The Influence of Information Costs on the Integration of Financial Markets: Northern Europe, 1350-1560

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Abstract

In this paper, the influence of information costs on the integration of Northern European financial markets between ca. 1350 and 1560 is explored. The approach is based on splitting information costs into their constitutive components and on measuring one of these, i.e. the costs of transmitting information, which have particular importance for market integration. The analysis has two main results: First, under pre-industrial conditions, when transmitting information was extremely labour intensive and very little capital intensive, transmission costs can be largely identified with labour costs, and were subject to the same influences. Next, the integration of financial markets depended crucially on the level of transmission costs, high costs being strongly and significantly correlated with weak integration, while lower costs favoured convergence.

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Keywords: Financial markets, integration, information costs, economic history

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1. The issue: information costs and market integration

In the context of New Institutional Economics, one of the most widely used concepts is that of transaction costs. Ronald Coase (1937), who introduced it into economic theory, defined transaction costs as the costs of using the price mechanism of the market. While a standard terminology has still not evolved and many different definitions appear in the literature,[2] there is wide agreement that these costs are a source of friction which damages the ability of the market smoothly to provide for the optimal allocation of resources. It follows that the ability of economic actors to engage in exchange, to specialise and to realise gains from productivity advances due to specialisation also depends on the level of transaction costs, which therefore have central importance for the performance of the economy as a whole.

Research in economic history inspired by New Institutional Economics often invokes transaction costs in order to explain the behaviour of economic agents or economic developments. Douglass C. North's (e.g. 1984a; 1984b; 1987; 1992) seminal studies stand for many others. Still, the approach has met with some criticism. Many scholars claim that it is impossible to operationalise the concept of transaction costs and meaningfully to use it in empirical studies. Clemens Wischermann (1993, p. 249; cf. Bonus and Maselli, 1996, p. 1084), for example, asserts that transaction costs can hardly be measured. Proponents of the concept usually counter this criticism in two ways. On the one hand, they claim that for comparative analyses it is sufficient to establish relative levels of transaction costs (Furubotn and Richter, 1991, p. 11). On the other hand, they point to studies where these costs have been measured, either by comparing the costs involved in specific kinds of transactions, or by estimating the size of the economic sector concerned with initiating and handling transactions (e.g. Wallis and North, 1986; Benham and Benham, 1998; the research on measuring transaction costs is surveyed in Wang, 2003).

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[2]   Thus, Yoram Barzel (1997, p. 4) defines transaction costs as "the costs associated with the transfer, capture, and protection of rights". According to Thráinn Eggertsson (1990, p. 14), they "are the costs that arise when individuals exchange owenership rights to economic assets and enforce their exclusive rights. A clear-cut definition of transaction costs does not exist, but neither are the costs of production in the neoclassical model well defined". A still wider definition is provided by Eirik Furubotn and Rudolf Richter (1997, p. 40), who claim that "transaction costs include the costs of resources utilized for the creation, maintenance, use, change, and so on of institutions and organizations …. Transaction costs consist of the costs of defining and measuring resources or claims, plus the costs uf utilizing and enforcing the rights specified".

As far as economic history is concerned, there have not been many attempts to measure transaction costs. In particular, few attempts seem to have been made with regard to pre-industrial history: the problems posed by the lack and poor quality of the data seemed too forbidding. Using a new approach, the present paper aims at remedying this defect, at least as far as Northern and Central Europe between the middle of the fourteenth and the second half of the sixteenth centuries are concerned. The intention is neither to measure the development of the transaction sector nor to establish how the costs developed which had to be incurred in order to enter into specific transactions. Rather, the approach is to split transaction costs into components that are more manageable and about whose definitions agreement is easier to reach than about the concept as a whole, and to measure at least one of these. Additionally, in order to demonstrate the relevance of this cost component, the effects its development had on markets in late medieval and early modern Europe are estimated.

Where exactly are costs incurred when economic agents use the market to co-ordinate their activities? A good approach is to return to the origin, that is, to the discoverer of transaction costs. Coase (1960, p. 15) pointed out that "[i]n order to carry out a market transaction it is necessary to discover who it is that one wishes to deal with, to inform people that one wishes to deal and on what terms, to conduct negotiations leading up to a bargain, to draw up the contract, to undertake the inspection needed to make sure that the terms of the contract are being observed, and so on". Obviously, in this context information costs take a central place: ex ante, information is needed in order to find a partner and to determine the characteristics of the good or service which is exchanged. Ex post, enforcing a contract against a dishonest partner is costly for many reasons, but without incurring information costs the agents cannot even begin to determine whether one of them has violated the agreement. If the issue is measuring transaction costs, it therefore makes sense to begin with measuring information costs.

Still, information costs, too, can be split into several categories (for the following see Dudley, 1999, pp. 601 f.). For one thing, there are the costs of encoding and decoding information, which are reduced for example when standardised writing systems and languages are introduced. Thus, without actually attempting to measure the costs involved, Ulrich Blum and Leonard Dudley (2003) showed how at the end of the Dark Ages the creation of a standardised alphabet and the spread of standard Latin contributed to economic growth by making it less costly to record contractual clauses. Apart from this, the costs of storing information depend on the price of the medium

used for storage. For instance, when cheap paper replaced expensive vellum in the course of the fourteenth and fifteenth centuries, the costs of storing information fell. Finally, there are the costs of transmitting information. In spatially segmented markets, they do not only influence the chances of discovering what the relevant prices are, but also of finding a partner with whom to do business. Put differently, the costs of transmitting information determine whether economic agents are able to recognise opportunities for arbitrage. It is this cost category that is analysed in the present paper.

Such an analysis would be incomplete if the relevance of the costs of transmitting information for the performance of markets was not examined, too. The above remarks already point to where it seems promising to look. It has long been realised that arbitrage is the driving force behind market integration, which is impeded by transport costs on the one hand, and information costs on the other (Kindleberger, 1989, pp. 67 ff.). Here, the costs of encoding and storing information play a minor role; what counts are the costs of transmitting it. Hence, it seems obvious to examine how their development influenced the integration of markets. Still, markets for which goods? Transport costs and information costs hamper integration, but their relative importance for different commodities differs: transport costs have a relatively stronger influence on the integration of markets for goods with a high weight-value ratio, that is, for heavy, bulky commodities which are typical mass goods. Grain comes to mind. Information costs, on the other hand, are relatively more important where goods with a low weight-value ratio are concerned: luxuries, for example. Under commodity money conditions as those existing in late medieval and early modern Europe, there is hardly any good whose weight-value ratio is more favourable than that of money, in other words, where transport costs are relatively less and information costs relatively more important for market integration. Consequently, it is the integration of financial markets that is examined below. This is done by employing a new method that allows us to push back the analysis several centuries farther than research has succeded in doing until now: Hitherto, the limit of quantitative analyses of financial markets has been the early eighteenth or at most the late seventeenth century (Neal, 1985; 1987; Schubert, 1988; 1989); with the method used here, it is the fourteenth century. The hypothesis which is tested is that the integration of these markets was driven by the development of information costs, high costs being correlated with weakly integrated markets, whereas low costs favoured convergence.

The rest of the article proceeds as follows: In section 2, the data are discussed. Here, it is first explained how the development of information costs was determined for the period between the middle of the fourteenth and the middle of the sixteenth centuries. Most importantly, the principal source on which this paper is based is introduced. Subsequently, it is explained how the data base needed for the analysis of the integration of financial markets was constructed. The following section (3) concerns the analysis of the data. In a final section (4), the results are presented and discussed in their historical context, and the main hypotheses of the paper are summarised.

2. The Data

2.1. Messenger wages

As indicated above, this paper considers only one component of information costs in the late Middle Ages and the early modern period, namely transmission costs. That transmitting information was an important issue was realised by anybody concerned with long distance trade. In the course of their career, merchants who were active on international markets sent and received hundreds of letters each of which contained bits of information – in effect vital pieces of the puzzle they needed to put together in order to obtain a picture of what went on abroad. No wonder that they took pride in being better-informed than their competitors. Thus, in 1410 Sievert Veckinghusen, a merchant from Lübeck whose business interests were as far-flung as Livonia, Flanders and Italy, did not only point out to his brother Hildebrand in Bruges that "great profit" could be made by keeping their agent in Venice abreast of events in Flanders, but also that it would be "a great honour" for him "always to receive letters with all runners, like other people do" (Stieda, 1921, p. 37).

Much information may, of course, have been transmitted informally in the late Middle Ages and in the early modern period, but the quotation shows that sending messengers was the usual way of spreading knowledge which was relevant for doing business. Obviously, such messengers could carry several oral messages and more than one letter at a time, so that here the economies of scale usually involved in the transmission of information apply. Still, if a rough and ready outline of how transmission costs developed over time is needed, the wages that messengers received are a useful indicator.

How can we study such wages over extended periods of time? Many late medieval and early modern commercial sources – e.g. account books (cf. Nirrnheim, 1895, p. 115) –

mention sums paid to messengers, but usually the data are too isolated to be easily comparable. What we need are sources that contain serialised information about messenger wages over several centuries or at least decades. Fortunately, such sources have been preserved, albeit rarely from a commercial context: most seem to be records kept by political authorities (cf. Braudel, 1949/86, pp. 365 ff.). The present study draws on the account books of the treasury of the city of Hamburg, which contain year-by-year entries of the sums paid to messengers of the council. These sums are used in order to establish how the costs of transmitting information developed. Is this approach feasible? Clearly, to be so two conditions need to be given: First, the messengers must have received wages and not just some kind of expense allowance, as it is sometimes claimed in the literature (Maack, 1935, p. 1; Ahrens, 1962, p. 28). Furthermore, if they were paid wages, these payments must be representative of the wages granted to messengers not only by political authorities such as the council of Hamburg, but also by e.g. merchants or firms. The material used here makes it possible to confirm that both conditions do indeed hold. In order to demonstrate this, it is necessary to introduce the source on which this paper is primarily based in some more detail.

The earliest preserved account books of the city of Hamburg date from 1350. In 1563, the financial administration was reorganised and transferred to a new department (Koppmann, 1894, p. XI). Between these dates, the principles according to which the records were kept did not change, the entries made in the mid-sixteenth century being organised in exactly the same way as those that are 200 years older. In the present context, the section headed "cursoribus" is of principal interest. Here, the scribes of the treasury entered the missions on which the council of Hamburg sent their messengers, first registering the messenger's name or just "uni cursori", "nuntio" or "tabellario", next the destination, and finally a sum of money paid out. The exact date is usually not given. Altogether, c. 6200 missions are recorded in the "cursoribus"-section;[3] additionally, there are c. 1500 entries that concern payments – apparently perquisites – made to some of the foreign messengers who arrived in Hamburg. Unfortunately, the books containing the entries for 1351-1369, 1388 to 1460, and 1501 to 1521 were lost when parts of the old town of Hamburg burned in 1842. Some of the missing material could be reconstructed with the help of notes taken by a historian of the town some years before the fire, but large lacunae remain (Koppmann, 1869, pp. VII f.). What survives is, however, sufficient to give us glimpses at developments during key periods

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[3] Some very few missions were entered in other sections of the accounts.

of late medieval and early modern history: at the aftermath of the Black Death, at the beginning recovery in the second half of the fifteenth century, and at the effects of the "Price Revolution" of the sixteenth century.

Before the method used in this paper to establish the development of information costs is explained, some points of interest should be noted. First, the source shows that the vast majority of couriers travelled on foot. Mounted messengers of Hamburg are explicitly mentioned only six times (Koppmann, 1878, p. 192; 1883, p. 501; 1892, pp. 347, 553; 1894, p. 211). This does not preclude that occasionally the scribes just did not make a note of the means of travel; in fact, it seems likely that the number of mounted messengers was larger. An examination of another section of the civic accounts of Hamburg – headed "ad pretium familiae" – shows why this is the case. In the "ad pretium"-section, the scribes entered the basic yearly salaries paid to the civil servants of Hamburg (the members of the city's "familia": night watchmen, gatekeepers, officials who supervised the market etc.). Among these civil servants, a number of "famuli equestri" appears, who were usually employed as outriders. When the names in the "cursoribus"-section are compared with those in the "ad pretium"-section, it becomes evident that occasionally, the mounted servants of the city were employed as messengers, too. Taking these cases into account, 42 missions can be identified where it is either certain or very likely that the messenger travelled on horse.

A second point that is shown by a comparison of the "cursoribus"- and "ad pretium familiae"-sections is that there was not a single year when the council of Hamburg restricted themselves to employing members of the familia as messengers. They always sent other persons, too. This can be conclusively determined when names are entered that do not appear among the city's familiares. However, for analytical purposes anonymous missions are here also attributed to such occasional messengers, the assumption being that the scribe of the treasury knew the familia, and would have entered the name if he had known it. While occasional messengers appear in all years, a trend is obvious: Whereas in 1350 practically every servant of the city could be employed as a messenger, regardless of his usual occupation, by 1371 two familiares were recorded as regular "cursores" (Koppmann, 1869, p. 142); they rarely seem to have fulfilled any other tasks. In the fifteenth century, the share of other familiares fell, and by the middle of the sixteenth century, the council hardly ever sent members of the familia other than the two main messengers. At the same time, the share of non-members of the familia, who were employed as messengers, grew. Taken together, both

developments (i.e. the fall in the share of other familiares and the rise in that of occasional runners) point to an increasing specialisation within the civil service of Hamburg.

Fig. 1: Types of messengers, 1350-1562
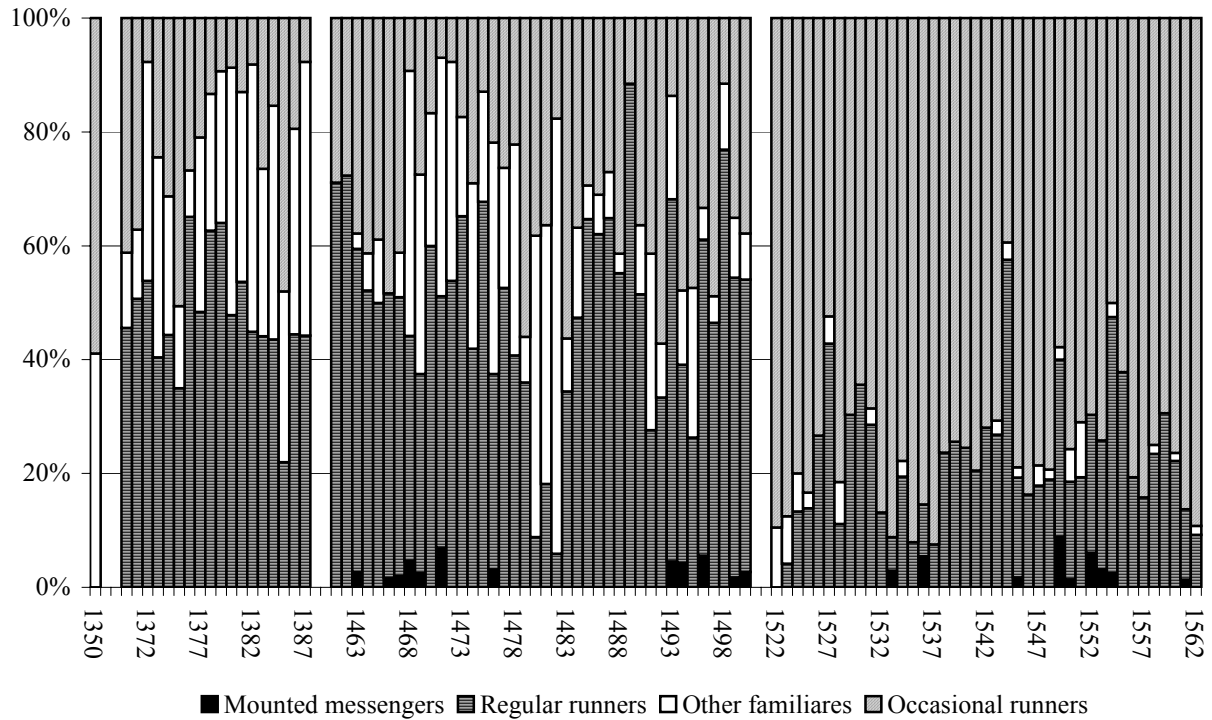
Finally, the source shows that the frequency with which the council of Hamburg sent messengers varied enormously. There were periods when traffic was intense, the council sending up to three messengers per week, while at other times only about twenty or thirty messengers were sent per year.

Table 1: Number of missions per year

Period	Missions	Period	Missions
1350	115	1491-95	40
1370	151	1496-1500	48
1371-75	136	1522-25	38
1376-80	92	1526-30	36
1381-85	67	1531-35	56
1386-87	60	1536-40	62
1461-65	56	1541-45	59
1466-70	74	1546-50	59
1471-75	45	1551-55	44
1476-80	39	1556-60	64
1481-85	54	1561-62	89
1486-90	47		

The cause of these variations is unclear, all the more so as falling numbers of civic messengers do not seem to have been made up by rises in the numbers of foreign envoys who arrived in Hamburg. However, since there must have been more foreign messengers than those who received a payment out of the treasury and who are mentioned in the account books (for some years, e.g. 1527, not even one is recorded), this problem must remain open.

The method used in the present paper in order to establish the development of transmission costs is to determine the geographical co-ordinates of the messengers' destinations, to calculate the distance from Hamburg and then the per-kilometre sum. Starting out from the distance as the crow flies obviously yields sums which are somewhat too high. However, the focus here is not on individual income or purchasing power but on the fluctuations of payments over time, so that this approach is acceptable. Altogether it is possible to determine the direct distance from Hamburg for about 75% of the destinations. In the rest of the cases, the scribe of the treasury did not make a note of the place, but rather of a person or of a larger region where the messenger was sent. Many of the persons were princes of neighbouring territories – the counts of Holstein, the dukes of Brunswick-Lüneburg, of Mecklenburg and so on –, who were fairly mobile and had so many residences that these entries must be neglected. Regions, such as the Alte Land opposite Hamburg on the south bank of the Elbe or Dithmarschen on the west coast of Holstein, present a problem because they are quite large and as destinations altogether too imprecise to allow the calculation of a per-kilometre sum from Hamburg.

The proponents of the hypothesis that civic messengers did not receive per-kilometre wages but rather an expense allowance do not tell, but their view seems to be based on the observation that even within the same year, sums paid for journeys to the same destinations varied widely. In 1350, for example, the messenger Arnold Sasse was twice sent to Bergedorf, a village just 18 kilometres from Hamburg. At one time he received 1s., at the other 4s. (Koppmann, 1869, p. 12).[4] In 1470, Johannes Bur got 16s. for his mission to Lübeck (c. 57 kilometres), while Ludekin Meiger was given just 7s. for the same distance (Koppmann, 1873, pp. 445 f.). Even at the end of the period considered

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[4]   The currency in which the accounts were kept is the Pound of Lübeck (£) that was divided into 20 shillings (s.) and 240 pennies (d.). Hamburg was a member of a currency union (the "Wendish Monetary Union") which linked it not only with Lübeck but also with the neighbouring cities of Lüneburg and Wismar. In these cities, the most common unit of account was not the pound but the Mark (m.), which was divided into 16 shillings or 192 pennies (thus, £1 equalled 1m.4s.). In the appendix, nominal wages of messengers are given in the more common unit of account, i.e. in the Mark of Lübeck.

here, fixed tariffs that were paid for specific distances did not exist (cf. Gerteis, 1989, p. 22).[5] The sums paid to messengers and the distances they went are still quite closely correlated (the mean correlation coefficient is 0.72 for the regular runners, 0.66 for occasional messengers and 0.59 for both mounted servants and other familiares), but such variations might nevertheless support the view that the payments were just supposed to cover expenses incurred by the messengers. However, any number of alternative explanations comes to mind. Thus, with regard to nearby Lüneburg's messenger service Ranft (1987, p. 82) suggested that the kind of mission – transmitting verbal information, carrying important documents etc. – influenced payments. Just as well, the messenger's age or experience, his speed or why not the weather or the time of the year may have been decisive.

