) (1920). *Quellen zur Rechts- und Wirtschaftsgeschichte der rheinischen Städte: Jülichsche Städte*, vol. 1: Düren. Bonn: P. Hansteins Verlag;

Schwartz, P. (ed.) (1905). *Liv-, est- und kurländisches Urkundenbuch*, vol. 11: 1450-1459. Riga, Moskau: J. Deubner;

Slaski, W. v. (1905). Danziger Handel im 15. Jahrhundert: Aufgrund eines im Danziger Stadtarchiv befindlichen Handlungsbuches geschildert. In. Heidelberg;

Soder von Güldenstubbe, E. (1988). Die Würzburger Dombauamtsrechnung des Rechnungsjahres 1529/30. *Würzburger Diözesan-Geschichtsblätter* 50, 659-686;

Spufford, P. (1986). *Handbook of Medieval Exchange.* London: Offices of the Royal Historical Society;

Stein, W. (1898). Handelsbriefe aus Riga und Königsberg von 1458 und 1461. *Hansische Geschichtsblätter* 27, 56-125;

ibid. (ed.) (1899-1916). *Hansisches Urkundenbuch*, vols. 8-11. München, Leipzig: Duncker & Humblot;

Steinhilber, D. (1956). *Geld- und Münzgeschichte Augsburgs im Mittelalter.* Kallmünz: Laßleben;

Stieda, W. (1894). *Hansisch-venetianische Handelsbeziehungen im 15. Jahrhundert: Festschrift der Landes-Universität Rostock.* Rostock: Universitäts-Buchdruckerei;

ibid. (ed.) (1921). *Hildebrand Veckinghusen: Briefwechsel eines deutschen Kaufmanns im 15. Jahrhundert*. Leipzig: Hirzel;

Straganz, M. (1903). *Hall in Tirol: Ein Beitrag zur Geschichte des tirolischen Stadtewesens*, vol. 1: Geschichte der Stadt bis zum Tode Kaiser Max I. Innsbruck: H. Schwick;

Strieder, J. (ed.) (1930/62). *Aus Antwerpener Notariatsarchiven: Quellen zur deutschen Wirtschaftsgeschichte des 16. Jahrhunderts*. Wiesbaden: Steiner;

Tenhaeff, N. B. (ed.) (1946). *Bronnen tot de bouwgeschiedenis van den dom te Utrecht*, vol. 2, 1 (Rekeningen 1395-1480). 'S-Gravenhage: Martinis Nijhoff;

Thumser, M. (ed.) (2002). *Ludwig von Eyb der Ältere (1417-1502): Schriften. Denkwürdigkeiten - Gültbuch - Briefe an Kurfürst Albrecht Achilles 1474/74 - Mein Buch*. Neustadt/Aisch: Kommissionsverlag Degener & Co;

Töppen, M. (ed.) (1880/1974). *Akten der Ständetage Preußens unter der Herrschaft des Deutschen Ordens*, vol. 2: Die Jahre 1436-1446. Aalen: Scientia;

Tscharner-Aue, M. (1983). *Die Wirtschaftsführung des Basler Spitals bis zum Jahre 1500.* Basel: Kommissionsverlag Friedrich Reinhardt AG;

Unger, W. S. (ed.) (1926). *Bronnen tot de geschiedenis van Middelburg in den landsheerlijken tijd*, vol. 2. 'S-Gravenhage: Martinus Nijhoff;

van Schevichaven, H. D. J. and Kleijntjens S.J., J. C. J. (eds.) (1910-14). *Rekeningen der Stad Nijmegen 1382-1543*, vols. 1-4. Nijmegen: Malmberg;

Verein für Lübeckische Geschichte und Alterthumskunde (ed.) (1877-1905). *Urkunden-Buch der Stadt Lübeck*, vols. 5-11 (1. Abt.). Lübeck: Lübcke & Nöhring;

Vogelsang, R. (ed.) (1976). *Kämmereibuch der Stadt Reval 1432-1463*. Köln, Wien: Böhlau;

ibid. (ed.) (1983). *Kämmereibuch der Stadt Reval 1463-1507*. Köln, Wien: Böhlau;

Volckart, O. (1996). *Die Münzpolitik im Deutschordensland und Herzogtum Preußen von 1370 bis 1550.* Wiesbaden: Harrassowitz;

Volger, W. F. (ed.) (1877). *Urkundenbuch der Stadt Lüneburg*, vol. 3: Von 1387 bis April 1402. Lüneburg: Herold & Wahlstab;