Still, there is a way to determine whether the expense-allowance view is correct. Obviously, the hypothesis can apply to civil servants only, that is to persons who received a regular basic salary. Occasional messengers must have received a wage. If the traditional hypothesis was correct, it should be possible to make out a systematic difference between the sums paid to both types of messengers: those who did not belong to the "familia" should have received more because they could not rely on a basic salary. In order to show whether this was indeed the case, it seems useful to treat the wages paid to the two regular runners whom the council employed as a benchmark; this is the only group for which data exist for every year apart from 1350. The wages that occasional runners received can then be compared to those of the council messengers.

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[5] In 1561, for example, Georg Wolters received £1 for one mission to Lübeck, and £1.10s. for another (Koppmann, 1894, p. 311).

Fig. 2: Deviation of wages of occasional runners from those of regular runners (in percent), 1370-1562
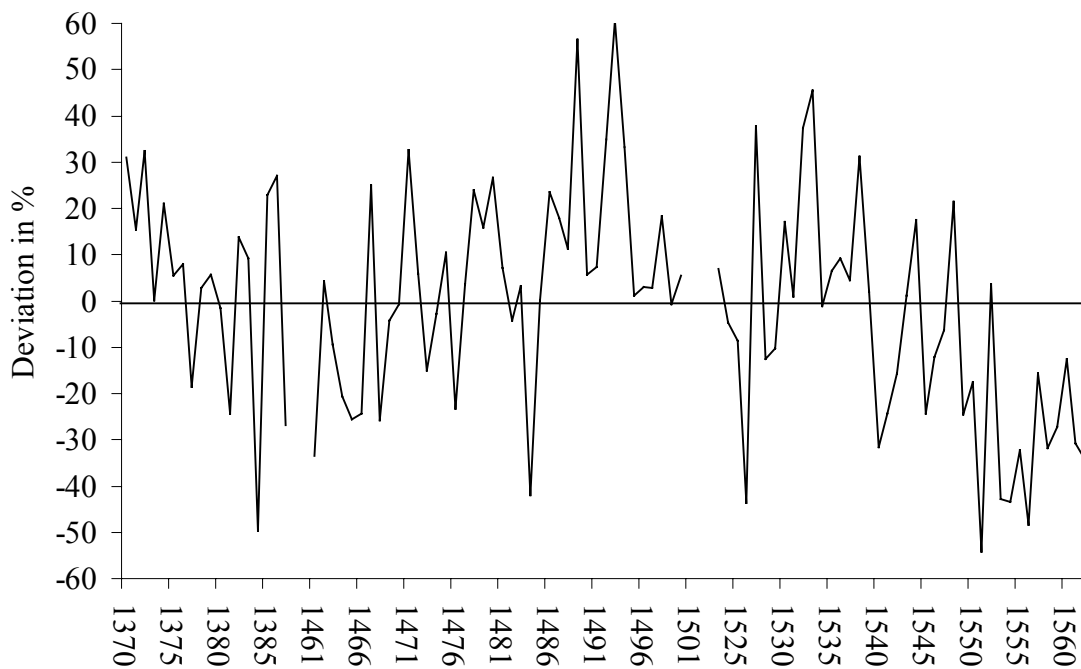
While differences could become large, there do not seem to have been systematic deviations into one or the other direction. Perhaps it could be said that conditions favoured the occasional runners in the late 1480s and 1490s, and harmed them in the 1550s, but otherwise years when they were better paid alternated with years when they received less than the two regular runners did. Evidently, this contradicts the hypothesis that familiares received a kind of expense allowance. Members of Hamburg's familia were paid a wage that seems to have been individually negotiated between them and the city's financial administration. At the same time, the lack of a clear direction into which the wages of regular runners deviated from those of occasional messengers suggests that the data found in the account books of Hamburg are indeed representative of messenger wages in general: Merchants probably paid similar per-kilometre sums.

The question of why the wages of regular and occasional runners diverged cannot be answered on the basis of the surviving sources. However, the general development can be explained. While New Institutional Economics suggests that the level of transaction costs – and by implication that of the costs of transmitting information – is strongly influenced by institutional change, the literature which is concerned with information costs in the narrow sense of the word puts the main stress on the importance of either cultural factors (such as the spread of standardised writing systems or languages) or technology (North, 1987; Blum and Dudley, 2003; Dudley, 1999; cf. Eggertsson, 1990,

p. 16). How about the present case? The problem becomes clearer when the wages that messengers received are contrasted with those of other professions. Unfortunately, other wage series from Hamburg are not preserved, so that interregional comparisons are necessary, for example with Antwerp where the wages of craftsmen are well recorded (at least from c. 1430, cf. van der Wee, 1963, pp. 457-62). As long as we do not have sufficient data to put together plausible commodity baskets, such comparisons are best based on the grain equivalents of the sums paid as wages. This can here be done because in the account books of the treasury of Hamburg prices of rye are mentioned relatively often; there are some gaps, but most of these can be filled with data from the account books of the treasury of nearby Lüneburg (StA Lüneburg, AB 56,1.2.).[6] Still, as for most years there are not more than one or two observations, and as grain prices were subject to violent seasonal fluctuations, low-frequency data such as those used here can not convey more than a vague impression of the general trend. To increase clarity we will therefore use decennial means, concentrating on the wages of professional messengers, that is, of Hamburg's two regular runners and of the occasional runners which the council employed, and compare those to the wages of masons from Antwerp.

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[6] Supplementing data from Hamburg with those from Lüneburg is possible because the distance between the cities is barely 44 kilometres. Moreover, Hamburg and Lüneburg were linked by a much-frequented waterway (via the rivers Elbe and Ilmenau) and had, at the time discussed here, the same currency. They are therefore assumed to have been a fairly well-integrated grain market. For the price of rye in Antwerp see van der Wee (1963, pp. 174-8).

Fig. 3: Wages of messengers in Hamburg (in litre rye per kilometre) and of masons in Antwerp (in litre rye per day), decennial means 1371-1560
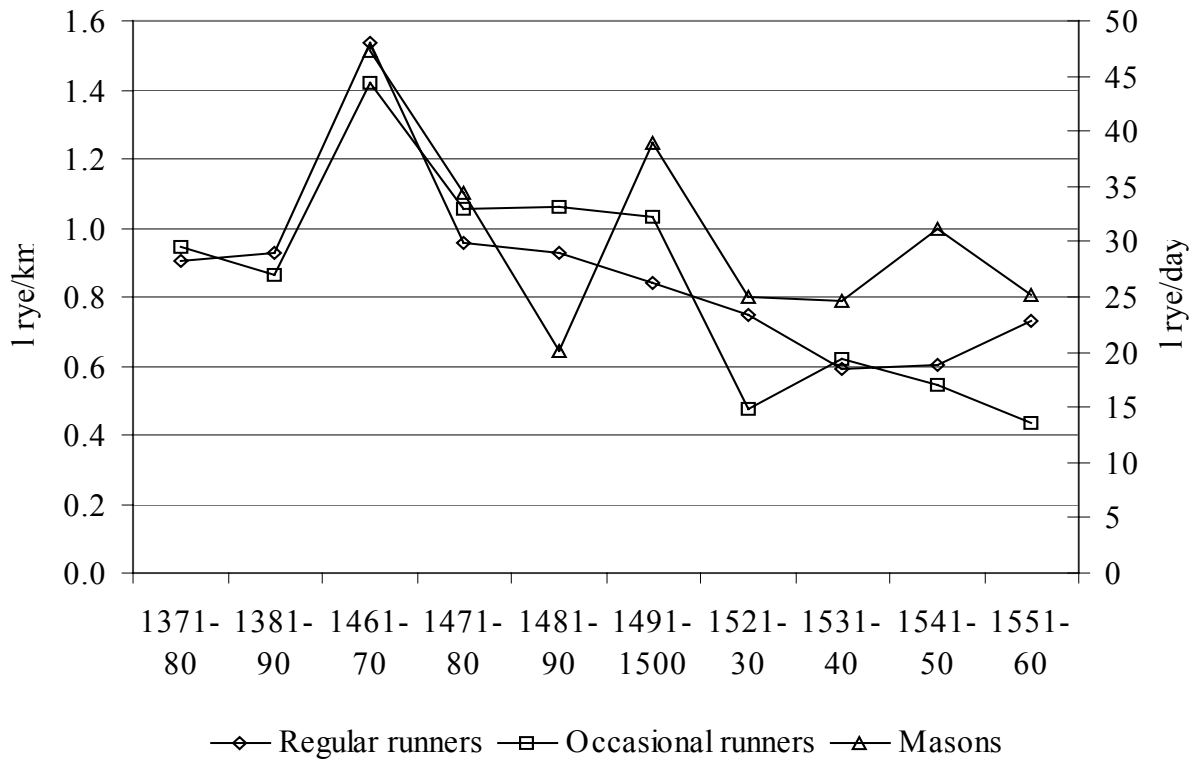
Despite the considerable differences that can be observed in some decades, the overall development of messenger wages in Hamburg and masons' wages in Antwerp was remarkably similar: Comparatively high real wages in the late fourteenth and fifteenth centuries were followed by much lower wages in the sixteenth century.[7] The data suggest that the factor which had the strongest influence on wages was the supply of labour which shrank due to the Black Death and to recurring waves of the plague in the second half of the fourteenth and the early fifteenth centuries, began to grow again in the second half of the fifteenth century, and outran the supply of grain in the sixteenth century. The fall of real wages after c. 1460 was, in fact, a common development which has been observed all over Europe (Braudel and Spooner, 1967, p. 428). By contrast, institutional change is unlikely to have had a strong effect on both the wages of messengers in Hamburg and of masons in Antwerp, as it would have had to occur in both cities at the same time. As for technical change, it is hard to imagine innovations that affected messengers and masons alike. In sum: the development of transmission costs seems to have been primarily driven by the labour supply – a conclusion which is all the more plausible as, like all services before industrialisation, transmitting

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[7] The coefficient for the correlation of the wages of regular runners and masons is 0.49, and for the wages of occasional runners and masons 0.44.

information was extremely labour intensive (and very little capital intensive) in the late Middle Ages and the early modern period.

2.2. Exchange rates and monetary standards

As explained above, it is plausible to expect that transmission costs influenced market integration, and that this influence should be most obvious where a commodity with a low weight-value ratio such as money was concerned. Hitherto, there has not been a lot of research on the question of how well integrated pre-modern financial markets were. The approach used in nineteenth- or twentieth-century studies is based on the examination of interest rated demanded by various banks; if rates between several localities were similar – if, in other words, the Law of One Price held –, this is interpreted as indicating a well-integrated market. Given the lack of data, this method cannot be used for the period analysed here. Alternatively, Larry Neal (1985; 1987) examined prices paid at English and Dutch stock markets. In this way, he was able to push the analysis back to the early eighteenth century. Eric S. Schubert (1988), who used exchange rates and fees paid for bills of exchange, managed to extend it into the late seventeenth century. Up to now, nobody has gone further back.

However, there is a simple approach to this issue which suggests itself under a commodity money system such as that which existed in fourteenth- to sixteenth-century Northern Europe. This approach is based on the fact that at this time, merchants tended to treat money just as any other commodity. Thus, in Hanseatic sources the terms used to describe exchange transactions were "buying" and "selling" coins, and the use of bills of exchange was called "overkof", which can be translated as "sale at a distance" (e.g. Mollwo, 1901, pp. 30, 33; Lesnikov, 1973, p. 39). Moreover, in commercial correspondence the partners frequently informed each other about the development of exchange rates abroad (e.g. Stieda, 1921, pp. 83, 94-97). In view of these facts, it would be more than surprising if they had shunned opportunities to profit from arbitrage in money.

During the time examined here, c. 20 different types of gold coins and about 6 major silver currencies were in use between the eastern Baltic and the Netherlands; additionally, there were a number of currencies of local importance. Under conditions like these, how can we use exchange rates in order to analyse the integration of financial markets? We need to relate the weight and fineness of gold coins to their exchange rates in silver currencies, and in order to become internationally comparable, we need to

reduce these exchange rates to their content of fine silver. Put briefly, exchange rates of gold coins must be used to determine the gold-silver ratios in Hamburg and in several places with which the city traded. When these ratios are interpreted as prices paid on local financial markets, the approach based on the Law of One Price can be used: Gold-silver ratios which were similar between several localities indicate well-integrated markets, whereas differences between local ratios show that opportunities for arbitrage existed – opportunities that were not used due to high transport- and, presumably, prohibitive information costs.

Despite its overall simplicity, the approach sketched above is beset with a host of difficulties. In late medieval and early modern Europe, the way gold coins were handled differed in an important respect from the way silver was used: gold was the most important medium of long distance trade, whereas silver was more often used for local and smaller transactions. Both media were, therefore, only imperfectly substitutable. Still, as accounts were kept in units based on silver coins (such as the mark or the pound), merchants and others who handled sums in gold were used to calculating the exchange rates, and it is from their account books that most of our information about these rates stems. In most cases, the person who kept the account simply translated a sum in gold into another sum in a silver currency. The same applies to many exchange rates found in commercial letters and similar papers. However, how did the authors of such documents arrive at the exchange rates? There were, in fact, several ways (cf. Spufford, 1986, pp. 1 f.): The most elementary one was based on manual exchange, that is, on the simultaneous and on the spot exchange of coins of one currency for that of another. A more sophisticated kind of exchange made use of bills, which developed during the high Middle Ages. Sometimes, rates based on them are recorded in account books, too. Finally, there were official rates that were determined or imposed by political authorities not only for domestic, but occasionally even for foreign gold. A broad literature exists where such rates, particularly those based on the nominal values of domestic gold coins, are used as a basis for calculating gold-silver ratios (e.g. Watson, 1967; Lane and Mueller, 1985, pp. 324 f.). Harry Miskimin (1985/89, pp. 148-51; cf. Luschin von Ebengreuth, 1892, pp. 7 f.) forcefully argued against this approach, claiming that Renaissance princes were seldom able to enforce the circulation of their gold at its nominal par value. Hence, in the present study politically imposed exchange rates are excluded from the start; here, the focus is on market rates only.

As for the two other ways exchange rates could develop – i.e. manual exchange and bills –, it is under dispute which was more important at the time considered here. The traditional assumption is that Hanseatic merchants made little use of bills of exchange and were hostile to credit in general (Dollinger, 1964/88, pp. 252 ff.). This view has been challenged by Jenks (1982), and the sources show, in fact, that by the early fifteenth century bills were employed quite frequently in monetary transfers at least between Bruges and Lübeck (Stieda, 1887; 1894; 1921; Lesnikov, 1973). In this context, two points should be noted. On the one hand, exchange rates found in bills may contain a hidden interest rate; hence, there may be a systematic difference between them and the rates paid in manual exchange (cf. de Roover, 1968, pp. 32 ff.). On the other hand, it has sometimes been claimed that already by the fourteenth and fifteenth centuries, bills and other credit instruments constituted an important part of the money supply (Henning, 1981). If this were the case, their bare existence would have influenced rates of exchange. Still, as long as bills were not freely negotiable, they were no fully-fledged substitutes for hard money. The question of how far they influenced rates of exchange therefore hinges on when negotiability became common. Despite some early instances (Munro, 1991), on the whole this was a development of the seventeenth century. There is no evidence that the endorsement of bills was practised in any Hanseatic town of the fourteenth, fifteenth or sixteenth centuries. Even in Flanders, credit instruments made a negligible contribution to monetary circulation (Blockmans, 1990, p. 26). Most exchange rates found in the sources, even those mentioned in account books and commercial letters, therefore ultimately reflect rates that developed in manual exchange. As for bills, too few are preserved to make it possible to make out a systematic difference between the rates mentioned in them and those based on manual exchange. Hence, it seems acceptable to use all quotations indiscriminately.[8]

A more serious problem is posed by the ambiguity and lack of clarity of the sources. Often enough, the merchant or official or whoever authored the document where the quotation is found did not bother clearly to define which kind of gold coin the exchange rate actually applied to. For example, in 1368 the Hamburg merchant Vicko von Geldersen noted that he paid 12s.4d. for 1 "olde scild" (Nirrnheim, 1895, p. 19). The "scild" could be either Flemish or French. In the first case, it could either be the écu d'or with the nominal value of 22 Flemish grotes which was struck since May 1349, or

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[8]   In the appendix, where the exchange rates used in this paper are presented in full, their type is
      indicated, using the categories developed by Spufford (1986, pp. l ff.) in his "Handbook of Medieval
      Exchange".

the écu of 24 grotes which was issued since December 1354 (Blockmans and Blockmans, 1979, p. 86). In France, écus had been minted since 1266 (nominal value 120d.), 1337 (240d.), 1343 (672d.), 1349 (300d.), and 1351 (300d.) (Blanchet and Dieudonné, 1912, pp. 225, 247 f., 255, 267). Needless to say, not only the nominal value but also the fine gold content of all these coins differed. In some of these cases, it is possible to make a plausible guess: Thus, Hamburg had closer commercial links with Flanders than with France, so that the "olde scild" bought by Geldersen was probably Flemish and had been minted before 1354 (otherwise it would not be "old"). Other cases cannot be decided and must be left out of account. A related problem is posed by changes of the standard of the gold or silver coinage. If an exchange took place shortly after such a change, it is often impossible to make sure whether the coins that changed hands were newly minted or had already circulated for some time. Here, the same assumptions were made as in Nikolaus Wolf's and the author's (2006) recent paper about silver exchange rates: Debased coins dominated circulation more quickly than re-enforced ones, and older coins continued to circulate abroad for a longer time than at home, where they had been minted.

Even if it is known which types of coins were exchanged, the problem remains of determining their content of specie. The principal class of sources that contain the relevant information are mint ordinances and contracts concluded between the authority who issued the coins and the mint master. Usually, such documents define the fineness of the alloy from which the coins were to be made, and the number of coins to be drawn from a specified quantity of that alloy. They could be straightforwardly interpreted if it were not for several obstacles. For one thing, in some cases there is no clarity about the exact metric equivalents of the units of weight used between the fourteenth and sixteenth centuries. Most scholars assume either for simplicity's sake (Kunzel, 1998) or based on complex metrological arguments (Munro, 1998) that at least some of them had the same weight as at the time of conversion to the metric system in 1789 or later, but for example for the Mark of Cologne, which was used in many German mints, this seems unlikely. Harald Witthöft (1991, p. 93), who spent a lifetime clearing a way through the maze of medieval metrology, asserts that its fifteenth-century weight was not 233.855 grams, as in the early nineteenth century, but rather 233.888 grams. The possibility of minor regional deviations cannot be discounted.

Apart from this, the ability of medieval and early modern mint technicians to make chemically pure gold and silver has been questioned. The Venetian mint may have been

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able to refine gold to a purity of more than 23¾ carats (989.57/1000), but Venice was exceptional, its standard being not even reached by Florence (Lane and Mueller, 1985, pp. 179, 229). As for silver, in France the fineness of the so-called "argent-le-roy" that was used for coinage purposes was to be 11.5 deniers (958.18/1000), while in the Hanseatic area "lötiges Silber" of about 15.5 lots (968.75/1000) seems to have been the best that could be made (Miskimin, 1963, p. 31; Jesse, 1928, p. 160). The problem is that this introduces an ambiguity into the ordinances and mint master contracts: if such a document prescribed e.g. 21 carats, did that mean that the mint technician had to add 3 units of base metal (e.g. copper) to 21 units of gold of the maximum fineness that could be made, or that the finished coin had to contain 21/24 (875/1000) of fine gold? Lest the reader think these matters unduly arcane, the example of the Flemish écu of 1349 mentioned above will suffice to show that they could become quite important. According to the ordinance, 54 écus were to be drawn from a Marc de Troyes of gold of a fineness of 23¼ carats. Suppose that the metric equivalent of the Marc de Troyes, as used in the Netherlands, was 298.587 grams (Miskimin, quoted by Munro, 1998, p. 8), and that 23¼ carats defined the fineness of the finished coin. Its content of fine gold would then have been 5.357 grams. Suppose, on the other hand, that the Marc de Troyes had only 244.753 grams (as at the time of conversion to the metric system) and that the stipulation of 23¼ carats meant that the mint official had to add 0.75 units of base metal to 23.25 units of the best fine gold he could make, i.e. gold of a purity of say 980/1000. In this case, the finished écu would have contained only 4.303 grams of fine gold, that is, almost 20% less than if the first assumptions apply.

In the present analysis, the weight of the Marc de Troyes as established by Munro (1998) is used. For the Mark of Cologne, we follow Witthöft's (1991) arguments and assume that in the period of time considered here, it was slightly heavier than in the early nineteenth century. Other units used in Central and Eastern Europe were, according to Witthöft (1995, p. 234), linked to this Mark of Cologne by simple relations based on whole numbers. Thus the Mark of Kulm, used in Prussia, was equivalent to 13 lots of Cologne (cf. Ropp, 1878, p. 224); it consequently had a weight of 190.034 grams. Finally, for Italy, i.e. Florence and Venice, we use the metric equivalents of the local marks and pounds given in the recent relevant literature (Bernocchi, 1976; Lane and Mueller, 1985). As for the purity of fine gold and silver, the assumption made here is that the ordinances and contracts determined the fineness of the finished coins. This approach is acceptable because no mint master of the fourteenth to sixteenth centuries

could rely on being able to manufacture coins exactly to the prescribed standard anyway. The pieces were struck "al marco", that is, mint officials checked that the prescribed number of them held a prescribed weight, regardless of variations among the individual coins. This alone makes it impossible to exclude a margin of error when the bullion content of late medieval and early modern coins is determined.

A final problem is posed by the fact that once in circulation money became worn down and defaced. For silver, losses due to wear and tear have variously been estimated at between 2 and 2.75% per decade (Mayhew, 1974, p. 3) and between 0.25 and 0.87% per year (North, 1990, p. 108). Still, losses and wear and tear influenced the amount of specie in circulation, and therefore probably affected the level of prices, but as far as exchange rates are concerned, their effects were less important. Presumably, coins made of both metals suffered alike from defacement, so that its effects on gold and silver cancelled each other out.[9] Still, for this reason, too, a margin of error is unavoidable.

Fortunately, there is a group of sources that helps us to reduce such errors to an acceptable minimum. Many late medieval and early modern authorities had foreign money assayed more or less regularly (cf. Ropp, 1878, pp. 223 f.; Cahn, 1895, pp. 169 ff.; Munro, 1972, p. 212 ff.). The interpretation of contemporary assays is, of course, problematic due to our imperfect knowledge of the metric equivalents of ancient units of weight, but if these sources are checked against the results of modern chemical tests (cf. Grierson, 1981; Kubiak, 1986), it is possible to derive a clear enough picture of how much gold and silver really changed hands when money was exchanged.

When all problems involved in determining the specie content of the coins in circulation have been solved, it is necessary once again to turn to the way the prices of gold and silver coins developed. These pieces of precious metal were not valued against some benchmark price that had been independently determined, but were solely subject to local supply and demand. Some of them were more popular than others, so that buyers were prepared to pay a premium. Thus, for a large part of the fourteenth century the florin of Florence was the most popular and widely used (and imitated: Berghaus, 1965; Giard, 1967) gold coin of Western Europe. In the fifteenth century, the Hungarian florin played a similar role further east, in Poland and Prussia. What follows from this is that gold-silver ratios that are determined for one place, but on the basis of different types of

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[9] Gold may have suffered less from wear and tear than silver. The hardness of both metals is about the same (2.5-3), but as the purchasing power of gold was higher, gold coins circulated slower. On the other hand, silver was more often alloyed to a higher degree with base metals, a practice which increased the hardness of silver money.

coins are not necessarily alike. For example, in 1378 the treasury of Hamburg reckoned 132 ducats at £84.13s.4d. and 48 francs at £28.16s. (Koppmann, 1869, p. 261). The first exchange rate gives a gold-silver ratio of 1:17.01, the second of 1:14.81. There are two ways out of this problem: Either, and this applies to the fourteenth century, the mean value of all ratios that can be found is established. Alternatively, when circulation was dominated by a single type of gold coin, as in Hamburg since the middle of the fifteenth century when the Rheingulden was the most popular type of gold, the ratios based on this are used and all others are ignored.

Using this approach, and aggregating the gold-silver ratios that correspond to individual exchange rate quotations on a yearly level, it is possible to construct an almost unbroken time series that represents the development of the ratio in Hamburg. The following graph shows this.

Fig. 4: The gold-silver ratio in Hamburg, 1350-1562
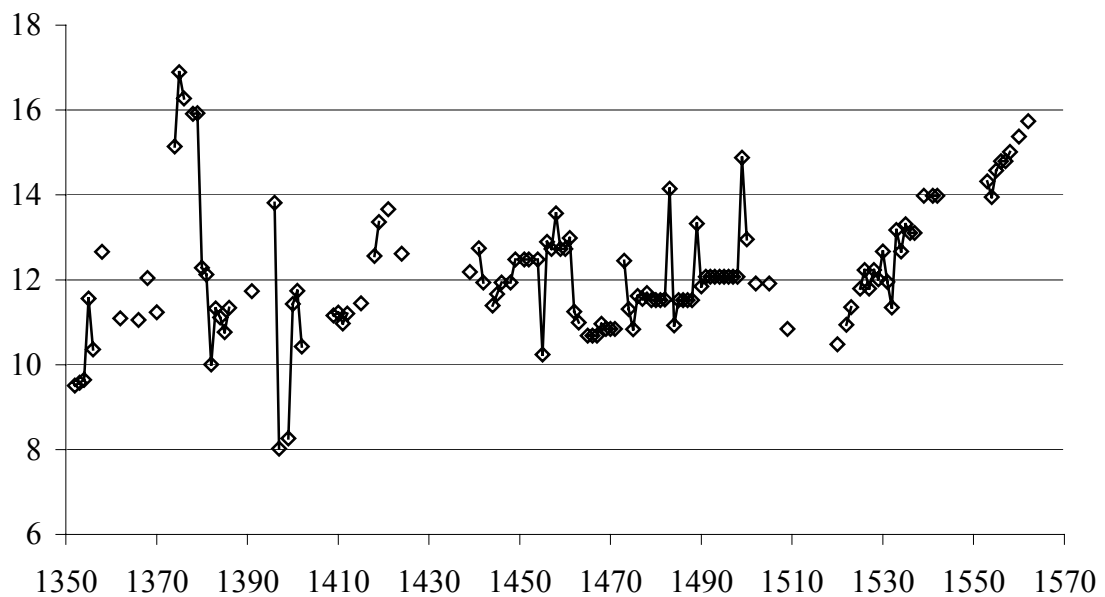
These data are contrasted with gold silver ratios from nineteen other places that had commercial links with Hamburg.[10] The data for most of these are more scattered, the only comparable time series being from Cologne where the relevant material has been prepared by Rainer Metz (1990, pp. 366 ff.). However, the following section shows that this does not impede the analysis.

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[10] Amsterdam, Antwerp, Bruges, Cologne, Danzig, Deventer, Dordrecht, Elbing, Gnesen, Königsberg, London, Lübeck, Lüneburg, Lund, Marienburg, Middelburg, Posen, Stuhm, and Thorn.

3. Analysing the data

It is now time to analyse both sets of data introduced above – transmission costs as well as gold-silver ratios – in context. In order to do so, it is useful briefly to consider the approach used here from a more formal point of view. Thus, the exchange rate of some type of gold coin sold in Hamburg for domestic silver money can be defined as $E_H = \dfrac{kC_H}{C_G}$, where k represents the sum in Hamburg's currency (C_H) which equalled one gold coin (C_G). The par ratio between these currencies is given by $R_H = \dfrac{kC_H S}{C_G G}$.

Here, S is the silver equivalent of the unit of account used in Hamburg, that is, of the Mark of Lübeck, and G is the fine gold content of the gold coin. Hamburg's gold-silver ratio is the average of the par ratios found per year (i.e. R_H'), subject to the restrictions described in the previous section. Ratios valid at the other places here considered (R_L) are defined analogously and are, like those from Hamburg, aggregated on a yearly level. Spreads between both aggregates are therefore given by $\Delta = \left| R_H' - R_L' \right|$.

These spreads are treated as the dependent variable that is to be explained by a number of independent ones, among whom information costs – that is, messenger wages per kilometre – are most important. To give an impression of how these wages developed between 1350 and 1562, figure 5 charts their yearly average values. Because the dependent variable refers to gold-silver ratios, and because a common standard of measurement is needed, silver instead of nominal wages are used in the analysis. Silver wages have the additional advantage of eliminating inflationary or deflationary effects due to changes in the standard of the coinage. Moreover, in contrast to nominal wages that rose practically over the whole period, they do not show any clear trend: In the middle of the sixteenth century, they were not higher than 200 years before. Detrending the data is therefore unnecessary.

Fig. 5: Messenger wages per kilometre, 1350-1562 (Index, 1461-65 = 100)
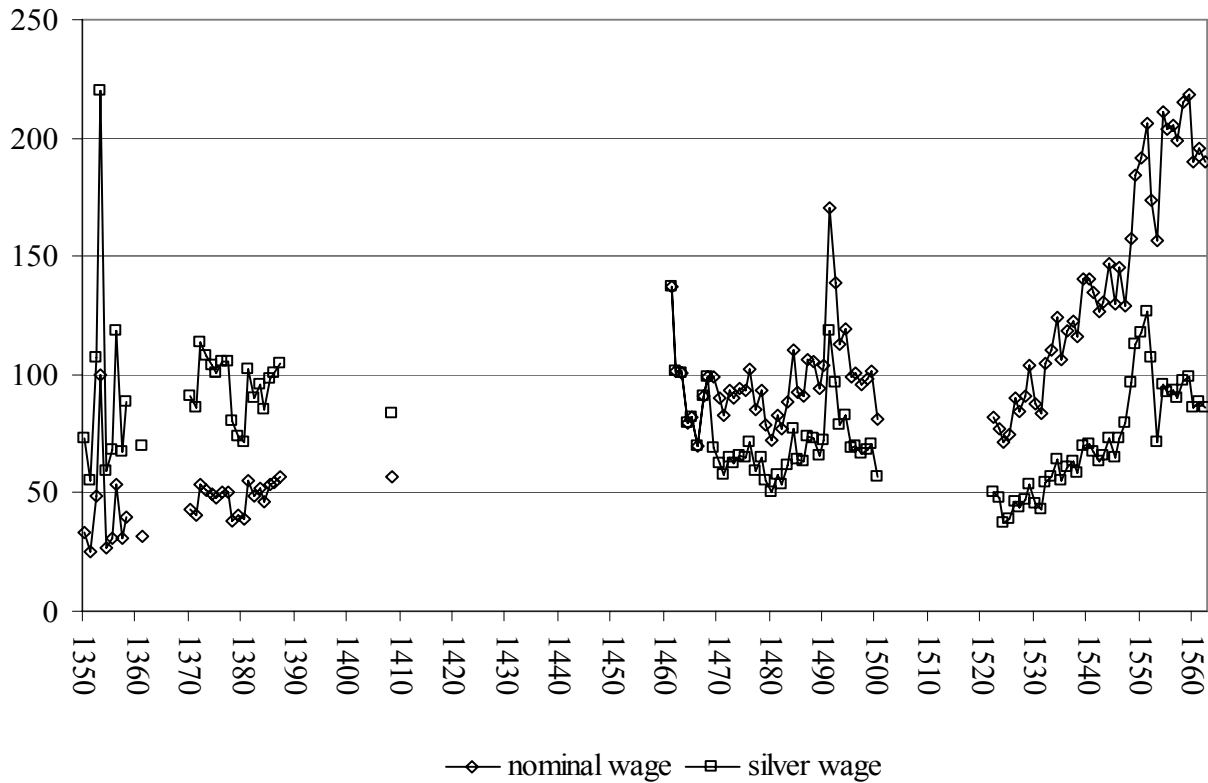
While the basic assumption of this study – i.e. that information costs impeded market integration – is plausible enough, it is obvious that the level of these costs was not the only relevant influence. Hence, it is necessary to control for a number of other variables. Integration studies usually stress the importance of transport costs, and though coins may have been inexpensive to ship, costs were certainly positive. Transport cost data do not exist, but given the lack of much progress in transport technology (Menard, 1991), the distance between Hamburg and the place where a gold-silver ratio was observed seems to be a good proxy: it should be positively correlated with differences between the ratios. However, transport costs have a wage component, and given the similarity of the development of the wages of messengers in Hamburg and masons in Antwerp, this component may have behaved in a comparable way. Testing for multicolinearity is therefore necessary.

Further, what about the influence of infrastructure? Important differences in the quality of the roads linking Hamburg and her several trading partners probably did not exist, but it is well known that using roads was usually more expensive than sea transport. However, just making a distinction between between places that could be reached by sea and those that were landlocked is still unsatisfactory. Hamburg had much better

communications with the west, i.e. the Netherlands or England, than with the east, that is, Prussia or Poland. Eastern European ports could be reached only by first travelling overland to a place like Lübeck or Wismar and then continuing by sea, or by rounding the northern tip of Denmark and entering the Baltic via the Oeresund. Hence, it is possible to define two dummies in order to capture the infrastructure effect: one for Hamburg's trading partners in the west, i.e. for those which could be reached via either the North Sea or the Baltic, and another for inland places which were linked to Hamburg by road. Price differences between Hamburg and the western cities should be smaller than those between Hamburg and her Baltic partners, which in turn should be smaller than differences between Hamburg and cities which were landlocked. The coefficients for the dummies should show this.

Another factor is the currency union formed by Hamburg and Lübeck in 1255, and extended to Lüneburg and Wismar in 1379 (Stefke, 2002). Such a union can be expected to have reduced transaction costs, thereby favouring market integration, so that prices should differ less among member cities than between Hamburg and places that had a different currency. Here, this effect is captured by a dummy that takes the value 1 if a city where a gold-silver ratio was observed was a member of this currency union in the given year, and 0 if this was not the case. To link the dependent variable Δ to these independent variables, a simple OLS regression model is used:

$\log(\Delta) = \alpha\log(wage) + \beta\log(distance) + \gamma(west) + \varepsilon(inland) + \zeta(union) + c,$

The result is given in the following table:

Dependent variable = log(Δ)	
log(wage)	0.646
	(5.02)**
log(dist)	0.067
	(0.49)
west	-0.335
	(2.15)*
inland	0.041
	(0.28)
union	-1.008
	(3.68)**
Constant	1.015
	(1.15)

Observations	500	Absolute value of t statistics in parentheses
R-sq	0.13	* significant at 5%; ** significant at 1%

The result does look quite promising: As expected, the influence of the costs of transmitting information (the *wage*-variable) comes out strongly and is highly significant. The weaker and in fact insignificant influence of transport costs is no surprise either. This result supports a central hypothesis of the present study: Information costs were relevant for the integration of financial markets, and given the favourable weight-value ratio which coins had, they were much more relevant than transport costs. Higher information costs significantly impeded the integration of financial markets, while lower costs obviously favoured exchange rate convergence. Another important insight is that even where a high-value and lightweight good like money was concerned, being landlocked was a drawback for economic integration. Markets with access to the sea integrated more easily, even if the sea-lanes were indirect or rather long, like those linking Hamburg and the Baltic. Also in line with what was expected, the influence of Hamburg's currency union with Lübeck, Lüneburg and Wismar comes out clearly and highly significantly. In fact, for the integration of financial markets, having the same currency seems to have been the single most important factor. And finally, the F-test shows that jointly, the independent variables do explain the dependent one. However, two problems remain: The R-sq is rather unsatisfactory, and there is still the possibility of multicolinearity between the variables.

As for the second problem, we can solve it by attempting to explain the messenger wages (as the dependent variable), using the others as independent variables. If there is indeed a strong relationship between the wages and the distance (as a proxy for transport costs), this should show up in the data. In fact, however, the regression yields a coefficient for log(*dist*) of barely 0.045 which is not even significant at 10%, and an R-sq of just 0.06. This is so small that the possibility of a strong linear relationship between the variables can be excluded; hence, the distance-variable can be safely retained.

What then can be done to improve the quality of the regression? The integration of financial markets was, of course, influenced by more factors than those included above. Thus, Mauro, Sussman and Yafeh (2006, pp. 91 ff.) found that in late nineteenth-century Europe, news on wars and violence were significantly associated with higher spreads between bond prices. As in the period discussed here, wars and urban unrest were frequent occurrences, it is plausible to expect a similar effect on late medieval financial markets. However, while Mauro and his co-authors were able to collect data on the news coverage of wars etc., here it is just possible to define dummies which

indicate whether a city was affected by wars or internal unrest in a given year or five-year period.[11] These dummies take the value of 1 if there were local disturbances in the years for which we have observations about gold-silver ratio differences; otherwise they have the value of 0. Two remarks about them are in order. First, because the dummies apply to years from which we have observations about ratio spreads, they designate not individual cities but city pairs. Hence, they overlap with the union and infrastructure dummies used above, and cannot be employed in the same regression. Second, it is important to point out that while unrest and war certainly affected financial markets, the direction of this influence is not evident without further information. In other words, under conditions of a system of commodity money based on both precious metals, we can not prima facie know whether such disturbances caused a local rise in the price of gold or in that of silver, thereby increasing or reducing the difference to the ratio valid in Hamburg. Despite the plausibility of the assumption that wars and unrest affected integration, we therefore cannot tell whether the coefficients will be positive or negative.