Wagner, F. (2001). Die Währungen am nördlichen Oberrhein im 15. Jahrhundert. *Mitteilungen des Historischen Vereins der Pfalz* 99, 105-144;

Wartena, R. (ed.) (1977). *De Stadsrekeningen van Zutphen 1364-1445/46*, vols. 1-3. Zutphen: Gemeentearchief;

Weise, E. (ed.) (1955). *Die Staatsverträge des Deutschen Ordens in Preußen im 15. Jahrhundert*, vol. 2: 1438-1467. Marburg: Elwert;

Weisenstein, K. (1995). *Das Kurtriersche Münz- und Geldwesen vom Beginn des 14. bis zum Ende des 16. Jahrhunderts: Auch ein Beitrag zur Geschichte des Rheinischen Münzvereins.* Koblenz: Numismatischer Verlag;

Welti, F. E. (ed.) (1896). *Die Stadtrechnungen von Bern aus den Jahren MCCCLXXV-MCCCLXXXIIII*. Bern: Stämpflische Buchdruckerei;

ibid. (ed.) (1904). *Die Stadtrechnungen von Bern aus den Jahren MCCCCXXX-MCCCCLII*. Bern: Stämpflische Buchdruckerei;

Welti, F. E. (1911). Stadtrechnungen von Bern. *Archiv des Historischen Vereins des Kantons Bern* 20, 1-44;

Wielandt, F. (1959). *Schaffhauser Münz- und Geldgeschichte.* Schaffhausen: Meier & Cie;

Wielandt, F. (1969). *Münz- und Geldgeschichte des Standes Luzern.* Luzern: C.J. Bucher.

2. Archival sources

Stadtarchiv Freiburg im Breisgau
StA. Freiburg, C1, ‘Münzbuch’; E1 A1; E1 BII b3.

Archiv der Hansestadt Lübeck
AHA Lübeck, Niederstadtbuch 1400-1418 (Urschrift).

Stadtarchiv Lüneburg
StA Lüneburg, AB 56,1,2.

Stadtarchiv Rostock
StA Rostock, U3k; 1.1.3.3.2, 204; 205.

Geheimes Staatsarchiv Preußischer Kulturbesitz Berlin
GStAPK, XX HA, OBA; OF24a; OF 198; Ostpr. Fol. 12868; 1133; 998; 913.

Stadtarchiv Schaffhausen
StA. Schaffhausen, A II.05.01.

Stadtarchiv Konstanz
StA. Konstanz, DII/Bände 4 ‘Münzbuch’; L863-928, Bände ‘Schuldbuch’; L943-993/Bände ‘Zinsbuch’.

References:

Abel, W. (1980). *Strukturen und Krisen der spätmittelalterlichen Wirtschaft.* Stuttgart, New York: Fischer.

Aiken, L. S. and West, S. G. (1991). *Multiple Regression: Testing and Interpreting Interactions.* Newbury Park: Sage.

Alchian, A. A. and Demsetz, H. (1972). Production, Information Costs, and Economic Organization. *American Economic Review* 62, 777-795.

Bairoch, P., Batou, J. and Chèvre, P. (1988). *La population des villes européennes: banque de données et analyse sommaire des résultats; 800 - 1850 (The population of European cities).* Genève: Droz.

Baltagi, B. H. (2005). *Econometric Analysis of Panel Data.* Chichester: John Wiley.

Bateman, V. N. (2007). The Evolution of Markets in Early Modern Europe, 1350-1800: A Study of Wheat Prices. Oxford: University of Oxford.

Bernard, J. (1972). Trade and Finance in the Middle Ages 900-1500. In *The Fontana Economic History of Europe*, vol. 1: The Middle Ages (ed. Cipolla, C. M.). London, Glasgow: Collins Clear, 274-338.

Bernocchi, M. (1976). *Le monete della Repubblica Fiorentina*, vol. 3: Documentazione. Firenze: Leo S. Olschki.

Bissegger, A. (1917). *Die Silberversorgung der Basler Münzstätte bis zum Ausgang des 18. Jahrhunderts.* Basel: Reinhardt.

Blanchard, I. (2009). The Late Medieval European 'Integration Crisis' 1340-1540. In *New Approaches to the History of Late Medieval and Early Modern Europe: Selected Proceedings of Two International Conferences at The Royal Danish Academy of Sciences and Letters in Copenhagen in 1997 and 1999* (eds. Dahlerup, T. and Inqesman, P.). Copenhagen: The Royal Danish Academy of Sciences and Letters, 301-334.