Apart from introducing disturbance-dummies, it is possible to improve the regression by using panel date. After all, we have wage-data for four types of messengers (mounted messengers, regular runners, other familiares and occasional runners) from the years between 1350 and 1562. A hausman-test having indicated that a random-effects regression is appropriate, we use the following equation:

$\log(\Delta) = \alpha\log(wage) + \beta\log(dist) + \gamma \ldots k(disturbance\_citypair) + c$

The result is given in this table:

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[11] The relevant information is taken from Blockmans and Prevenier (1999), Boockmann (1992), Dollinger (1964/88), Ennen (1865; 1875), Gabrielsson (1982); Hoffmann (1988), Nicholas (1992), Postel (1982) and Reinecke (1933).

Dependent variable = log(Δ)			
log(*wage*)	0.618	koenigsberg	0.122
	(4.88)**		(0.16)
log(*dist*)	0.200	london	0.104
	(2.40)*		(0.50)
hamburg	0.164	luebeck	-3.776
	(0.85)		(5.55)**
amsterdam	-0.685	lueneburg	0.000
	(1.49)		(.)
antwerp	0.000	lund	0.000
	(.)		(.)
bruges	0.750	marienburg	0.198
	(2.53)*		(0.31)
cologne	-0.818	middelburg	0.000
	(4.55)**		(.)
danzig	0.000	posen	0.000
	(.)		(.)
deventer	0.000	stuhm	0.000
	(.)		(.)
dordrecht	-2.133	thorn	-0.149
	(3.89)**		(0.19)
elbing	0.000	Constant	0.052
	(.)		(0.09)
gnesen	0.000		
	(.)		

Observations   500   Absolute value of z statistics in parentheses
Number of groups   4   * significant at 5%; ** significant at 1%

Interestingly, the relevant variables, that is, those in which we are principally interested, have not changed very much. The influence of information costs still comes out strongly and highly significantly, while that of transport costs is much weaker and less significant. The most important difference between this regression and the simpler variant shown above is the higher R-sq: In this case, it is 0.21.

Still, almost 80% of the differences between the exchange rates at Hamburg and at the other places here considered remain unaccounted for. This is probably due to the low quality and number of data and variables. Defining dummies for war and urban unrest can never give more than a vague impression of conditions during the time analysed here. In particular during the fourteenth and fifteenth century, being at peace or war was not really a question of either – or, but rather one of more or less. Some major wars can, of course, be identified, for example the one which devastated Prussia between 1454 and 1466, or that waged by Charles the Bold in the vicinity of Cologne in 1473-74. However, on the whole it is difficult to make a clear-cut distinction between all-out wars and everyday low-level violence of the type of feuds. Particularly in Germany

feuding was going on practically continuously (Volckart, 2004). Any war-dummy defined for specific places and years has therefore a strong element of arbitrariness. This probably accounts for much of the low R-sq in the regression shown above.

With regard to the quality of the data, it should be remembered that transmitting information involved economies of scale, so that messenger wages can never be more than a rough indicator for transmission costs. Moreover, it has been shown above that while there was quite a strong correlation between the distances messengers covered and the sums they received, it was far from unambigous. This may have been caused by a large number of influences that are impossible to analyse, such as the age and experience of the messenger, his speed, the type of document he carried etc. Finally, it should be kept in mind that in determining fourteenth- to sixteenth-century gold-silver ratios a margin of error cannot be avoided. As a rule, not too much should be read into or expected from the few surviving data from the late Middle Ages and the early modern period. However, all this does not detract from the main result of the above analysis: The wages of messengers are a useful proxy for the costs of transmitting information, and had a strong and highly significant influence on the integration of the gold market.

4. Conclusion

This article is motivated by the desire to give more substance to the concept of transaction costs that is frequently invoked by economic historians inspired by New Institutional Economics. The approach is to isolate information costs as a component of transaction costs which has central importance, then to split information costs into their constitutive components, and finally to measure one of these, namely transmission costs, i.e. the costs of transmitting information between different localities. Additionally, the effects these costs had on the integration of financial markets in fourteenth- to sixteenth-century Northern Europe are explored. The underlying assumption is that arbitrage on the money market was relatively little impeded by transport costs, whereas transmission costs had a comparatively strong influence. Briefly, the paper aims at testing the hypothesis that the integration financial markets depended on the level of the costs which were involved in transmitting information, high costs being correlated with weakly integrated markets, while low costs favoured convergence.

In order to measure transmission costs, the article draws on the account books of the treasury of Hamburg. There, the sums paid to messengers whom the council of the city sent are recorded in a way that makes it possible to calculate how much they received per kilometre. A comparison of the sums paid to regular and occasional messengers shows that the payments did not have the character of expense allowances, as has sometimes been claimed in the literature, but were indeed wages that were probably individually negotiated between the messengers and the financial administration of Hamburg. At the same time, the comparison suggests that the sums recorded in the accounts are representative of messenger wages in general, i.e. of those wages which messengers sent by merchants were paid, too. Hence, it is possible to treat the per-kilometre wages as general indicators of how the costs of transmitting information developed.

The integration of financial markets is examined on the basis of exchange rates of gold coins for silver, and of the specie content of the coins which changed hands. These data are used to construct local gold-silver ratio series which can then be compared; differences between them are treated as indicators of opportunities for arbitrage which were forgone. While the exchange rate quotations found in the sources are relatively unambiguous (leaving aside the problem of rates based on bills of exchange, which cannot be decided on the basis of the surviving material), it is more difficult to determine the fineness of gold and silver coins. For one thing, a number of exchange rate quotations are so vague that the types of the coins involved cannot be established, and for another, it is sometimes difficult to reach a definite conclusion with regard to their fineness. Even if the information gleaned from the sources is checked against the results of modern chemical tests, a margin of error remains. In the present study, the ratio valid in Hamburg is contrasted with that of nineteen other places. Differences between both ratios are related to the yearly averages of the wages of several groups of messengers.

The analysis yields three important results: First, in contrast to hypotheses hitherto advanced with regard to transaction costs in general and information costs in particular, it has become evident that neither institutional nor technical change had a strong influence on the development of transmission costs. This does not mean that such influences did not exist; it just means that the relevance of such factors cannot be estimated and anyway pales in comparison to the one dominant influence: the supply of labour. Under pre-industrial conditions, transmitting information was extremely labour

intensive; in fact, most of Hamburg's messengers went on foot, so that not even the prices of horses and oats or similar factors played a role. Transmission costs were essentially labour costs, and hence dependent on the labour supply. The recurring waves of the plague in the late fourteenth and fifteenth century reduced the supply of labour; therefore, the real wages of messengers in Hamburg peaked in about 1460-70. From then on, population began to recover; the supply of labour grew, and wages fell. In real terms, the per-kilometre costs of transmitting information in the mid-sixteenth century were less than half of what they had been about 100 years before. Despite being reached on the basis of sources from just one city, this result probably applies to all Western and Northern Europe. After all, a comparison with wages paid in other professions and at other places shows a roughly parallel development. Consequently, there is no reason to suppose that messenger wages – and therefore the costs of transmitting information – in for example Antwerp or Paris behaved any different than in Hamburg. The important point is that in the late Middle Ages and at the beginning of the early modern period, this component of information- and transaction costs can be closely identified with the costs of labour.

The second important result of the analysis presented above is that transmission costs had a clear and positive influence on the integration of financial markets. In other words, the hypothesis which this study set out to test – i.e. that the integration of the these markets was inversely correlated with the development of the costs of transmitting information – has been fully confirmed: When messenger wages – expressed in grams of silver – were high, differences between gold prices – likewise expressed in grams of silver – were large. The regressions presented above show that this correlation was strong and highly significant. They also show that the influence of information costs was much stronger and more significant that that of transport costs. This is as it should be, given the favourable weight value ratio of commodity money: Transport was cheap, and profiting from arbitrage on financial markets required paying for information about exchange rate differences.

Is it possible to draw any conclusions with regard to the integration of other markets? While the importance of transport costs obviously depended on the weight-value ratio of the good, this was not true for information costs. Information costs had a similar influence on the integration of all markets. In order to profit from an opportunity for arbitrage, a merchant had first to acquire the necessary information, regardless of whether he planned to sell grain or money. Before he had found out or had at least

developed rational expectations about potential buyers and about the relevant prices, transport was not even an issue. Hence, when markets became better integrated in the course of the late fifteenth and sixteenth centuries, this was not due to technical advances in transport – which were anyway negligible – but to the reduction in information costs due to the fall of messenger wages.

The third result is of a more general nature. The present paper aims at contributing to an estimation of how transaction costs developed in the pre-statistical age. Hitherto, attempts to capture these costs and their effects either aimed at determining the size of the transaction sector or the costs involved in concluding specific types of transactions. By contrast, the approach used here is based on splitting transaction costs into their components and measuring one of these. This method has been shown to be viable: it is not only possible to measure how this cost-component developed, but also how it influenced market performance. Altogether, this suggests that with the help of further studies, which focus on those components of transaction costs not analysed here, it should be possible to derive a relatively comprehensive picture of the development of transaction costs and of their importance over time.

Appendix

1. *Messenger wages from Hamburg*

	Mounted messengers				Regular runners				
	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Wage-distance corr. coeff.
1350	0				0				
1370	0				62	0.0026	0.1580	106.71	0.7828
1371	0				75	0.0026	0.1614	108.23	0.8305
1372	0				70	0.0030	0.1850	117.20	0.8406
1373	0				38	0.0034	0.2087	137.97	0.9594
1374	0				51	0.0030	0.1869	116.01	0.6123
1375	0				29	0.0032	0.1674	153.74	0.8274
1376	0				56	0.0033	0.1691	141.53	0.7796
1377	0				30	0.0037	0.1894	162.87	0.8113
1378	0				47	0.0027	0.1381	122.64	0.6329
1379	0				48	0.0026	0.1393	97.35	0.2940
1380	0				33	0.0026	0.1417	127.02	0.7700
1381	0				29	0.0034	0.1852	136.56	0.8169
1382	0				22	0.0031	0.1692	163.03	0.5611
1383	0				15	0.0033	0.1786	214.85	0.9738
1384	0				17	0.0036	0.1914	99.20	0.5950
1385	0				11	0.0033	0.1735	215.65	0.9696
1386	0				16	0.0035	0.1849	114.99	0.7315
1387	0				23	0.0043	0.2264	151.50	0.8007
1461	0				32	0.0103	0.2094	174.97	0.7101
1462	0				34	0.0068	0.1382	146.25	0.8942
1463	1	0.0043	0.0877	115.32	21	0.0071	0.1444	153.81	0.9177
1464	0				24	0.0060	0.1205	177.69	0.8061
1465	0				18	0.0060	0.1214	240.38	0.7739
1466	1	0.0030	0.0603	115.32	30	0.0054	0.1092	166.47	0.8024
1467	1	0.0040	0.0804	115.32	25	0.0056	0.1139	211.78	0.9732
1468	2	0.0043	0.0881	115.32	17	0.0072	0.1466	189.45	0.7843

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	Mounted messengers				Regular runners				
	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Wage-distance corr. coeff.
1469	1	0.0027	0.0551	115.32	14	0.0070	0.1429	196.79	0.9732
1470	0				36	0.0061	0.1243	146.76	0.5731
1471	3	0.0026	0.0519	138.68	19	0.0056	0.1145	135.96	0.7926
1472	0				21	0.0060	0.1220	205.83	0.9498
1473	0				15	0.0062	0.1269	225.37	0.6885
1474	0				13	0.0069	0.1411	359.31	0.8831
1475	0				21	0.0061	0.1233	157.84	0.9166
1476	1	0.0048	0.0979	64.92	11	0.0085	0.1727	165.22	0.9774
1477	0				10	0.0059	0.1192	94.02	0.6351
1478	0				11	0.0061	0.1248	169.86	0.9165
1479	0				9	0.0051	0.1031	142.25	0.9928
1480	0				3	0.0048	0.0975	72.88	0.8421
1481	0				6	0.0053	0.1076	153.30	0.9318
1482	0				2	0.0063	0.1274	177.60	1.0000
1483	0				11	0.0061	0.1249	147.46	0.1182
1484	0				9	0.0077	0.1570	122.10	0.9701
1485	0				11	0.0063	0.1274	191.35	0.7962
1486	0				18	0.0057	0.1150	187.60	0.7821
1487	0				24	0.0070	0.1431	287.28	0.7914
1488	0				16	0.0067	0.1359	119.11	0.7970
1489	0				23	0.0060	0.1216	176.35	0.8519
1490	0				17	0.0073	0.1482	153.94	0.8600
1491	0				8	0.0088	0.1786	371.03	0.9973
1492	0				7	0.0077	0.1564	125.72	0.7978
1493	1	0.0065	0.1322	115.32	14	0.0068	0.1385	181.81	0.8363
1494	1	0.0060	0.1212	115.32	8	0.0072	0.1465	451.74	0.9881
1495	0				5	0.0066	0.1346	111.89	0.9351
1496	1				10	0.0066	0.1351	222.82	0.9982
1497	0				20	0.0065	0.1312	131.98	0.7736
1498	0				20	0.0062	0.1260	188.05	0.7854
1499	1	0.0098	0.1983	115.32	30	0.0066	0.1334	171.13	0.8263
1500	1	0.0113	0.2297	365.16	19	0.0050	0.1013	145.92	0.3325

	Mounted messengers				Regular runners				
	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Wage-distance corr. coeff.
1522	0				0				
1523	0				1	0.0049	0.0873	88.52	
1524	0				2	0.0052	0.0914	127.29	
1525	0				5	0.0055	0.0973	198.53	0.9482
1526	0				4	0.0092	0.1627	213.60	0.3497
1527	0				9	0.0048	0.0848	218.00	0.9849
1528	0				3	0.0068	0.1204	154.69	0.5054
1529	0				10	0.0076	0.1348	144.95	0.7782
1530	0				16	0.0054	0.0949	157.58	0.5101
1531	0				10	0.0057	0.1000	118.55	0.6396
1532	0				5	0.0054	0.0959	299.44	0.9969
1533	1	0.0130	0.2297	115.32	2	0.0052	0.0911	146.95	
1534	0				7	0.0073	0.1287	105.45	0.9320
1535	0				5	0.0069	0.1215	145.12	0.0073
1536	3	0.0130	0.2297	115.32	5	0.0073	0.1289	264.64	0.4964
1537	0				4	0.0081	0.1424	589.06	0.9830
1538	0				9	0.0064	0.1126	258.34	0.9631
1539	0				11	0.0094	0.1669	384.99	0.8650
1540	0				12	0.0128	0.2258	496.87	0.6895
1541	0				8	0.0115	0.2024	583.90	0.7716
1542	0				16	0.0097	0.1721	379.88	0.9600
1543	0				11	0.0086	0.1512	386.31	0.7491
1544	0				19	0.0094	0.1710	306.83	0.8835
1545	1	0.0250	0.4572	115.32	10	0.0107	0.1957	507.78	0.7755
1546	0				7	0.0110	0.2017	444.33	0.9761
1547	0				5	0.0094	0.1709	162.60	0.8768
1548	0				11	0.0092	0.1675	219.58	0.9383
1549	4	0.0226	0.4136	458.22	14	0.0138	0.2524	284.24	0.8760
1550	1	0.0563	1.0281	103.31	12	0.0144	0.2624	410.06	0.9472
1551	0				6	0.0237	0.4332	700.43	0.5731
1552	2	0.0206	0.3624	160.70	8	0.0110	0.1938	328.08	0.9975
1553	1	0.0225	0.3957	115.32	7	0.0154	0.2706	612.70	0.7910

	Mounted messengers				Regular runners				
	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Wage-distance corr. coeff.
1554	1	0.0336	0.5912	115.32	18	0.0173	0.3048	514.48	0.9013
1555	0				14	0.0174	0.3054	720.31	0.7994
1556	0				6	0.0230	0.4049	831.89	0.5936
1557	0				6	0.0157	0.2754	407.38	0.9689
1558	0				15	0.0187	0.3292	329.42	0.9724
1559	0				11	0.0183	0.3213	654.77	0.9530
1560	0				16	0.0143	0.2519	253.09	0.9654
1561	1	0.0235	0.4138	576.77	9	0.0180	0.3170	638.87	0.9268
1562	0				6	0.0190	0.3343	907.54	0.7833

	Other familiares					Occasional messengers				
	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Wage-distance corr. coeff.	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Wage-distance corr. coeff.
1350	37	0.0022	0.1413	97.11	0.4977	53	0.0023	0.1490	117.68	0.7084
1370	18	0.0030	0.1861	82.26	0.4280	56	0.0034	0.2068	90.87	0.6256
1371	18	0.0027	0.1678	103.46	0.7811	55	0.0030	0.1861	120.80	0.5475
1372	50	0.0046	0.2838	114.99	0.5608	10	0.0040	0.2451	83.19	0.0227
1373	33	0.0037	0.2279	127.94	0.8886	23	0.0034	0.2089	96.79	0.2970
1374	28	0.0036	0.2240	116.18	0.6807	36	0.0037	0.2264	117.49	0.2776
1375	12	0.0028	0.1449	99.78	0.7649	42	0.0034	0.1765	126.97	0.8163
1376	7	0.0044	0.2276	71.17	0.6021	23	0.0035	0.1826	121.42	0.7209
1377	19	0.0033	0.1733	124.60	0.6586	13	0.0030	0.1544	101.60	0.4901
1378	18	0.0024	0.1230	98.67	0.8900	10	0.0027	0.1421	102.91	0.1679
1379	20	0.0032	0.1713	92.05	0.8613	7	0.0027	0.1472	114.30	0.2523
1380	30	0.0027	0.1468	90.06	0.6147	6	0.0026	0.1395	152.88	0.0074
1381	18	0.0047	0.2524	89.60	0.4806	7	0.0026	0.1399	86.12	0.8314
1382	23	0.0035	0.1881	100.86	0.6229	4	0.0036	0.1924	112.32	0.9430