Blockmans, W. (1990). Handelstechniken in Flandern und Brabant im Vergleich mit denjenigen der Hanse, 14. - 15. Jahrhundert. In *Brügge-Kolloquium des Hansischen Geschichtsvereins 26.-29. Mai 1988: Referate und Diskussionen* (ed. Friedland, K.). Köln, Wien: Böhlau, 25-32.

Boerner, L. and Volckart, O. (2008). Currency Unions, Optimal Currency Areas and the Integration of Financial Markets: Central Europe from the Fourteenth to the Sixteenth Centuries. Florence: European University Institute, EUI Working Papers MWP 2008/42.

Bollandt, J. (ed.) (1960). *Hamburgische Burspraken 1346 bis 1594 mit Nachträgen bis 1699*, vol. 2: Bursprakentexte. Hamburg: Hans Christians Druckerei und Verlag.

Britnell, R. (1996). *The Commercialisation of English Society 1000-1500.* Manchester, New York: Manchester University Press.

Canjels, E., Prakash-Canjels, G. and Taylor, A. M. (2004). Measuring Market Integration: Foreign Exchange Arbitrage and the Gold Standard, 1879-1913: National Bureau of Economic Research, NBER Working Paper 10583.

Chilosi, D. (1998). On the Economic and Political Incentives Determining the Size of Nations. Colchester: University of Essex.

Chirot, D. (1985). The Rise of the West. *American Sociological Review* 50, 181-195.

Cipolla, C. M. (1963). Currency Depreciation in Medieval Europe. *Economic History Review* XV, 413-422.

Cipolla, C. M. (1983). *The Monetary Policy of Fourteenth-Century Florence.* Berkeley, Los Angeles, London: University of California Press.

Cipolla, C. M. (2002). *Storia Economica dell' Europa Pre-Industriale.* Bologna: Il Mulino.

Clark, G. (2001). Markets and Economic Growth: The Grain Market of Medieval England. Davis: University of California.

Clemens, L. and Matheus, M. (1996). Trierer Wirtschaft und Gewerbe im Hoch- und Spätmittelalter. In *Trier im Mittelalter* (eds. Anton, H.-H. and Haverkamp, A.). Trier: Spee-Verlag, 501-529.

Coleman, A. (2007). The Pitfalls of Estimating Transaction Costs from Price Data: Evidence From Trans-Atlantic Gold Point Arbitrage, 1886-1905. *Explorations in Economic History* 44, 387-410.

Crone, P. (1989). *Pre-Industrial Societies.* Oxford: Basil Blackwell.

Day, J. (1980/87). The Great Bullion Famine of the Fifteenth Century. In *The Medieval Market Economy* (ed. Day, J.). Oxford: Basil Blackwell, 1-54.

Day, J. (1981/87). The Question of Monetary Contraction in Late Medieval Europe. In *The Medieval Market Economy* (ed. Day, J.). Oxford: Basil Blackwell, 55-71.

Day, J. (1987a). Crises and Trends in the Late Middle Ages. In *The Medieval Market Economy* (ed. Day, J.). Oxford: Basil Blackwell, 185-224.

Day, J. (1987b). Medieval Merchants and Financiers. In *The Medieval Market Economy* (ed. Day, J.). Oxford: Basil Blackwell, 162-184.

de Roover, R. (1948). *Money, Banking and Credit in Medieval Bruges: Italian Merchant-Bankers Lombards and Money-Changers. A Study in the Origins of Banking.* Cambridge/MA: The Medieval Academy of America.

de Roover, R. (1968). *The Bruges Money Market Around 1400.* Brussel: Paleis der Academien.

Denzel, M. A. (1996). Die Integration Deutschlands in das internationale Zahlungsverkehrssystem im 17. und 18. Jahrhundert. In *Wirtschaftliche und soziale Integration in historischer Sicht: Arbeitstagung der Gesellschaft für Sozial- und*

Wirtschaftsgeschichte in Marburg 1995 (ed. Schremmer, E.). Stuttgart: Steiner, 58-109.

Dobado González, R. and Marrero, G. A. (2005). Corn Market Integration in Porfirian Mexico. *Journal of Economic History* 65, 103-128.

Dollinger, P. (1981). *Die Hanse.* Stuttgart: Kröner.

Dyer, C. (2005). *An Age of Transition? Economy and Society in England in the Later Middle Ages.* Oxford: Oxford University Press.

Eiden, H. and Irsigler, F. (2000). Environs and Hinterland: Cologne and Nuremberg in the Later Middle Ages. In *Trade, Urban Hinterlands and Market Integration c.1300-1600* (ed. Galloway, J. A.). London: Centre for Metropolitan History, 43-57.

Ejrnæs, M., Persson, K. G. and Rich, S. (2008). Feeding the British: Convergence and Market Efficiency in the Nineteenth-Century Grain Trade. *Economic History Review* 61, 140-171.

Ellmers, D. (2007). Techniken und Organisationsformen zur Nutzung der Binnenwasserstrassen im hohen und späten Mittelalter. In *Straßen- und Verkehrswesen im hohen und späten Mittelalter* (ed. Schwinges, R. C.). Sigmaringen: Thorbecke, 161-183.

Epstein, S. (1994). Regional Fairs, Institutional Innovation, and Economic Growth in Late Medieval Europe. *Economic History Review* XLVII, 459-482.

Epstein, S. (2000). *Freedom and Growth: The Rise of States and Markets in Europe, 1300-1750.* London, New York: Routledge.

Esteves, R. P., Reis, J. and Ferramosca, F. (forthcoming 2009). Market Integration in the Golden Periphery: The Lisbon/London Exchange. *Explorations in Economic History*.

Fackler, P. L. and Goodwin, B. K. (2001). Spatial Price Analysis. In *Handbook of Agricultural Economics*, vol. 1 (eds. Gardner, B. and Rausser, G.). Amsterdam: Elsevier, 971-1024.

Federico, G. (2007). Market Integration and Market Efficiency: The Case of 19th Century Italy. *Explorations in Economic History* 44, 293-316.

Federico, G. (2008). The First European Grain Invasion: A Study in the Integration of the European Market 1750-1870, HEC No. 2008/01.

Federico, G. and Persson, K. G. (2007). Market Integration and Convergence in the World Wheat Market, 1800-2000. In *The New Comparative Economic History: Essays in Honor of Jeffrey G. Williamson* (eds. Hatton, J., O'Rourke, K. and Taylor, A. M.). Cambridge/MA, London: : The MIT Press, 87-113.

Fischer, M. G. (2007). *Reichsreform und "Ewiger Landfrieden": Über die Entwicklung des Fehderechts im 15. Jahrhundert bis zum absoluten Fehdeverbot von 1495.* Aalen: Scientia.

Flandreau, M. (1997). As Good as Gold? Bimetallism in Equilibrium, 1850-70. In *Monetary Standards and Exchange Rates* (eds. Marcuzzo, M. C., Officer, L. H. and Rosselli, A.). London, New York: Routledge, 150-176.

Flynn, D. O. and Giraldez, A. (1995). Arbitrage, China, and World Trade in the Early Modern Period. *Journal of the Economic and Social History of the Orient* 38, 429-448.

Füssel, S. (2005). *Gutenberg and the Impact of Printing.* Aldershot: Ashgate.

Gabrielsson, P. (1982). Die Zeit der Hanse. In *Hamburg: Geschichte der Stadt und ihrer Bewohner*, vol. 1: Von den Anfängen bis zur Reichsgründung (ed. Loose, H.-D.). Hamburg: Hoffmann und Campe, 101-190.

Galloway, J. A. (2000). One Market or Many? London and the Grain Trade of England. In *Trade, Urban Hinterlands and Market Integration c. 1300-1600* (ed. Galloway, J. A.). London: Centre of Metropolitan History, 23-42.

Gras, N. S. B. (1915). *The Evolution of the English Corn Market from the Twelfth to the Eighteenth Century.* Cambridge, MA: Harvard University Press.

Grierson, P. (1981). The Weight of the Gold Florin in the Fifteenth Century. *Quaderni Ticinesi: Numismatica e Antichità Classiche* 10, 421-431.

Griese, S. (1997). Falsche Gulden, gefälschte Ablässe, unerwünschte Bischöfe: Einblattdrucke als publizistische Gattung im Spätmittelalter. *Verhandlungen des Historischen Vereins für Oberpfalz und Regensburg* 137, 49-67.

Haebler, K. (1907-08). ‚Falsche-Gulden'-Blätter aus der Frühzeit der Druckerkunst. *Zeitschrift für Bücherfreunde* 11, 219-233.

Hall, J. H. (1995). A Theory of the Rise of the West. *METU Studies in Development* 22, 231-241.