	Other familiares					Occasional messengers				
	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Wage-distance corr. coeff.	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Wage-distance corr. coeff.
1383	10	0.0040	0.2128	128.82	0.5141	9	0.0036	0.1952	137.40	0.8250
1384	16	0.0032	0.1688	111.73	0.8582	6	0.0018	0.0963	99.01	0.0100
1385	15	0.0034	0.1810	96.54	0.7200	24	0.0040	0.2134	136.73	0.7524
1386	13	0.0036	0.1930	74.51	0.4797	7	0.0044	0.2349	95.39	0.7078
1387	25	0.0036	0.1900	84.30	0.5436	4	0.0031	0.1655	89.90	0.8155
1461	0					13	0.0069	0.1393	152.92	0.3592
1462	0					13	0.0071	0.1440	169.12	0.8236
1463	1	0.0097	0.1970	372.28		14	0.0065	0.1308	175.58	0.5974
1464	3	0.0053	0.1067	414.65		19	0.0047	0.0957	152.11	0.7493
1465	4	0.0077	0.1562	99.34	0.0016	14	0.0045	0.0904	104.31	0.6188
1466	0					29	0.0041	0.0826	101.51	0.2874
1467	4	0.0058	0.1177	97.00	0.0156	21	0.0070	0.1423	166.34	0.9633
1468	20	0.0069	0.1411	169.68	0.8234	4	0.0053	0.1087	232.41	0.9362
1469	14	0.0068	0.1391	165.71	0.8425	11	0.0067	0.1368	296.68	0.7194
1470	14	0.0063	0.1289	95.76	0.4359	10	0.0061	0.1234	211.23	0.6064
1471	18	0.0056	0.1134	177.85	0.8267	3	0.0075	0.1519	189.56	
1472	15	0.0070	0.1430	89.25	0.7085	3	0.0064	0.1293	187.14	0.0273
1473	4	0.0067	0.1369	89.92	0.9978	4	0.0053	0.1079	145.75	0.9480
1474	9	0.0053	0.1073	133.44	0.5685	9	0.0068	0.1373	166.31	0.9505
1475	6	0.0073	0.1487	92.11	0.2464	4	0.0067	0.1363	97.52	0.5973
1476	13	0.0061	0.1240	109.63	0.8888	7	0.0065	0.1324	163.73	0.8792
1477	4	0.0055	0.1124	83.52	0.9903	5	0.0061	0.1235	208.17	0.9961
1478	10	0.0057	0.1165	113.66	0.8053	6	0.0076	0.1547	102.26	0.8543
1479	2	0.0043	0.0883	84.11		14	0.0059	0.1194	159.68	0.9317
1480	18	0.0041	0.0839	208.99	0.9818	13	0.0061	0.1234	138.77	0.8274
1481	15	0.0059	0.1194	193.24	0.9759	12	0.0057	0.1154	242.10	0.9211
1482	26	0.0048	0.0970	306.63	0.9164	6	0.0060	0.1219	144.20	0.9607
1483	3	0.0043	0.0866	130.21		18	0.0063	0.1289	152.78	0.8950
1484	3	0.0131	0.2662	162.94	0.5192	7	0.0045	0.0911	119.37	0.0082
1485	1	0.0070	0.1432	115.32		5	0.0063	0.1276	303.99	0.9888
1486	2	0.0065	0.1315	78.43		9	0.0070	0.1420	268.65	0.4547
1487	3	0.0050	0.1012	85.92	0.9964	10	0.0083	0.1686	146.73	0.5813

	Other familiares					Occasional messengers				
	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Wage-distance corr. coeff.	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Wage-distance corr. coeff.
1488	1	0.0109	0.2212	103.41		12	0.0074	0.1513	266.77	0.9046
1489	0					3	0.0094	0.1901	115.64	1.0000
1490	4	0.0052	0.1050	128.57	0.0053	12	0.0077	0.1566	212.57	0.7313
1491	9	0.0168	0.3423	168.65	0.9723	12	0.0094	0.1915	342.68	0.6284
1492	2	0.0102	0.2064	152.44		12	0.0104	0.2109	228.95	0.7270
1493	4	0.0088	0.1786	187.10	0.9929	3	0.0110	0.2226	388.37	0.7816
1494	3	0.0071	0.1453	260.18	0.9986	11	0.0096	0.1954	218.21	0.8215
1495	5	0.0071	0.1436	119.45	0.0078	9	0.0067	0.1362	254.97	0.6316
1496	1	0.0088	0.1784	42.74		6	0.0068	0.1392	335.22	0.9453
1497	2	0.0064	0.1304	130.78		21	0.0066	0.1350	155.22	0.7373
1498	3	0.0091	0.1841	361.74	0.9993	3	0.0073	0.1491	125.26	1.0000
1499	6	0.0114	0.2316	251.35	0.7064	20	0.0065	0.1323	210.29	0.9235
1500	3	0.0073	0.1481	158.39	0.9715	14	0.0053	0.1068	121.97	0.8039
1522	4	0.0061	0.1075	177.24	0.8116	34	0.0056	0.0984	167.71	0.8850
1523	2	0.0055	0.0976	272.66		21	0.0053	0.0934	161.97	0.5380
1524	1	0.0057	0.1002	396.56		12	0.0049	0.0871	205.55	0.9974
1525	1	0.0053	0.0935	94.46		30	0.0050	0.0890	207.96	0.8814
1526	0					11	0.0052	0.0917	178.62	0.6475
1527	1	0.0053	0.0935	94.46		11	0.0066	0.1169	153.81	0.8419
1528	2	0.0082	0.1447	62.70		22	0.0060	0.1052	153.28	0.6101
1529	0					23	0.0069	0.1211	206.07	0.2918
1530	0					29	0.0063	0.1110	165.16	0.6642
1531	1	0.0054	0.0957	115.32		24	0.0057	0.1011	234.23	0.6112
1532	0					33	0.0075	0.1318	261.62	0.8356
1533	0					31	0.0075	0.1326	184.92	0.7636
1534	1	0.0524	0.9254	23.86		28	0.0072	0.1272	153.05	0.9092
1535	0					58	0.0073	0.1294	171.70	0.7653
1536	0					47	0.0080	0.1407	204.72	0.7120
1537	0					49	0.0084	0.1487	333.01	0.8754
1538	0					29	0.0084	0.1479	244.24	0.9121
1539	0					32	0.0096	0.1703	158.65	0.6404
1540	0					37	0.0087	0.1544	156.97	0.7607

	Other familiares					Occasional messengers				
	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Wage-distance corr. coeff.	Observations (identifiable destinations only)	Mark of Lübeck per kilometre	Grams of silver per kilometre	Kilometres per mission	Wage-distance corr. coeff.
1541	0					31	0.0087	0.1529	176.91	0.9375
1542	0					41	0.0082	0.1452	192.11	0.7085
1543	1	0.0212	0.3740	94.46		29	0.0087	0.1529	209.13	0.9034
1544	1	0.0088	0.1603	42.74		13	0.0110	0.2010	255.75	0.7561
1545	1	0.0102	0.1857	49.20		45	0.0081	0.1478	213.79	0.9285
1546	0					36	0.0097	0.1773	200.68	0.9359
1547	1	0.0081	0.1485	115.32		22	0.0088	0.1600	122.41	0.6110
1548	1	0.0115	0.2094	436.36		46	0.0111	0.2034	175.36	0.6249
1549	1	0.0087	0.1584	115.32		26	0.0104	0.1904	194.69	0.7307
1550	4	0.0146	0.2666	340.29	0.9982	53	0.0118	0.2165	177.40	0.8566
1551	3	0.0183	0.3336	651.85	0.9628	22	0.0108	0.1981	153.34	0.8172
1552	0					23	0.0114	0.2010	168.41	0.5518
1553	0					23	0.0088	0.1549	187.20	0.9197
1554	1	0.0396	0.6962	189.56		20	0.0098	0.1723	156.53	0.5674
1555	0					23	0.0117	0.2067	234.33	0.8950
1556	0					25	0.0119	0.2087	258.71	0.9440
1557	0					32	0.0132	0.2326	211.57	0.9001
1558	1	0.0481	0.8464	41.58		48	0.0128	0.2247	153.10	0.7610
1559	0					25	0.0133	0.2340	270.23	0.9433
1560	1	0.0150	0.2637	83.42		55	0.0125	0.2203	163.27	0.0996
1561	0					63	0.0125	0.2198	185.79	0.6819
1562	1	0.0060	0.1057	967.77		58	0.0125	0.2195	203.27	0.6575

2. Exchange rates and gold-silver ratios

Quotation types: A = account book, B = bill of exchange, C = commercial rate (vaguely defined), H = historian (no primary source given, no information about the type of quotation), L = loan, M = manual exchange (politically imposed fixed exchange rates are not included) (cf. Spufford, 1986, pp. l. ff.).

Hamburg

yyyy-mm-dd	sum1	sum2	place	type	Source	quantity Au	quantity Ag	ratio
1352-00-00	6 florenis	3m. lüb.	Hamburg	A	(Koppmann, 1869, p. 31)	20.8869	193.6156	9.27
1352-00-00	12 florenis aureis	6m.4d. lüb.	Hamburg	A	(Koppmann, 1869, p. 32)	41.7737	388.5758	9.30
1352-00-00	40 florenis aureis	£17.3s. 4d. lüb.	Hamburg	A	(Koppmann, 1869, p. 32)	139.2457	1384.8895	9.95
1353-00-00	1000 florenis	£404.3s. 4d. lüb.	Hamburg	A	(Koppmann, 1869, p. 35)	3481.1419	32605.4091	9.37
1353-00-00	20 florenis	£8.4s. lüb.	Hamburg	A	(Koppmann, 1869, p. 37)	69.6228	661.5201	9.50
1353-00-00	6 florenis	51s. lüb.	Hamburg	A	(Koppmann, 1869, p. 37)	20.8869	205.7166	9.85
1354-00-00	10 florenis	5m.20d. lüb.	Hamburg	A	(Koppmann, 1869, p. 43)	34.8114	329.4155	9.46
1354-00-00	200 Lübeck fl.	£85.lüb.	Hamburg	A	(Koppmann, 1869, p. 41)	698.1372	6857.2201	9.82
1355-00-00	25 florenis	£11.3s. lüb.	Hamburg	A	(Koppmann, 1869, p. 48)	87.0285	899.5059	10.34
1355-00-00	108 scudatos	£58.3s. lüb.	Hamburg	A	(Koppmann, 1869, p. 48)	367.1294	4691.1452	12.78
1356-00-00	10 florenis	£4.6s. lüb.	Hamburg	A	(Koppmann, 1869, p. 53)	34.8114	346.8947	9.96
1356-00-00	1 floren	9s. preter 4d. lüb.	Hamburg	A	(Koppmann, 1869, p. 53)	3.4811	34.9584	10.04
1356-00-00	6 florenis	55s. lüb.	Hamburg	A	(Koppmann, 1869, p. 53)	20.8869	221.8512	10.62
1356-00-00	12 florenis	7m. lüb.	Hamburg	A	(Koppmann, 1869, p. 53)	41.7737	451.7698	10.81
1358-00-00	15 scudatis	£8 lüb.	Hamburg	A	(Koppmann, 1869, p. 65)	50.9902	645.3854	12.66
1362-00-00	63 florenis	£30.3s. lüb.	Hamburg	A	(Koppmann, 1869, p. 81)	219.3119	2432.2963	11.09
1366-00-00	24 florenis aureis	£12 lüb.	Hamburg	A	(Koppmann, 1869, p. 96)	83.5474	923.2401	11.05
1368-00-00	1 olde scild	12s.4d. lüb.	Hamburg	C	(Nirrnheim, 1895, p. 19)	3.9659	47.4443	11.96
1368-00-00	1 antiquus schudatus	12½s. lüb.	Hamburg	C	(Nirrnheim, 1895, p. 19)	3.9659	48.0854	12.12
1370-00-00	6 florens	£3 lüb.	Hamburg	A	(Koppmann, 1869, p. 125)	20.8869	230.8100	11.05
1370-00-00	13 florenis aureis	£6½.4s.4d. lüb.	Hamburg	A	(Koppmann, 1869, p. 126)	45.2548	516.7580	11.42
1374-00-00	10 florenis aureis	£5½ lüb.	Hamburg	A	(Koppmann, 1869, p. 188)	34.8114	519.2424	14.92
1374-00-00	4 florenis aureis	45s.4d. lüb.	Hamburg	A	(Koppmann, 1869, p. 204)	13.9246	213.9908	15.37
1375-00-00	3 ghuldenen (lüb.?)	2m.1s. lüb.	Hamburg	C	(Nirrnheim, 1895, p. 99)	10.2518	155.7727	15.19
1375-00-00	10 florens aureos	£5½.5s. lüb.	Hamburg	A	(Koppmann, 1869, p. 222)	34.8114	542.8444	15.59
1375-00-00	12 florenis aureis	£7.4s. lüb.	Hamburg	A	(Koppmann, 1869, p. 224)	41.7737	679.7355	16.27

yyyy-mm-dd	sum1	sum2	place	type	Source	quantity Au	quantity Ag	ratio
1376-00-00	1 floren	12s. lüb.	Hamburg	A	(Koppmann, 1869, p. 241)	3.4811	56.6446	16.27
1376-00-00	12 florenis aureis	£7.4s. lüb.	Hamburg	A	(Koppmann, 1869, p. 241)	41.7737	679.7355	16.27
1378-00-00	48 francen	£28.16s. lüb.	Hamburg	A	(Koppmann, 1869, p. 261)	183.5647	2718.9422	14.81
1378-00-00	132 ducats	£84.13s. 4d. lüb.	Hamburg	A	(Koppmann, 1869, p. 261)	469.8793	7993.1865	17.01
1379-00-00	1 floren	10s. lüb.	Hamburg	A	(Koppmann, 1869, p. 291)	3.4811	47.2039	13.56
1379-00-00	48 francen	£28.16s. lüb.	Hamburg	A	(Koppmann, 1869, p. 280)	183.5647	2718.9422	14.81
1379-00-00	132 ducats	£84.13s. 4d. lüb.	Hamburg	A	(Koppmann, 1869, p. 280)	469.8793	7993.1865	17.01
1379-00-00	10 ducats	£6½ lüb.	Hamburg	A	(Koppmann, 1869, p. 276)	35.5969	613.6501	17.24
1380-00-00	10 ducats	£6½ lüb.	Hamburg	A	(Koppmann, 1869, p. 307)	35.5969	437.2932	12.28
1381-00-00	20 florenis aureis	£12 lüb.	Hamburg	A	(Koppmann, 1869, p. 327)	69.6228	807.3105	11.60
1381-00-00	11 florenis aureis	£7.4s. lüb.	Hamburg	A	(Koppmann, 1869, p. 328)	38.2926	484.3863	12.65
1382-00-00	3 florenis	24s. lüb.	Hamburg	A	(Koppmann, 1869, p. 347)	10.4434	80.7311	7.73
1382-00-00	29 ducats	£18½.7s. lüb.	Hamburg	A	(Koppmann, 1869, p. 349)	103.2311	1268.1503	12.28
1383-00-00	12 florenis	£6½.8s. lüb.	Hamburg	A	(Koppmann, 1869, p. 370)	41.7737	464.2036	11.11
1383-00-00	60 florenis aureis	£35½ lüb.	Hamburg	A	(Koppmann, 1869, p. 370)	208.8685	2388.2937	11.43
1383-00-00	12 florenis aureis	£7.2s. lüb.	Hamburg	A	(Koppmann, 1869, p. 369)	41.7737	477.6587	11.43
1384-00-00	40 florenis	£23 lüb.	Hamburg	A	(Koppmann, 1869, p. 391)	139.2457	1547.3452	11.11
1385-00-00	10 florenis aureis	£5½ lüb.	Hamburg	A	(Koppmann, 1869, p. 415)	34.8114	361.7947	10.39
1385-00-00	26 Rheingulden	£14½.9s. lüb.	Hamburg	A	(Koppmann, 1869, p. 415)	88.2984	983.4238	11.14
1386-00-00	1 floren	12s. lüb.	Hamburg	A	(Koppmann, 1869, p. 439)	3.4811	39.4685	11.34
1391-00-00	1 floren	10s. lüb.	Hamburg	A	(Koppmann, 1869, p. 476)	3.4811	32.8904	9.45
1391-00-00	20 ducats	£13.6½s.2d. lüb.	Hamburg	A	(Koppmann, 1869, p. 476)	71.1938	877.0781	12.32
1391-11-11	5 vranken	£1 grote	Hamburg	C	(Hanserecesse, 1877, p. 31)	19.1213	256.7832	13.43
1396-00-00	3 florenis	46½s. lüb.	Hamburg	A	(Koppmann, 1869, p. 483)	10.3595	143.1022	13.81
1397-00-00	1 floren	8s. lüb.	Hamburg	A	(Koppmann, 1869, p. 484)	3.4532	24.6197	7.13
1397-00-00	1 floren	10s. lüb.	Hamburg	A	(Koppmann, 1869, p. 483)	3.4532	30.7747	8.91
1399-00-00	33 florens	15m. lüb.	Hamburg	C	(Nirrnheim, 1930, p. 45)	113.9550	708.9336	6.22
1399-00-00	48 noble	£14.8s. grote	Hamburg	C	(Nirrnheim, 1930, p. 5)	362.2320	3730.1132	10.30
1400-00-00	8 olde schilde	7½m. lüb.	Hamburg	C	(Nirrnheim, 1930, p. 69)	31.7272	354.4668	11.17
1400-00-00	50 florenis	£33.6½s.2d. lüb.	Hamburg	A	(Koppmann, 1869, p. 490)	172.6591	1969.2600	11.41
1400-00-00 (c.)	1 noble	30s. lüb.	Hamburg	C	(Nirrnheim, 1895, p. 127)	7.5465	88.6167	11.74
1401-00-00	100 noble	£150 lüb.	Hamburg	A	(Koppmann, 1873, p. 2)	754.6500	8861.6702	11.74
1402-00-00	20 florenis	£7 lüb.	Hamburg	A	(Koppmann, 1873, p. 3)	55.5541	413.5446	7.44
1402-00-00	100 Rheingulden	£67 lüb.	Hamburg	A	(Koppmann, 1873, p. 3)	332.2266	3958.2127	11.91
1409-00-00	10 Rheingulden	£6.15s. lüb.	Hamburg	A	(Koppmann, 1873, p. 15)	32.4844	362.4660	11.16