Hesse, C. (2007). Handel und Straßen: Der Einfluss der Herrschaft auf die Verkehrsinfrastruktur in Fürstentumern des spätmittelalterlichen Reiches. In *Straßen- und Verkehrswesen im hohen und späten Mittelalter* (ed. Schwinges, R. C.). Sigmaringen: Thorbecke, 229-256.

Irsigler, F. (1971). Köln, die Frankfurter Messen und die Handelsbeziehungen mit Oberdeutschland im 15. Jahrhundert. In *Köln, das Reich und Europa: Abhandlungen über weiträumige Verflechtungen der Stadt Köln in Politik, Recht und Wirtschaft im Mittelalter* (ed. Stehkämpfer, H.). Köln: Paul Neuber, 341-429.

Jacks, D. (2004). Market Integration in the North and Baltic Seas, 1500-1800. *Journal of European Economic History* 33, 285-329.

Jacks, D. S. (2005). Intra- and International Commodity Market Integration in the Atlantic Economy, 1800–1913. *Explorations in Economic History* 42, 381-413.

Jensen, M. C. and Meckling, W. H. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics* 2, 305-360.

Jesse, W. (1928). *Der Wendische Münzverein.* Lübeck: Hansischer Geschichtsverein.

Johanek, P. (2002). Imperial and Free Towns of the Holy Roman Empire. City States in Pre-Modern Germany? In *A Comparative Study of Thirty City-State Cultures. An Investigation Conducted by the Copenhagen Polis Centre* (ed. Hansen, M. H.). Copenhagen: Reitzel, 295-319.

Jones, E. L. (1987). *The European Miracle: environments, economies, and geopolitics in the history of Europe and Asia.* Cambridge: Cambridge University Press.

Jörberg, L. (1972). *A History of Prices in Sweden 1732-1914.* Lund: CWK Gleerup.

Keene, D. (2000). Changes in London's Economic Hinterland as Indicated by Debt Cases in the Court of Common Pleas. In *Trade, Urban Hinterlands and Market Integration c.1300-1600* (ed. Galloway, J. A.). London: (Centre for Metropolitan History, 59-81.

Klovland, J. T. (2005). Commodity Market Integration, 1850-1913: Evidence From Britain And Germany. *European Review of Economic History* 9, 163-197.

Kondratieff, N. D. and Stolper, W. F. (1935). The Long Waves in Economic Life. *The Review of Economics and Statistics* 17, 105-115.

Koppmann, K. (ed.) (1880). *Kämmereirechnungen der Stadt Hamburg von 1482-1500*. Hamburg: Hermann Grüning.

Kubiak, S. (1986). *Monety i stosunki monetarne w Prusach Królewskich w 2 polowie XV wieku.* Wroclaw, Warszawa, Kraków, Gdansk, Lódz:

Zaklad Narodowy Imiena Ossolinskich Wydawnictwo Polskiej Akademii Nauk.

Kugler, P. (2008). Financial Market Integration in Late Medieval Europe: Results from a Threshold Error Correction Model for the Rhinegulden and Basle Pound 1365-1429. Basel: Universität Basel.

Landes, D. S. (1998). *The Wealth and Poverty of Nations: Why Some are So Rich and Some So Poor.* New York, London: W.W. Norton & Co.

Lane, F. C. and Mueller, R. C. (1985). *Money and Banking in Medieval and Renaissance Venice*, vol. 1: Coins and Moneys of Account. Baltimore, London: John Hopkins University Press.

Lesnikov, M. P. (ed.) (1973). *Die Handelsbücher des hansischen Kaufmanns Veckinghusen*. Berlin: Akademie-Verlag.

Lo, M. C. and Zivot, E. (2001). Threshold Cointegration and Nonlinear Adjustment to the Law of One Price. *Macroeconomic Dynamics* 5, 533-576.

Lopez, R. S. and Miskimin, H. A. (1962). The Economic Depression of the Renaissance. *Economic History Review* XIV, 408-426.

Lothian, J. R. (2002). The Internationalization of Money and Finance and the Globalization of Financial Markets. *Journal of International Money and Finance* 21, 699-724.

Lüders, P. S. K. H. (1910). *Hamburgs Handel und Gewerbe am Ausgang des Mittelalters.* Leipzig: August Hoffmann.

Mayhew, N. J. (1974). Numismatic Evidence and Falling Prices in the Fourteenth Century. *Economic History Review* XVII, 1-15.

Melis, F. (1967). *1967. Tracce di una Storia Economica di Firenze e della Toscana in Generale, dal 1252 al 1550: Appunti Raccolti alle Lezioni del Prof. Federigo Melis. Dini, B. (ed.).* Florence: Università degli Studi di Firenze.

Meyer, W. (2000). Vom 13. bis zum Ende des 15. Jahrhunderts: Basel im Spätmittelalter. In *Basel - Geschichte einer städtischen Gesellschaft* (eds. Kreis, G. and Wartburg, B. v.). Basel: Christoph Merian Verlag, 37-77.

Miskimin, H. (1963). *Money, Prices, and Foreign Exchange in Fourteenth-Century France.* New Haven, London: Yale University Press.

Miskimin, H. (1969). *The Economy of Early Renaissance Europe 1300-1460.* Englewood Cliffs/NJ: Prentice-Hall.

Miskimin, H. (1985/89). The Enforcement of Gresham's Law. In *Cash, Credit and Crisis in Europe, 1300-1600* (ed. Miskimin, H.). London: Variorum Reprints, IX, 147-161.

Miskimin, H. A. (1983). Money and Money Movements in France and England at the End of the Middle Ages. In *Precious Metals in the Later Medieval and Early Modern Worlds* (ed. Richards, J. F.). Durham/NC: Carolina Acedemic Press, 79-96.

Mitchener, J. and Ohnuki, M. (2009). Institutions, Competition and Capital Market Integration in Japan. *Journal of Economic History* 69, 138-171.

Molho, A. (1971). *Florentine Public Finances in the Early Renaissance, 1400-1433.* Cambridge/MA: Harvard University Press.

Moraw, P. (1989a). Cities and Citizenry as Factors of State Formation in the Roman-German Empire of the Late Middle Ages *Theory and Society* 18, 631-662.

Moraw, P. (1989b). *Von offener Verfassung zu gestalteter Verdichtung: Das Reich im Späten Mittelalter 1250 bis 1490.* Frankfurt, Berlin: Propyläen.

Mueller, R. C. (1995). The Spufford Thesis on Foreign Exchange: The Evidence of Exchange Rates. *Journal of European Economic History* 24, 121-129.

Munro, J. H. (1972). *Wool, Cloth, and Gold: The Struggle for Bullion in Anglo-Burgundian Trade, 1340-1478.* Brussels, Toronto: University of Toronto Press.

Munro, J. H. (2001). The "New Institutional Economics" and the Changing Fortune of Fairs in Medieval and Early Modern Europe: the Textile Trades, Warfare and Transaction Costs. *Vierteljahrschrift für Sozial- und Wirtschaftsgeschichte* 88, 1-47.

Munro, J. H. (2003). The Medieval Origins of the 'Financial Revolution': Usury, Rentes, and Negotiablity. *International History Review* 3 25, 505-562.

Munro, J. H. (2009). Warfare, Liquidity Crises, and Coinage Debasements in Burgundian Flanders, 1384 - 1482: Monetary or Fiscal Remedies? Toronto.

Murray, J. M. (2005). *Bruges, Cradle of Capitalism, 1280-1390.* Cambridge: Cambridge University Press.

Neal, L. (1985). Integration of International Capital Markets: Quantitative Evidence from the Eighteenth to the Twentieth Centuries. *Journal of Economic History* 45, 219-226.

Neal, L. (1987). The Integration and Efficiency of the London and Amsterdam Stock Markets in the Eighteenth Century. *Journal of Economic History* 47, 97-115.

Nightingale, P. (1990). Monetary Contraction and Mercantile Credit in Later Medieval England. *Economic History Review* XLIII, 560-575.

Nightingale, P. (1997). England and the European Depression of the Mid-Fifteenth Century. *Journal of European Economic History* 26, 631-651.

North, M. (1990). *Geldumlauf und Wirtschaftskonjunktur im südlichen Ostseeraum an der Wende zur Neuzeit (1440-1570): Untersuchungen zur Wirtschaftsgeschichte am Beispiel des*

Großen Lübecker Münzschatzes, der norddeutschen Münzfunde und der schriftlichen Überlieferung. Sigmaringen: Thorbecke.

Özmucur, S. and Pamuk, Ş. (2007). Did European Commodity Prices Converge During 1500-1800? In *The New Comparative Economic History: Essays in Honor of Jeffrey G. Williamson* (eds. Hatton, J., O'Rourke, K. and Taylor, A. M.). Cambridge/MA, London: The MIT Press, 59-85.