yyyy-mm-dd	sum1	sum2	place	type	Source	quantity Au	quantity Ag	ratio
1410-00-00	19 Rheingulden	£12½.6½s. lüb.	Hamburg	A	(Koppmann, 1873, p. 19)	61.7203	688.6853	11.16
1410-00-00	30 Rheingulden	£20½ lüb.	Hamburg	A	(Koppmann, 1873, p. 19)	97.4531	1100.8225	11.30
1411-00-00	38 Rheingulden	£26.12s. lüb.	Hamburg	A	(Koppmann, 1873, p. 20)	123.4406	1345.9776	10.90
1411-00-00	10 Rheingulden	£7.20d. lüb.	Hamburg	A	(Koppmann, 1873, p. 21)	32.4844	358.4213	11.03
1412-00-00	5 Rheingulden	£3½.20d. lüb.	Hamburg	A	(Koppmann, 1873, p. 23)	16.2422	181.3190	11.16
1412-00-00	100 Rheingulden	£72.20d. lüb.	Hamburg	A	(Koppmann, 1873, p. 22)	324.8438	3647.4643	11.23
1415-00-00	40 Rheingulden	£29.6s. 8d. lüb.	Hamburg	A	(Koppmann, 1873, p. 26)	129.9375	1486.8161	11.44
1418-00-00	200 Rheingulden	£146.13s.4d. lüb.	Hamburg	A	(Koppmann, 1873, p. 29)	590.6250	7421.4303	12.57
1419-00-00	200 Rheingulden	£146.13s.4d. lüb.	Hamburg	A	(Koppmann, 1873, p. 29)	555.4828	7421.4303	13.36
1421-00-00	500 Rheingulden	£375 lüb.	Hamburg	A	(Koppmann, 1873, p. 36)	1388.7070	18975.2479	13.66
1424-00-00	20 ducats	£21.10s. lüb.	Hamburg	A	(Koppmann, 1873, p. 40)	71.1938	897.9609	12.61
1439-00-00	20 Rheingulden	£22 lüb.	Hamburg	A	(Koppmann, 1873, p. 64)	55.5483	677.0428	12.19
1441-00-00	1 Rheingulden	23s. lüb.	Hamburg	A	(Koppmann, 1873, p. 71)	2.7774	35.3909	12.74
1442-00-00	20 Rheingulden	£21 lüb.	Hamburg	A	(Koppmann, 1873, p. 72)	55.5483	632.9430	11.39
1442-00-00	1 Rheingulden	23s. lüb.	Hamburg	A	(Koppmann, 1873, p. 71)	2.7774	34.6612	12.48
1444-00-00	8 Rheingulden	£8.8s. lüb.	Hamburg	A	(Koppmann, 1873, p. 74)	22.2193	253.1772	11.39
1444-00-00	1000 Rheingulden	£1050 lüb.	Hamburg	A	(Koppmann, 1873, p. 75)	2777.4141	31647.1488	11.39
1445-00-00	10 Rheingulden	£10.15s. lüb.	Hamburg	A	(Koppmann, 1873, p. 76)	27.7741	324.0065	11.67
1445-00-00	4 Rheingulden	£4.6s. lüb.	Hamburg	A	(Koppmann, 1873, p. 76)	11.1097	129.6026	11.67
1446-00-00	20 Rheingulden	£22 lüb.	Hamburg	A	(Koppmann, 1873, p. 78)	55.5483	663.0831	11.94
1448-00-00	30 Rheingulden	£33 lüb.	Hamburg	A	(Koppmann, 1873, p. 79)	83.3224	994.6247	11.94
1448-00-00	10 Rheingulden	£11 lüb.	Hamburg	A	(Koppmann, 1873, p. 79)	27.7741	331.5416	11.94
1449-00-00	20 Rheingulden	£23 lüb.	Hamburg	A	(Koppmann, 1873, p. 80)	55.5483	693.2233	12.48
1451-00-00	20 Rheingulden	£23 lüb.	Hamburg	A	(Koppmann, 1873, p. 88)	55.5483	693.2233	12.48
1452-00-00	400 Rheingulden	£460 lüb.	Hamburg	A	(Koppmann, 1873, p. 89)	1110.9656	13864.4652	12.48
1454-00-00	30 Rheingulden	£34.10s. lüb.	Hamburg	A	(Koppmann, 1873, p. 91)	83.3224	1039.8349	12.48
1455-00-00	30 Rheingulden	£21 lüb.	Hamburg	A	(Koppmann, 1873, p. 93)	81.6886	632.9430	7.75
1455-00-00	100 Rheingulden	£115 lüb.	Hamburg	A	(Koppmann, 1873, p. 92)	272.2955	3466.1163	12.73
1456-00-00	30 Rheingulden	£32.10s. lüb.	Hamburg	A	(Koppmann, 1873, p. 93)	81.6886	979.5546	11.99
1456-00-00	20 ducats	£32.12s. lüb.	Hamburg	A	(Koppmann, 1873, p. 94)	71.1938	982.5686	13.80
1457-00-00	300 Rheingulden	£345 lüb.	Hamburg	A	(Koppmann, 1873, p. 94)	816.8865	10398.3489	12.73
1458-00-00	20 Rheingulden	£23 lüb.	Hamburg	A	(Koppmann, 1873, p. 96)	54.4591	693.2233	12.73
1458-00-00	41 ducats	£69.14s. lüb.	Hamburg	A	(Koppmann, 1873, p. 95)	145.9474	2100.7679	14.39
1459-00-00	220 Rheingulden	£253 lüb.	Hamburg	A	(Koppmann, 1873, p. 97)	599.0501	7625.4559	12.73
1460-00-00	20 Rheingulden	£23 lüb.	Hamburg	A	(Koppmann, 1873, p. 101)	54.4591	693.2233	12.73

yyyy-mm-dd	sum1	sum2	place	type	Source	quantity Au	quantity Ag	ratio
1460-04-25	600 Rheingulden	£690 lüb.	Hamburg	A	(Koppmann, 1873, p. 103)	1633.7730	20796.6978	12.73
1461-00-00	20 Rheingulden	£23 lüb.	Hamburg	A	(Koppmann, 1873, p. 128)	54.4591	693.2233	12.73
1461-00-00	6 Rheingulden	£6.18s. lüb.	Hamburg	A	(Koppmann, 1873, p. 127)	16.3377	207.9670	12.73
1461-00-00	11 Hungarian fl.	£16.10s. lüb.	Hamburg	A	(Koppmann, 1873, p. 127)	38.6121	497.3123	12.88
1461-00-00	20 Rheingulden	£24 lüb.	Hamburg	A	(Koppmann, 1873, p. 128)	54.4591	723.3634	13.28
1461-00-00	1 Rheingulden	£1.4s. lüb.	Hamburg	A	(Koppmann, 1873, p. 128)	2.7230	36.1682	13.28
1462-00-00	2 Rheingulden	£2.4s. lüb.	Hamburg	A	(Koppmann, 1873, p. 161)	5.4459	55.1306	10.12
1462-00-00	21 Rheingulden	£24.3s. lüb.	Hamburg	A	(Koppmann, 1873, p. 159)	57.1821	605.1839	10.58
1462-00-00	10 Rheingulden	£11.10s. lüb.	Hamburg	A	(Koppmann, 1873, p. 161)	27.2295	288.1828	10.58
1463-00-00	1 Rheingulden	23s. lüb.	Hamburg	A	(Koppmann, 1873, p. 180)	2.7230	28.8183	10.58
1463-00-00	30 Rheingulden	£34.10s. lüb.	Hamburg	A	(Koppmann, 1873, p. 194)	81.6886	864.5484	10.58
1463-00-00	1 noble	£3.4s. lüb.	Hamburg	A	(Koppmann, 1873, p. 195)	6.7919	80.1900	11.81
1465-00-00	100 Rheingulden	£115 lüb.	Hamburg	A	(Koppmann, 1873, p. 246)	269.6519	2881.8281	10.69
1465-09-29	20 Rheingulden	£23 lüb.	Hamburg	A	(Koppmann, 1873, p. 263)	53.9304	576.3656	10.69
1466-00-00	10 Rheingulden	£11.10s. lüb.	Hamburg	A	(Koppmann, 1873, p. 300 f)	26.9652	288.1828	10.69
1466-00-00	20 Rheingulden	£23 lüb.	Hamburg	A	(Koppmann, 1873, p. 301)	53.9304	576.3656	10.69
1467-00-00	20 Rheingulden	£23 lüb.	Hamburg	A	(Koppmann, 1873, p. 340)	53.9304	576.3656	10.69
1468-00-00	7 Rheingulden	£8.1s. lüb.	Hamburg	A	(Koppmann, 1873, p. 377)	18.8756	204.6516	10.84
1468-00-00	4 Rheingulden	£4.12s. lüb.	Hamburg	A	(Koppmann, 1873, p. 377)	10.7861	116.9438	10.84
1468-00-00	100 Rheingulden	£115 lüb.	Hamburg	A	(Koppmann, 1873, p. 378)	269.6519	2923.5938	10.84
1468-00-00	1 Rheingulden	£1.4s. lüb.	Hamburg	A	(Koppmann, 1873, p. 383)	2.6965	30.5071	11.31
1469-00-00	20 Rheingulden	£23 lüb.	Hamburg	A	(Koppmann, 1873, p. 414)	53.9304	584.7188	10.84
1470-00-00	20 Rheingulden	£23 lüb.	Hamburg	A	(Koppmann, 1873, p. 454)	53.9304	584.7188	10.84
1471-00-00	20 Rheingulden	£23 lüb.	Hamburg	A	(Koppmann, 1878, p. 31)	53.9304	584.7188	10.84
1473-00-00	20 Rheingulden	£24 lüb.	Hamburg	A	(Koppmann, 1878, p. 116)	53.9304	610.1413	11.31
1473-00-00	4 Rheingulden	£4.16s. lüb.	Hamburg	A	(Koppmann, 1878, p. 117)	10.7861	122.0283	11.31
1473-00-00	382½ Rheingulden	£643 lüb.	Hamburg	A	(Koppmann, 1878, p. 92)	1031.4183	16346.7024	15.85
1473-10-15	20 Rheingulden	£24 lüb.	Hamburg	A	(Koppmann, 1878, p. 117)	53.9304	610.1413	11.31
1474-00-00	20 Rheingulden	£24 lüb.	Hamburg	A	(Koppmann, 1878, p. 156)	53.9304	610.1413	11.31
1474-00-00	25 Rheingulden	£30 lüb.	Hamburg	A	(Koppmann, 1878, p. 157)	67.4130	762.6766	11.31
1475-00-00	36 florenis	£37.10s. lüb.	Hamburg	A	(Koppmann, 1878, p. 176)	102.1935	953.3458	9.33
1475-00-00	1000 florenis	£1200 lüb.	Hamburg	A	(Koppmann, 1878, p. 180)	2696.5185	30507.0652	11.31
1475-00-00	20 Rheingulden	£24 lüb.	Hamburg	A	(Koppmann, 1878, p. 200)	53.9304	610.1413	11.31
1475-00-00	135 Rheingulden	£163.4s. lüb.	Hamburg	A	(Koppmann, 1878, p. 211)	364.0300	4148.9609	11.40
1476-00-00	15 Rheingulden	£18 lüb.	Hamburg	A	(Koppmann, 1878, p. 239)	40.4478	457.6060	11.31

yyyy-mm-dd	sum1	sum2	place	type	Source	quantity Au	quantity Ag	ratio
1476-00-00	275 Rheingulden	£330 lüb.	Hamburg	A	(Koppmann, 1878, p. 243)	741.5426	8389.4429	11.31
1476-00-00	60 Rheingulden	£72 lüb.	Hamburg	A	(Koppmann, 1878, p. 243)	161.7911	1830.4239	11.31
1476-00-00	20 Rheingulden	£24.10s. lüb.	Hamburg	A	(Koppmann, 1878, p. 242)	53.9304	622.8526	11.55
1476-00-00	6 Rheingulden	£7.7s. lüb.	Hamburg	A	(Koppmann, 1878, p. 243)	16.1791	186.8558	11.55
1476-00-00	49½ ducats	£84.3s. lüb.	Hamburg	A	(Koppmann, 1878, p. 243)	176.2048	2139.3079	12.14
1476-00-00	131 ducats	£223.4s. lüb.	Hamburg	A	(Koppmann, 1878, p. 243)	466.3196	5674.3141	12.17
1477-00-00	15 Rheingulden	£18.7s.6d. lüb.	Hamburg	A	(Koppmann, 1878, p. 281)	40.4478	467.1394	11.55
1477-00-00	100 Rheingulden	£122.10s. lüb.	Hamburg	A	(Koppmann, 1878, p. 264)	269.6519	3114.2629	11.55
1477-00-00	60 Rheingulden	£73 10s. lüb.	Hamburg	A	(Koppmann, 1878, p. 269)	161.7911	1868.5577	11.55
1477-00-00	20 Rheingulden	£24.10s. lüb.	Hamburg	A	(Koppmann, 1878, p. 284)	53.9304	622.8526	11.55
1478-00-00	1000 Rheingulden	£1200 lüb.	Hamburg	A	(Koppmann, 1878, p. 304)	2647.1642	30507.0652	11.52
1478-00-00	30 Rheingulden	£36.15s. lüb.	Hamburg	A	(Koppmann, 1878, p. 322)	79.4149	934.2789	11.76
1478-00-00	20 Rheingulden	£24.10s. lüb.	Hamburg	A	(Koppmann, 1878, p. 323)	52.9433	622.8526	11.76
1479-00-00	20 Rheingulden	£24 lüb.	Hamburg	A	(Koppmann, 1878, p. 361)	52.9433	610.1413	11.52
1479-00-00	13 Rheingulden	£15.12s. lüb.	Hamburg	A	(Koppmann, 1878, p. 362)	34.4131	396.5918	11.52
1480-00-00	12 Rheingulden	£14.8s. lüb.	Hamburg	A	(Koppmann, 1878, p. 401)	31.7660	366.0848	11.52
1480-00-00	600 Rheingulden	£720 lüb.	Hamburg	A	(Koppmann, 1878, p. 378)	1588.2985	18304.2391	11.52
1481-00-00	200 Rheingulden	£240 lüb.	Hamburg	A	(Koppmann, 1878, p. 421)	529.4328	6101.4130	11.52
1481-00-00	11 Rheingulden	£13.4s. lüb.	Hamburg	A	(Koppmann, 1878, p. 421)	29.1188	335.5777	11.52
1481-00-00	6 Rheingulden	£7.4s. lüb.	Hamburg	A	(Koppmann, 1878, p. 440)	15.8830	183.0424	11.52
1482-00-00	20 Rheingulden	£24 lüb.	Hamburg	A	(Koppmann, 1880, p. 8)	52.9433	610.1413	11.52
1482-00-00	3 Rheingulden	£3.12s. lüb.	Hamburg	A	(Koppmann, 1880, p. 8)	7.9415	91.5212	11.52
1482-00-00	1200 Rheingulden	£1440 lüb.	Hamburg	A	(Koppmann, 1880, p. 20)	3176.5971	36608.4783	11.52
1482-00-00	12 Rheingulden	£14.8s. lüb.	Hamburg	A	(Koppmann, 1880, p. 16)	31.7660	366.0848	11.52
1482-00-00	1 Lübeck fl.	£1.12s. lüb.	Hamburg	A	(Koppmann, 1878, p. 479)	3.5233	40.6761	11.54
1482-00-00	30 Hungarian fl.	£48 lüb.	Hamburg	A	(Koppmann, 1878, p. 467)	105.3058	1220.2826	11.59
1483-00-00	20 Rheingulden	£24 lüb.	Hamburg	A	(Koppmann, 1880, p. 44)	52.9433	610.1413	11.52
1483-00-00	12 Rheingulden	£14.8s. lüb.	Hamburg	A	(Koppmann, 1880, p. 44)	31.7660	366.0848	11.52
1483-00-00	1 Lübeck fl.	£1.12s. lüb.	Hamburg	A	(Koppmann, 1880, p. 51)	3.5233	40.6761	11.54
1483-00-00	15 Rheingulden	£18.9s. lüb.	Hamburg	A	(Koppmann, 1880, p. 51)	39.7075	469.0461	11.81
1484-00-00	445 Rheingulden	£534 lüb.	Hamburg	A	(Koppmann, 1878, p. 487)	1177.9881	13575.6440	11.52
1484-00-00	100 Rheingulden	£120 lüb.	Hamburg	A	(Koppmann, 1880, p. 74)	264.7164	3050.7065	11.52
1485-00-00	1600 Rheingulden	£1920 lüb.	Hamburg	A	(Koppmann, 1878, p. 503)	4235.4627	48811.3043	11.52
1485-00-00	400 florenis renensibus luneburgensibus	£480 lüb.	Hamburg	A	(Koppmann, 1878, p. 504)	1058.8657	12202.8261	11.52

yyyy-mm-dd	sum1	sum2	place	type	Source	quantity Au	quantity Ag	ratio
1485-12-31	600 Rheingulden	£720 lüb.	Hamburg	C	(Pitz, 1961, p. 42)	1588.2985	18304.2391	11.52
1485-12-31	1600 Rheingulden	£1920 lüb.	Hamburg	C	(Pitz, 1961, p. 42)	4235.4627	48811.3043	11.52
1486-00-00	10 Rheingulden	£12 lüb.	Hamburg	A	(Koppmann, 1880, p. 124)	26.4716	305.0707	11.52
1486-00-00	17 Rheingulden	£20.8s. lüb.	Hamburg	A	(Koppmann, 1880, p. 131)	45.0018	518.6201	11.52
1487-00-00	1 Rheingulden	24s. lüb.	Hamburg	A	(Koppmann, 1880, p. 146)	2.6472	30.5071	11.52
1488-00-00	5 Rheingulden	£6 lüb.	Hamburg	A	(Koppmann, 1880, p. 170)	13.2358	152.5353	11.52
1488-00-00	6 aureis (Rheingulden)	£7.4s. lüb.	Hamburg	A	(Koppmann, 1880, p. 163)	15.8830	183.0424	11.52
1488-00-00	100 aureis (Rheingulden)	£120 lüb.	Hamburg	A	(Koppmann, 1878, p. 539)	264.7164	3050.7065	11.52
1488-00-00	2 Rheingulden	£2.8s. lüb.	Hamburg	A	(Koppmann, 1880, p. 162)	5.2943	61.0141	11.52
1488-00-00	6 Rheingulden	£7.4s. lüb.	Hamburg	A	(Koppmann, 1880, p. 163)	15.8830	183.0424	11.52
1489-00-00	1 Rheingulden	£1.4s. lüb.	Hamburg	A	(Koppmann, 1880, p. 183)	2.5755	30.5071	11.84
1489-00-00	100 Rheingulden	£120 lüb.	Hamburg	A	(Koppmann, 1878, p. 550)	257.5547	3050.7065	11.84
1489-00-00	1 Rheingulden	30s. lüb.	Hamburg	A	(Koppmann, 1880, p. 183)	2.5755	38.1338	14.81
1490-00-00	2 Rheingulden	£2. 8s. lüb.	Hamburg	A	(Koppmann, 1880, p. 209)	5.1511	61.0141	11.84
1491-00-00	20 Rheingulden	£24 lüb.	Hamburg	A	(Koppmann, 1880, p. 228)	50.5481	610.1413	12.07
1492-00-00	2 Rheingulden	£2.8s. lüb.	Hamburg	A	(Koppmann, 1880, p. 248)	5.0548	61.0141	12.07
1493-00-00	1000 Rheingulden	£1200 lüb.	Hamburg	A	(Koppmann, 1878, p. 597)	2527.4058	30507.0652	12.07
1493-00-00	15 Rheingulden	£18 lüb.	Hamburg	A	(Koppmann, 1880, p. 268)	37.9111	457.6060	12.07
1494-00-00	23 Rheingulden	£27.12s. lüb.	Hamburg	A	(Koppmann, 1880, p. 278)	58.1303	701.6625	12.07
1494-06-28	1500 Rheingulden	£1800 lüb.	Hamburg	A	(Koppmann, 1880, p. 277)	3791.1087	45760.5978	12.07
1495-00-00	59 Rheingulden	£70.16s. lüb.	Hamburg	A	(Koppmann, 1880, p. 299)	149.1169	1799.9168	12.07
1495-00-00	26 Rheingulden	£31.4s. lüb.	Hamburg	A	(Koppmann, 1880, p. 299)	65.7126	793.1837	12.07
1496-00-00	10 Rheingulden	£12 lüb.	Hamburg	A	(Koppmann, 1880, p. 323)	25.2741	305.0707	12.07
1496-00-00	20 Rheingulden	£24 lüb.	Hamburg	A	(Koppmann, 1880, p. 330)	50.5481	610.1413	12.07
1497-00-00	6 Rheingulden	£7.4s. lüb.	Hamburg	A	(Koppmann, 1880, p. 353)	15.1644	183.0424	12.07
1497-00-00	10 Rheingulden	£12 lüb.	Hamburg	A	(Koppmann, 1880, p. 360)	25.2741	305.0707	12.07
1498-00-00	36 Rheingulden	£43.4s. lüb.	Hamburg	A	(Koppmann, 1880, p. 381)	90.9866	1098.2543	12.07
1499-00-00	1500 ducats	£3022.12s. lüb.	Hamburg	A	(Koppmann, 1878, p. 630)	5339.5379	76842.2128	14.39
1499-00-00	150 ducats	£322.12s. lüb.	Hamburg	A	(Koppmann, 1880, p. 425)	533.9538	8201.3160	15.36
1500-00-00	4000 Rheingulden	£4800 lüb.	Hamburg	A	(Koppmann, 1878, p. 634)	10109.6232	122028.2609	12.07
1500-00-00	80 Rheingulden	£96 lüb.	Hamburg	A	(Koppmann, 1880, p. 456)	202.1925	2440.5652	12.07
1500-00-00	3 renenses - 3s.	£4.16s. lüb.	Hamburg	A	(Koppmann, 1880, p. 455)	7.5822	118.2149	15.59
1502-06-11	540 Rheingulden	£648 lüb.	Hamburg	A	(Koppmann, 1883, p. 12)	1364.7991	16263.3779	11.92
1505-06-25	540 Rheingulden	£648 lüb.	Hamburg	A	(Koppmann, 1883, p. 39)	1364.7991	16263.3779	11.92
1509-00-00	500 Rheingulden	£600 lüb.	Hamburg	A	(Koppmann, 1883, p. 73)	1263.7029	13704.3457	10.84