Palme, R. (1984). Rechtliche und soziale Probleme im Tiroler Erzbergbau vom 12. bis zum 16. Jahrhundert. In *Montanwirtschaft Mitteleuropas vom 12. bis 17. Jahrhundert: Forschungsprobleme* (eds. Kroker, W. and Westermann, E.). Bochum: Deutsches Bergbau-Museum, 118-124.

Parsley, D. C. and Wei, S.-J. (2001). Explaining the Border Effect: The Role of Exchange Rate Variability, Shipping Costs, and Geography. *Journal of International Economics* 55, 87-105.

Patterson, C. C. (1972). Silver Stocks and Losses in Ancient and Medieval Times. *Economic History Review* XXV, 205-233.

Persson, K. G. (1999). *Grain Markets in Europe, 1500-1900: Integration and Deregulation.* Cambridge: Cambridge University Press.

Pirenne, H. (1936/61). *Economic and Social History of Medieval Europe.* London: Routledge & Kegan Paul.

Postan, M. M. (1952/87). The Trade of Medieval Europe: The North. In *The Cambridge Economic History of Europe*, vol. 2: Trade and Industry in the Middle Ages (eds. Postan, M. M. and Miller, E.). Cambridge, London, New York, New Rochelle, Melbourne, Sydney: Cambridge University Press, 168-305.

Press, V. (1987). The Holy Roman Empire in German History. In *Politics and Society in Reformation Europe: Essays for Sir Geoffrey Elton on his Sixty-Fifth Birthday* (eds. Kouri, E. I. and Scott, T.). Basingstoke, London: Macmillan, 51-77.

Rönnbäck, K. (2009). Integration of Global Commodity Markets in the Early Modern Era. *European Review of Economic History* 13, 95-120.

Schubert, E. S. (1988). Innovations, Debts, and Bubbles: International Integration of Financial Markets in Western Europe, 1688-1720. *Journal of Economic History* 48, 299-306.

Schubert, E. S. (1989). Arbitrage in the Foreign Exchange Markets of London and Amsterdam During the 18th Century. *Explorations in Economic History* 26, 1-20.

Schüttenhelm, J. (1984). Zur Münzprägung und Silberversorgung süddeutscher Münzstätten im frühen 16. Jahrhundert. In *Der Anschnitt: Zeischrift für Kunst und Kultur im Bergbau. Beiheft 2: Montanwirtschaft Mitteleuropas vom 12. bis 17. Jahrhundert. Stand, Wege und Aufgaben der Forschung* (ed. Kroker, W.). Bochum: Deutsches Bergbau-Museum, 159-169.

Schwinges, R. C. (2007). Straßen und Verkehrswesen im hohen und späten Mittelalter - Eine Einführung. In *Straßen und Verkehrswesen im hohen und späten Mittelalter* (ed. Schwinges, R. C.). Sigmaringen: Thorbecke, 9-18.

Scott, T. and Scribner, B. (1997). Urban Networks. In *Germany: A New Social and Economic History*, vol. 1: 1450-1630 (eds. Ogilvie, S. and Scribner, B.). London, New York, Sydney, Auckland: Arnold, 113-143.

Sprenger, B. (2002). *Das Geld der Deutschen: Geldgeschichte Deutschlands von den Anfängen bis zur Gegenwart.* Paderborn, München, Wien, Zürich: Schöningh.

Spufford, P. (1986). *Handbook of Medieval Exchange.* London: Offices of the Royal Historical Society.

Spufford, P. (1991). *Money and its Use in Medieval Europe.* Cambridge, New York, Port Chester, Melbourne, Sydney: Cambridge University Press.

Spufford, P. (2002a). Late Medieval Merchant's Notebooks: A Project. Their Potential for the History of Banking. In *Kaufmannsbücher und Handelspraktiken vom Spätmittelalter bis zum beginnenden 20. Jahrhundert* (eds. Denzel, M. A., Hocquet, J. C. and Witthöft, H.). Stuttgart: Steiner, 47-61.

Spufford, P. (2002b). *Power and Profit: The Merchant in Medieval Europe.* London: Thames & Hudson.

Stromer, W. v. (1970). *Oberdeutsche Hochfinanz 1350-1450*, vol. 2. Wiesbaden: Steiner.

Stromer, W. v. (1979). Funktion und Rechtsnatur der Wechselstuben als Banken in Oberdeutschland, den Rheinlanden und den mitteleuropäischen Montanzentren im Spätmittelalter. *Bankhistorisches Archiv: Zeitschrift für Bankgeschichte* 5, 3-33.