yyyy-mm-dd	sum1	sum2	place	type	Source	quantity Au	quantity Ag	ratio
1520-00-00	7000 Rheingulden	£8400 lüb.	Hamburg	A	(Koppmann, 1883, p. 164)	17691.8407	185465.4785	10.48
1522-00-00	50 Rheingulden	£62.12s. lüb.	Hamburg	A	(Koppmann, 1883, p. 200)	126.3703	1382.1594	10.94
1523-00-00	2 Rheingulden	£2.12s. lüb.	Hamburg	A	(Koppmann, 1883, p. 223)	5.0548	57.4060	11.36
1523-00-00	5 Rheingulden	£6.10s. lüb.	Hamburg	A	(Koppmann, 1883, p. 219)	12.6370	143.5150	11.36
1525-00-00	200 floreni auri (Rheingulden)	£270 lüb.	Hamburg	A	(Koppmann, 1883, p. 276)	505.4812	5961.3904	11.79
1526-00-00	50 Rheingulden	£70 lüb.	Hamburg	A	(Koppmann, 1883, p. 304)	126.3703	1545.5457	12.23
1527-00-00	80 Rheingulden	£108 lüb.	Hamburg	A	(Koppmann, 1883, p. 330)	202.1925	2384.5562	11.79
1528-00-00	50 Rheingulden	£70 lüb.	Hamburg	A	(Koppmann, 1883, p. 355)	126.3703	1545.5457	12.23
1529-00-00	120 Rheingulden	£162 lüb.	Hamburg	A	(Koppmann, 1883, p. 382)	303.2887	3576.8342	11.79
1529-00-00	50 Rheingulden	£70 lüb.	Hamburg	A	(Koppmann, 1883, p. 382)	126.3703	1545.5457	12.23
1530-00-00	1 Rheingulden	29s. lüb.	Hamburg	A	(Koppmann, 1883, p. 419)	2.5274	32.0149	12.67
1531-00-00	41 Rheingulden	61m.8s. lüb.	Hamburg	A	(Koppmann, 1883, p. 432)	103.6236	1086.2978	10.48
1531-00-00	59 Rheingulden	£85.6s. lüb.	Hamburg	A	(Koppmann, 1883, p. 449)	149.1169	1883.3578	12.63
1531-00-00	17 Rheingulden (auri)	£24.16s. lüb.	Hamburg	A	(Koppmann, 1883, p. 443)	42.9659	547.5647	12.74
1532-00-00	1 Rheingulden	24s. lüb.	Hamburg	A	(Koppmann, 1883, p. 484)	2.5274	26.4951	10.48
1532-00-00	200 Rheingulden	£240 lüb.	Hamburg	A	(Koppmann, 1883, p. 484)	505.4812	5299.0137	10.48
1532-00-00	1 pecia aurea portugalie	26m. lüb.	Hamburg	A	(Koppmann, 1883, p. 455)	35.1000	459.2479	13.08
1533-00-00	50 Rheingulden	£75.8s. lüb.	Hamburg	A	(Koppmann, 1883, p. 510)	126.3703	1664.7735	13.17
1534-00-00	50 Rheingulden	£72.10s. lüb.	Hamburg	A	(Koppmann, 1883, p. 543)	126.3703	1600.7437	12.67
1535-00-00	30 Rheingulden	£43 lüb.	Hamburg	A	(Koppmann, 1883, p. 578)	75.8222	949.4066	12.52
1535-00-00	50 Rheingulden	£75 lüb.	Hamburg	A	(Koppmann, 1883, p. 578)	126.3703	1655.9418	13.10
1535-00-00	20 Rheingulden	£30 lüb.	Hamburg	A	(Koppmann, 1883, p. 587)	50.5481	662.3767	13.10
1535-00-00	30 Rheingulden	£45 lüb.	Hamburg	A	(Koppmann, 1883, p. 587)	75.8222	993.5651	13.10
1536-00-00	50 Rheingulden	£75 lüb.	Hamburg	A	(Koppmann, 1883, p. 615)	126.3703	1655.9418	13.10
1537-00-00	147 Rheingulden	£220.10s. lüb.	Hamburg	A	(Koppmann, 1883, p. 656)	371.5287	4868.4688	13.10
1539-00-00	50 Rheingulden	£80 lüb.	Hamburg	A	(Koppmann, 1883, p. 736)	126.3703	1766.3379	13.98
1541-00-00	150 Rheingulden	£240 lüb.	Hamburg	A	(Koppmann, 1892, p. 29)	379.1109	5299.0137	13.98
1541-00-00	100 Rheingulden (auri)	£160 lüb.	Hamburg	A	(Koppmann, 1892, p. 28)	252.7406	3532.6758	13.98
1542-00-00	50 Rheingulden	£80 lüb.	Hamburg	A	(Koppmann, 1892, p. 70)	126.3703	1766.3379	13.98
1553-00-00	4000 Rheingulden	£6581.13s. lüb.	Hamburg	A	(Koppmann, 1892, p. 505)	10109.6232	144760.9493	14.32
1554-00-00	1 Rheingulden	2m. lüb.	Hamburg	A	(Koppmann, 1892, p. 574)	2.5274	35.1914	13.92
1554-00-00	3000 Rheingulden	£4817.10s. lüb.	Hamburg	A	(Koppmann, 1892, p. 540)	7582.2174	105959.1248	13.97
1555-00-00	43 aurei justi ponderis renenses	£70.19s. lüb.	Hamburg	A	(Koppmann, 1894, p. 7)	108.6784	1560.5189	14.36
1555-00-00	20 aurei renenses	£34 lüb.	Hamburg	A	(Koppmann, 1894, p. 7)	50.5481	747.8174	14.79
1556-00-00	50 Rheingulden	£85 lüb.	Hamburg	A	(Koppmann, 1894, p. 76)	126.3703	1869.5435	14.79

yyyy-mm-dd	sum1	sum2	place	type	Source	quantity Au	quantity Ag	ratio
1557-00-00	50 Rheingulden	£85 lüb.	Hamburg	A	(Koppmann, 1894, p. 124)	126.3703	1869.5435	14.79
1557-00-00	20 Rheingulden	£34 lüb.	Hamburg	A	(Koppmann, 1894, p. 125)	50.5481	747.8174	14.79
1558-00-00	50 Rheingulden	£86.5s. lüb.	Hamburg	A	(Koppmann, 1894, p. 174)	126.3703	1897.0367	15.01
1560-00-00	50 Rheingulden	£87.10s. lüb.	Hamburg	A	(Koppmann, 1894, p. 271)	125.2002	1924.5300	15.37
1562-00-00	50 Rheingulden	£88.15s. lüb.	Hamburg	A	(Koppmann, 1894, p. 368)	125.2002	1952.0233	15.59
1562-00-00	1100 Rheingulden (in auro)	£1980 lüb.	Hamburg	A	(Koppmann, 1894, p. 343)	2754.4043	43549.3652	15.81
1562-00-00	500 Rheingulden	£900 lüb.	Hamburg	A	(Koppmann, 1894, p. 343)	1252.0020	19795.1660	15.81

Other places (for Cologne see Metz, 1990, pp. 366 ff.)

yyyy-mm-dd	sum1	sum2	place	type	source	quantity Au	quantity Ag	ratio
1474-05-17	1 Rheingulden	22 stuvers	Amsterdam	C	(Stein, 1907, p. 210)	2.6965	31.8613	11.82
1475-06-23	1 Rheingulden	40 grote	Amsterdam	C	(Stein, 1907, p. 269)	2.6965	27.5074	10.20
1495-03-07	1 gouden gulden (Rheingulden)	24 stuvers	Amsterdam	C	(Stein, 1916, p. 528)	2.5755	28.7945	11.18
1380-00-00	1 floren	28gr. 9 miten flem.	Antwerp	H	(Spufford, 1986, p. 215)	3.4811	31.4963	9.05
1492-12-10	1 ducat	74 grote	Antwerp	B	(Spufford, 1986, p. 223)	3.5597	44.3915	12.47
1493-03-00	2880 croonen	£620 grote	Antwerp	C	(Stein, 1916, p. 418)	9433.1847	89262.8588	9.46
1493-03-12	1 ducat	73 grote	Antwerp	B	(Spufford, 1986, p. 223)	3.5597	43.7916	12.30
1493-10-10	1 ducat	82 grote	Antwerp	B	(Spufford, 1986, p. 223)	3.5597	48.2907	13.57
1493-11-00	1 Hungarian fl.	72 grote	Antwerp	A	(Spufford, 1986, p. 224)	3.5102	43.1917	12.30
1493-11-00	1 Rheingulden	54 grote	Antwerp	A	(Spufford, 1986, p. 255)	2.5274	32.3938	12.82
1493-12-11	1 ducat	73 grote	Antwerp	A	(Spufford, 1986, p. 223)	3.5597	43.7916	12.30
1494-06-00	1 Hungarian fl.	72 grote	Antwerp	A	(Spufford, 1986, p. 224)	3.5102	43.1917	12.30
1494-06-00	1 Rheingulden	54 grote	Antwerp	A	(Spufford, 1986, p. 255)	2.5274	32.3938	12.82
1495-00-00	1 Rheingulden	56 grote	Antwerp	C	(Spufford, 1986, p. 255)	2.5274	33.5935	13.29
1495-09-00	1 ducat	82 grote	Antwerp	B	(Spufford, 1986, p. 223)	3.5597	49.1906	13.82
1495-10-02	1 ducat	49 grote	Antwerp	B	(Spufford, 1986, p. 223)	3.5597	29.3944	8.26
1495-11-00	1 Rheingulden	54 grote	Antwerp	C	(Spufford, 1986, p. 255)	2.5274	32.3938	12.82
1495-12-00	1 Hungarian fl.	62 grote	Antwerp	A	(Spufford, 1986, p. 224)	3.5102	37.1929	10.60
1495-12-00	1 ducat	72 grote	Antwerp	?	(Spufford, 1986, p. 223)	3.5597	43.1917	12.13
1496-04-00	1 ducat	80 grote	Antwerp	A	(Spufford, 1986, p. 223)	3.5597	41.5476	11.67
1496-11-00	1 ducat	68 grote	Antwerp	A	(Spufford, 1986, p. 223)	3.5597	35.3154	9.92
1496-12-00	1 ducat	72 grote	Antwerp	A	(Spufford, 1986, p. 223)	3.5597	37.3928	10.50

yyyy-mm-dd	sum1	sum2	place	type	source	quantity Au	quantity Ag	ratio
1497-01-10	1 ducat	68 grote	Antwerp	A	(Spufford, 1986, p. 223)	3.5597	35.3154	9.92
1497-05-26	1 ducat	68 grote	Antwerp	A	(Spufford, 1986, p. 223)	3.5597	35.3154	9.92
1497-06-00	1 ducat	64 grote	Antwerp	A	(Spufford, 1986, p. 223)	3.5597	33.2381	9.34
1497-12-16	1 ducat	68 grote	Antwerp	A	(Spufford, 1986, p. 223)	3.5597	35.3154	9.92
1498-01-00	1 ducat	80 grote	Antwerp	B	(Spufford, 1986, p. 223)	3.5597	41.5476	11.67
1498-02-00	1 ducat	84 grote	Antwerp	C	(Spufford, 1986, p. 223)	3.5597	43.6250	12.26
1498-06-00	1 ducat	68 grote	Antwerp	B	(Spufford, 1986, p. 223)	3.5597	35.3154	9.92
1498-07-18	1 ducat	80 grote	Antwerp	B	(Spufford, 1986, p. 223)	3.5597	41.5476	11.67
1498-11-00	1 ducat	79 grote	Antwerp	B	(Spufford, 1986, p. 223)	3.5597	41.0282	11.53
1499-08-00	1 ducat	79 grote	Antwerp	B	(Spufford, 1986, p. 223)	3.5597	41.0282	11.53
1499-10-10	1 ducat	68 grote	Antwerp	A	(Spufford, 1986, p. 223)	3.5597	35.3154	9.92
1500-12-00	1 ducat	75 grote	Antwerp	A	(Spufford, 1986, p. 223)	3.5597	38.9509	10.94
1558-00-00	1 Hungarian fl.	79 grote flem.	Antwerp	C	(Kellenbenz, 1974, p. 193)	3.5102	35.8333	10.21
1558-00-00	1 Rheingulden	57 grote flem.	Antwerp	C	(Kellenbenz, 1974, p. 193)	2.5274	25.8544	10.23
1558-00-00	1 Hungarian fl.	82 grote flem.	Antwerp	C	(Kellenbenz, 1974, p. 193)	3.5102	37.1941	10.60
1558-00-00	1 Rheingulden	60 grote flem.	Antwerp	C	(Kellenbenz, 1974, p. 193)	2.5274	27.2152	10.77
1558-06-00	1 ducat	70 3/4 grote	Antwerp	B	(Denzel, 1994, p. 110)	3.5597	32.0912	9.02
1370-08-28	1 floren	31gr. 4 miten flem.	Bruges	B	(Spufford, 1986, p. 215)	3.4811	37.0883	10.65
1370-08-28	1 ducat	32gr. 4 miten flem.	Bruges	B	(Spufford, 1986, p. 217)	3.5597	38.2783	10.75
1370-08-28	1 floren	32 grote	Bruges	B	(Spufford, 1986, p. 215)	3.4811	38.0800	10.94
1384-08-28	1 floren	35gr. 12 miten flem.	Bruges	B	(Spufford, 1986, p. 215)	3.4811	43.4437	12.48
1384-09-29	1 ducat	36gr. Flem.	Bruges	B	(Spufford, 1986, p. 217)	3.5597	44.0555	12.38
1385-00-00	1 ducat	42gr. Flem.	Bruges	B	(Spufford, 1986, p. 217)	3.5597	51.3981	14.44
1386-00-00	1 floren	34 grote	Bruges	C	(Spufford, 1986, p. 215)	3.4811	40.0077	11.49
1387-00-00	1 floren	34 grote	Bruges	C	(Spufford, 1986, p. 215)	3.4811	36.4983	10.48
1460-10-15	1 ducat	54 grote	Bruges	B	(Spufford, 1986, p. 222)	3.5597	45.8912	12.89
1460-10-23	1 ducat	53gr. 12 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	45.4663	12.77
1461-01-26	1 ducat	53gr. 18 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	45.6787	12.83
1461-01-30	1 ducat	54gr. 6 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	46.1036	12.95
1461-02-05	1 ducat	54gr. 8 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	46.1745	12.97
1461-02-23	1 ducat	54gr. 14 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	46.3869	13.03
1461-03-12	1 ducat	57 grote	Bruges	B	(Spufford, 1986, p. 222)	3.5597	48.4407	13.61
1461-03-17	1 ducat	54gr. 8 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	46.1745	12.97
1461-03-30	1 ducat	57gr. 12 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	48.8656	13.73
1461-07-24	1 ducat	56gr. 12 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	48.0158	13.49

yyyy-mm-dd	sum1	sum2	place	type	source	quantity Au	quantity Ag	ratio
1461-07-31	1 ducat	54gr. 16 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	46.4577	13.05
1462-03-30	1 ducat	55 grote	Bruges	B	(Spufford, 1986, p. 222)	3.5597	46.7410	13.13
1463-00-00	1 noble	8s. grote	Bruges	C	(Gilliodts-van Severen, 1885, p. 206)	6.7919	81.5843	12.01
1463-03-12	1 ducat	54 grote	Bruges	B	(Spufford, 1986, p. 222)	3.5597	45.8912	12.89
1463-03-22	1 ducat	54gr. 12 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	46.3161	13.01
1463-04-05	1 ducat	54gr. 14 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	46.3869	13.03
1463-05-20	1 ducat	54gr. 12 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	46.3161	13.01
1463-08-19	1 ducat	54gr. 9 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	46.2099	12.98
1463-10-04	1 ducat	54gr. 6 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	46.1036	12.95
1463-10-19	1 ducat	54gr. 14 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	46.3869	13.03
1463-12-05	1 ducat	54gr. 20 miten flem.	Bruges	B	(Spufford, 1986, p. 222)	3.5597	46.5994	13.09
1464-02-20	1 ducat	53 grote	Bruges	B	(Spufford, 1986, p. 222)	3.5597	45.0414	12.65
1465-03-03	1 ducat	55 grote	Bruges	B	(Spufford, 1986, p. 222)	3.5597	46.7410	13.13
1467-07-31	1 floren	34gr. 8 miten flem.	Bruges	C	(Spufford, 1986, p. 217)	3.4532	25.4642	7.37
1467-08-13	1 crown	4s. grote	Bruges	C	(Stein, 1903, p. 250)	3.4965	35.6004	10.18
1493-06-07	1 ducat	80gr. 12 miten flem.	Bruges	B	(Spufford, 1986, p. 223)	3.5597	48.2907	13.57
1495-05-00	1 ducat	84 grote	Bruges	B	(Spufford, 1986, p. 223)	3.5597	50.3903	14.16
1495-05-06	1 ducat	82 grote	Bruges	B	(Spufford, 1986, p. 223)	3.5597	49.1906	13.82
1496-03-00	1 ducat	82 grote	Bruges	A	(Spufford, 1986, p. 223)	3.5597	42.5863	11.96
1496-05-06	1 ducat	68 grote	Bruges	A	(Spufford, 1986, p. 223)	3.5597	35.3154	9.92
1496-05-06	182 Rheingulden (golden gulden)	£41.7s. grote	Bruges	C	(Schäfer, 1888, p. 485)	459.9879	5153.9769	11.20
1497-06-00	1 ducat	80 grote	Bruges	B	(Spufford, 1986, p. 223)	3.5597	41.5476	11.67
1498-05-00	1 ducat	80 grote	Bruges	B	(Spufford, 1986, p. 223)	3.5597	41.5476	11.67
1499-05-06	1 ducat	80 grote	Bruges	B	(Spufford, 1986, p. 223)	3.5597	41.0282	11.53
1500-01-00	1 ducat	79 grote	Bruges	B	(Spufford, 1986, p. 223)	3.5597	41.0282	11.53
1500-08-00	1 ducat	79 grote	Bruges	A	(Spufford, 1986, p. 223)	3.5597	41.0282	11.53
1385-05-17	40 noble	42½m. pr.	Danzig	A	(Hanserecesse, 1875, p. 194)	301.8600	3323.1135	11.01
1385-05-17	80 noble	85m. pr.	Danzig	A	(Hanserecesse, 1875, p. 194)	603.7200	6646.2270	11.01
1468-00-00	14 noble	£5.9s. sterl.	Danzig	C	(Stein, 1903, p. 419)	95.0859	945.0183	9.94
1485-00-00	31 Rheingulden	46m. – 4sc. pr.	Danzig	A	(Posthumus, 1953, p. 312)	83.5921	741.1570	8.87
1485-00-00	7 Rheingulden	10½m. pr.	Danzig	A	(Posthumus, 1953, p. 311)	18.8756	169.7923	9.00
1486-00-00	182 Rheingulden	225m. pr.	Danzig	A	(Posthumus, 1953, p. 313)	490.7664	3638.4073	7.41
1491-11-19	1 Lübeck fl.	2m. pr.	Danzig	C	(Górski and Biskup, 1957, p. 369)	3.5233	39.5903	11.24
1491-11-19	1 Hungarian fl.	2m. pr.	Danzig	C	(Górski and Biskup, 1957, p. 369)	3.5102	39.5903	11.28