Studer, R. (2008). India and the Great Divergence: Assessing the Efficiency of Grain Markets in Eighteenth- and Nineteenth-Century India. *Journal of Economic History* 68, 393-437.

Tits-Dieuaide, M.-J. (1975). *La Formation des Prix Cerealiers en Brabant et en Flandre au XV^{e} Siecle.* Bruxelles: Editions de l'Universite de Bruxellex.

Toniolo, G., Conte, L. and Vecchi, G. (2003). Monetary Union, Institutions and Financial Market Integration: Italy, 1862–1905. *Explorations in Economic History* 40, 443-461.

Trenkler, C. and Wolf, N. (2005). Economic Integration in Interwar Poland - A Threshold Cointegration Analysis of the Law of One Price for Poland. *European Review of Economic History* 9, 199–231.

Unger, R. W. (1980). *The Ship in the Medieval Economy 600-1600.* London, Montreal: Croom Helm, McGill-Queen's University Press.

Unger, R. W. (1983). Integration of Baltic and Low Countries Grain Markets, 1400-1800. In *The Interactions of Amsterdam and Antwerp with the Baltic Region, 1400-1800* (ed. van Winter, J. M.). Leiden: Nijhoff, 1-10.

Unger, R. W. (2007). Thresholds for Market Integration in the Low Countries and England in the Fifteenth Century. In *Money, Markets and Trade in Late Medieval Europe: Essays in Honour of John H.A. Munro* (eds. Armstrong, L., Elbl, I. and Elbl, M. M.). Leiden, Boston: Brill, 349-380.

van Campenhout, B. (2007). Modelling trends in food market integration: Method and an application to Tanzanian maize markets. *Food Policy* 32, 112-127.

van der Wee, H. (1963). *The Growth of the Antwerp Market and the European Economy (fourteenth-sixteenth centuries)*, vol. 2: Interpretation. Louvain.

van der Wee, H. (1990). Structural Changes in European Long-Distance Trade, and Particularly in the Re-Export Trade from South to North, 1350-1750. In *The Rise of Merchant Empires: Long-Distance Trade in the Early Modern World, 1350-1750* (ed. Tracy, J. D.). Cambridge: Cambridge University Press, 14-33.

van der Wee, H. and Aerts, E. (1979). De Vlaams-Brabantse muntgeschiedenis in cijfers: Een poging tot homogenisering van de veertiende- en vijftiende-eeuwse gegevens. *Revue Belge de Numismatique et de Sigillographie* 125, 59-87.

van der Wee, H. and Aerts, E. (1980). Het gehalte van de goudmunten in Vlaanderen en Brabant tijdens de late middeleeuwen: Moeilijkheden bij de homogenisering van de gegebens. *Revue Belge de Numismatique et de Sigillographie* 126, 129-153.

van Duijn, J. J. (1977). The Long Wave in Economic Life. *De Economist* 125, 544-576.

Volckart, O. (2000). The Open Constitution and its Enemies: Competition, Rent Seeking, and the Rise of the Modern State. *Journal of Economic Behavior and Organizations* 42, 1-17.

Volckart, O. (2002). *Wettbewerb und Wettbewerbsbeschränkung im vormodernen Deutschland 1000-1800.* Tübingen: Mohr Siebeck.

Volckart, O. (2004). The Economics of Feuding in Late Medieval Germany. *Explorations in Economic History* 41, 282-299.

Volckart, O. (forthcoming 2009). Regeln, Willkür und der gute Ruf: Geldpolitik und Finanzmarkteffizienz in Deutschland, 14. bis 16. Jahrhundert. *Jahrbuch für Wirtschaftsgeschichte*.

Volckart, O. and Wolf, N. (2006). Estimating Financial Integration in the Middle Ages: What can we learn from a TAR-model? *Journal of Economic History* 66, 122-139.

Wallerstein, I. (1989). *The Modern World-System.* San Diego: Academic Press.

Watson, A. M. (1967). Back to Gold - and Silver. *Economic History Review* XX, 1-34.

Weisenstein, K. (2002). Die Münzpolitik der rheinischen Kurfürsten (Rheinischer Münzverein) unter besonderer Berücksichtigung der Einflüsse von Reich und Städten. In *Währungsunionen: Beiträge zur Geschichte überregionaler Münz- und Geldpolitik* (ed. Cunz, R.). Hamburg: Museum für Hamburgische Geschichte, 105-143.

Westergaard, H. (1932). *Contributions to the History of Statistics.* London: P.S. King & Son.

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