yyyy-mm-dd	sum1	sum2	place	type	source	quantity Au	quantity Ag	ratio
1491-11-19	1 engeler	3m. pr.	Danzig	C	(Górski and Biskup, 1957, p. 369)	5.0310	59.3855	11.80
1558-00-00	1 Rheingulden	33 gr. pr.	Danzig	C	(Kellenbenz, 1974, p. 246)	2.5274	25.3333	10.02
1483-08-26	1 Rheingulden	20 stuvere flem.	Deventer	C	(Stein, 1907, p. 665)	2.6472	23.6030	8.92
1350-00-00 (c.)	180 florens	100m. lüb.	Doberan	C	(Verein für meklenburgische Geschichte und Alterthumskunde, 1875, p. 722)	313.3028	3226.9271	10.30
1350-00-00 (c.)	90 florens	50m. lüb.	Doberan	C	(Verein für meklenburgische Geschichte und Alterthumskunde, 1875, p. 722)	313.3028	3226.9271	10.30
1471-06-12	1 Rheingulden	20 st. (= stuivers flem.)	Dordrecht	C	(Stein, 1907, p. 17)	2.6965	28.9649	10.74
1385-04-08	1 noble	1m. pr.	Elbing	C	(Voigt, 1853, p. 34)	7.5465	78.1909	10.36
1467-02-17	1 Hungarian fl.	7f. pr.	Elbing	C	(Töppen, 1886, p. 223)	3.5102	37.2659	10.62
1476-05-05	1 Hungarian fl.	36gr. pr.	Gnesen	A	(Woehlky, 1885, p. 564)	3.5102	35.7581	10.19
1477-06-17	1 Hungarian fl.	38gr. pr.	Gnesen	A	(Woehlky, 1885, p. 564)	3.5102	30.7243	8.75
1480-09-07	1 Hungarian fl.	36gr. pr.	Gnesen	A	(Woehlky, 1885, p. 565)	3.5102	29.1073	8.29
1481-07-31	1 Hungarian fl.	36gr. 2s. pr.	Gnesen	A	(Woehlky, 1885, p. 565)	3.5102	29.6463	8.45
1374-12-13	1 alder schild	½m. pr.	Königsberg	A	(Ziesemer, 1921, p. 2)	3.7771	43.5813	11.54
1374-12-13	1 noble	1m. pr.	Königsberg	A	(Ziesemer, 1921, p. 2)	7.5465	87.1626	11.55
1461-01-08	200 Rheingulden	300m. pr.	Königsberg	B	(Stein, 1898, p. 112)	555.4828	6388.4399	11.50
1461-01-15	200 Rheingulden	300m. pr.	Königsberg	B	(Stein, 1898, p. 113)	555.4828	6388.4399	11.50
1467-06-19	4 Hungarian fl.	7m. pr.	Königsberg	A	(GStAPK, XX HA, OBA 16118, fol. 2v)	14.0408	149.0636	10.62
1529-07-28	1 Rheingulden	2m. pr.	Königsberg	C	(GStAPK, XX HA, Ostpr.Fol. 1133, fol. 146 r.)	2.5274	30.4000	12.03
1529-07-28	1 Hungarian fl.	3m. pr.	Königsberg	C	(GStAPK, XX HA, Ostpr.Fol. 1133, fol. 146 r.)	3.5102	45.6000	12.99
1529-11-06	1 Horn fl.	20sc. pr.	Königsberg	C	(GStAPK, XX HA, Ostpr.Fol. 998, fol. 204 r.)	1.2670	12.6667	10.00
1529-11-06	1 Rheingulden	2m. pr.	Königsberg	C	(GStAPK, XX HA, Ostpr.Fol. 998, fol. 204 r.)	2.5274	30.4000	12.03
1529-11-06	1 Hungarian fl.	3m. pr.	Königsberg	C	(GStAPK, XX HA, Ostpr.Fol. 998, fol. 204 r.)	3.5102	45.6000	12.99
1530-03-25	1 Rheingulden	30gr. pr.	Königsberg	C	(GStAPK, XX HA, Ostpr.Fol. 913, fol. 137 r.)	2.5274	22.8000	9.02
1531-00-00	1 Rheingulden	90s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	2.5274	22.8000	9.02
1531-00-00	1 Hungarian fl.	135s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	34.2000	9.74
1532-00-00	1 Rheingulden	84s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	2.5274	21.2800	8.42

yyyy-mm-dd	sum1	sum2	place	type	source	quantity Au	quantity Ag	ratio
1534-00-00	1 Hungarian fl.	180s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	45.6000	12.99
1536-00-00	1 Horn fl.	37s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	1.2670	9.3733	7.40
1536-00-00	1 Horn fl.	38s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	1.2670	9.6267	7.60
1536-00-00	1 Hungarian fl.	135s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	34.2000	9.74
1537-00-00	1 Hungarian fl.	135s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	34.2000	9.74
1538-00-00	1 Hungarian fl.	135s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	34.2000	9.74
1540-00-00	1 Rheingulden	96s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	2.5274	24.3200	9.62
1540-00-00	1 Hungarian fl.	136s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	34.4533	9.82
1540-00-00	1 Hungarian fl.	137s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	34.7067	9.89
1541-00-00	1 Horn fl.	39s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	1.2670	9.8800	7.80
1541-00-00	1 Hungarian fl.	136s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	34.4533	9.82
1541-00-00	1 Hungarian fl.	137s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	34.7067	9.89
1542-00-00	1 Horn fl.	38s.2d. pr.	Königsberg	H	(Volckart, 1996, p. 441)	1.2670	9.7111	7.66
1542-00-00	1 Rheingulden	96s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	2.5274	24.3200	9.62
1542-00-00	1 Hungarian fl.	139s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	35.2133	10.03
1542-00-00	1 Hungarian fl.	140s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	35.4667	10.10
1543-00-00	1 Rheingulden	90s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	2.5274	22.8000	9.02
1543-00-00	1 Hungarian fl.	141s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	35.7200	10.18
1544-00-00	1 Horn fl.	42s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	1.2670	10.6400	8.40
1544-00-00	1 Hungarian fl.	144s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	36.4800	10.39
1545-00-00	1 Hungarian fl.	144s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	36.4800	10.39
1548-00-00	1 Rheingulden	105s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	2.5274	26.6000	10.52
1548-00-00	1 Hungarian fl.	157s. pr.	Königsberg	H	(Volckart, 1996, p. 441)	3.5102	39.7733	11.33
1548-00-00	1 Hungarian fl.	158s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	3.5102	40.0267	11.40
1550-00-00	1 Horn fl.	45s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	1.2670	11.4000	9.00
1550-00-00	1 Rheingulden	108s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	2.5274	27.3600	10.83
1550-00-00	1 Hungarian fl.	156s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	3.5102	39.5200	11.26
1551-00-00	1 Hungarian fl.	159s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	3.5102	40.2800	11.48
1552-00-00	1 Hungarian fl.	156s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	3.5102	39.5200	11.26
1553-00-00	1 Hungarian fl.	153s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	3.5102	38.7600	11.04
1554-00-00	1 Horn fl.	50s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	1.2670	11.4000	9.00
1554-00-00	1 Rheingulden	105s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	2.5274	26.6000	10.52
1554-00-00	1 Hungarian fl.	156s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	3.5102	39.5200	11.26
1555-00-00	1 Rheingulden	105s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	2.5274	26.6000	10.52
1555-00-00	1 Hungarian fl.	153s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	3.5102	38.7600	11.04

yyyy-mm-dd	sum1	sum2	place	type	source	quantity Au	quantity Ag	ratio
1556-00-00	1 Hungarian fl.	153s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	3.5102	38.7600	11.04
1556-00-00	1 Rheingulden	115s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	2.5274	29.1333	11.53
1557-00-00	1 Hungarian fl.	156s. pr.	Königsberg	H	(Volckart, 1996, p. 442)	3.5102	39.5200	11.26
1561-01-27	1200 Hungarian fl.	3700 taler	Königsberg	H	(Lohmeyer, 1893, p. 237)	4212.2329	97643.0000	23.18
1380-10-13	1 floren	3s.	London	C	(Spufford, 1986, p. 201)	3.4811	38.8411	11.16
1382-02-21	1 floren	3s.	London	C	(Spufford, 1986, p. 201)	3.4811	38.8411	11.16
1460-01-11	1 ducat	3s.11d.	London	C	(Spufford, 1986, p. 205)	3.5597	42.2577	11.87
1460-09-30	1 ducat	3s.7d.	London	B	(Spufford, 1986, p. 205)	3.5597	38.6613	10.86
1461-02-09	1 ducat	3s.7d.	London	B	(Spufford, 1986, p. 205)	3.5597	39.3356	11.05
1461-03-20	1 ducat	3s.11d.	London	B	(Spufford, 1986, p. 205)	3.5597	42.2577	11.87
1461-04-13	1 ducat	3s.6d.	London	B	(Spufford, 1986, p. 205)	3.5597	38.0619	10.69
1461-08-19	1 ducat	3s.7d.	London	B	(Spufford, 1986, p. 205)	3.5597	39.1109	10.99
1462-02-04	1 ducat	3s.8d.	London	B	(Spufford, 1986, p. 205)	3.5597	39.7852	11.18
1462-09-09	1 ducat	3s.7d.	London	B	(Spufford, 1986, p. 205)	3.5597	39.3356	11.05
1463-01-11	1 ducat	3s.5d.	London	C	(Spufford, 1986, p. 205)	3.5597	37.1628	10.44
1463-03-04	1 ducat	3s.7d.	London	B	(Spufford, 1986, p. 205)	3.5597	38.6613	10.86
1463-04-04	1 ducat	3s.7d.	London	B	(Spufford, 1986, p. 205)	3.5597	38.6613	10.86
1463-04-04	1 ducat	3s.11d.	London	B	(Spufford, 1986, p. 205)	3.5597	42.2577	11.87
1463-10-22	1 ducat	3s.8d.	London	B	(Spufford, 1986, p. 205)	3.5597	39.5604	11.11
1466-04-29	1 ducat	4s.2d.	London	C	(Spufford, 1986, p. 205)	3.5597	35.9640	10.10
1466-07-29	1 ducat	3s.10d.	London	C	(Spufford, 1986, p. 205)	3.5597	33.4465	9.40
1468-09-05	1 ducat	4s.1d.	London	C	(Spufford, 1986, p. 205)	3.5597	35.2447	9.90
1469-04-23	1 noble (old)	8s.4d. sterl. (nyes geldes)	London	A	(Stein, 1903, p. 535)	6.7919	71.9280	10.59
1469-06-27	1 ducat	4s.1d.	London	C	(Spufford, 1986, p. 205)	3.5597	35.7842	10.05
1471-04-09	1 ducat	4s.2d.	London	C	(Spufford, 1986, p. 205)	3.5597	35.9640	10.10
1471-10-21	1 ducat	4s.2d.	London	C	(Spufford, 1986, p. 205)	3.5597	36.5035	10.25
1473-08-11	1 ducat	4s. 2d.	London	C	(Spufford, 1986, p. 205)	3.5597	35.9640	10.10
1475-10-23	1 ducat	4s.3d.	London	C	(Spufford, 1986, p. 206)	3.5597	37.0486	10.41
1475-11-21	2 noble	13s.4d. sterl.	London	A	(Schäfer, 1881, p. 291)	13.5837	115.0848	8.47
1475-11-21	1 real	10s. sterl.	London	A	(Schäfer, 1881, p. 291)	7.5465	86.3136	11.44
1476-05-29	1 ducat	4s.3d.	London	C	(Spufford, 1986, p. 206)	3.5597	37.0486	10.41
1476-05-31	1 ducat	4s.8d.	London	C	(Spufford, 1986, p. 206)	3.5597	40.2797	11.32
1477-04-22	1 ducat	4s.4d.	London	C	(Spufford, 1986, p. 206)	3.5597	37.7622	10.61
1478-01-23	1 ducat	4s. 12m.	London	M	(Spufford, 1986, p. 206)	3.5597	34.8851	9.80
1481-07-31	1 ducat	4s.3d.	London	C	(Spufford, 1986, p. 206)	3.5597	37.2313	10.46

yyyy-mm-dd	sum1	sum2	place	type	source	quantity Au	quantity Ag	ratio
1497-12-18	1 ducat	4s.4d.	London	C	(Spufford, 1986, p. 206)	3.5597	37.4026	10.51
1350-00-00	1 Lübeck fl.	9s. lüb.	Lübeck	C	(Verein für Lübeckische Geschichte und Alterthumskunde, 1871, p. 189)	3.5688	36.3029	10.17
1350-00-00	1 Lübeck fl.	10s. lüb.	Lübeck	C	(Verein für Lübeckische Geschichte und Alterthumskunde, 1871, p. 189)	3.5688	40.3366	11.30
1370-01-07	16 Lübeck fl.	10m. lüb.	Lübeck	L	(Verein für Lübeckische Geschichte und Alterthumskunde, 1871, p. 773)	54.6762	615.4934	11.26
1371-07-25	1 noble	21s.6d. lüb.	Lübeck	M	(Dittmer, 1860, p. 46)	7.5465	82.7069	10.96
1378-00-00	1 Lübeck fl.	12s. lüb.	Lübeck	C	(Pauli, 1847, p. 229)	3.4173	38.8560	11.37
1463-02-09	1 Rheingulden	23s. lüb.	Lübeck	C	(Ropp, 1888, p. 207)	2.7774	29.0954	10.48
1468-00-00	1 Lübeck fl.	2m. lüb.	Lübeck	H	(Jesse, 1928, p. 218)	3.5233	45.0450	12.78
1472-00-00	1 Lübeck fl.	2m. lüb.	Lübeck	H	(Jesse, 1928, p. 218)	3.5233	40.6761	11.54
1472-00-00	1 Lübeck fl.	34s.6d. lüb.	Lübeck	H	(Jesse, 1928, p. 218)	3.5233	43.8539	12.45
1472-01-25	1 ducat	35½s. lüb.	Lübeck	B	(Pauli, 1872, p. 140)	3.5597	45.1250	12.68
1476-00-00	1 Lübeck fl.	34s. lüb.	Lübeck	H	(Jesse, 1928, p. 218)	3.5233	43.2183	12.27
1491-09-16	180 Rheingulden	307½m. lüb.	Lübeck	C	(Schäfer, 1888, p. 8)	463.5984	6253.9484	13.49
1475-09-21	5 Rheingulden	10m. lüb.	Lund	C	(Stein, 1907, p. 285)	13.4826	203.3804	15.08
1461-08-31	1 gulden	23s. lüb.	Lüneburg	C	(Verein für Lübeckische Geschichte und Alterthumskunde, 1898, p. 88)	2.7774	34.6612	12.48
1477-00-00	8 Hungarian fl.	16m. lüb.	Lüneburg	A	(StA Lüneburg, AB 56,1, S. 412, Z. 10)	28.0816	325.4087	11.59
1479-00-00	2 nye collnsche gulden	3m. lüb.	Lüneburg	A	(StA Lüneburg, AB 56,1, S. 444, Z. 10)	5.2943	61.0141	11.52
1480-00-00	4 Rheingulden	6m. lüb.	Lüneburg	A	(StA Lüneburg, AB 56,2, S. 6, Z. 20)	10.5887	122.0283	11.52
1480-00-00	3 Rheingulden	4½m. lüb.	Lüneburg	A	(StA Lüneburg, AB 56,2, S. 22, Z. 15)	7.9415	91.5212	11.52
1481-00-00	3 Rheingulden	4½m. lüb.	Lüneburg	A	(StA Lüneburg, AB 56,2, S. 35, Z. 34)	7.9415	91.5212	11.52
1482-09-08	3 Rheingulden	4½m. lüb.	Lüneburg	A	(Stein, 1907, p. 596)	7.9415	91.5212	11.52
1494-00-00	5 Hungarian fl.	10m. lüb.	Lüneburg	A	(StA Lüneburg, AB 56,2, S. 310, Z. 8)	17.5510	203.3804	11.59
1466-11-07	2500 Hungarian fl.	4000m. pr.	Marienburg	C	(Thunert, 1896, p. 3)	8775.4852	85179.1992	9.71
1471-12-20	1 Hungarian fl.	7f. pr.	Marienburg	C	(Thunert, 1896, p. 163)	3.5102	34.8981	9.94
1490-00-00	1 gouwen gulden (Rheingulden)	3s. 4 grote flem.	Middelburg	A	(Stein, 1916, p. 252)	2.5755	29.7721	11.56
1491-00-00	22 gulden (Rheingulden)	£3.13s. 4 grote	Middelburg	A	(Stein, 1916, p. 253)	56.6620	654.9853	11.56
1499-02-02	10 Hungarian fl.	20m. pr.	Poznan	C	(Stein, 1916, p. 687)	35.1019	395.9033	11.28

yyyy-mm-dd	sum1	sum2	place	type	source	quantity Au	quantity Ag	ratio
1491-12-13	2 Hungarian fl.	4m. pr.	Stuhm	C	(Górski and Biskup, 1957, p. 396)	7.0204	79.1807	11.28
1491-12-13	2 Rheingulden	3m. pr.	Stuhm	C	(Górski and Biskup, 1957, p. 396)	5.1511	59.3855	11.53
1460-02-08	1 Hungarian fl.	1½m.6s. pr. (geringes geldis)	Thorn	L	(Ciesielska and Janosz-Biskupowa, 1964, p. 130)	3.5102	34.0717	9.71
1461-02-27	1 gulden (Hungarian fl.)	2m. – 8s. pr.	Thorn	L	(Ciesielska and Janosz-Biskupowa, 1964, p. 41)	3.5102	39.7503	11.32
1465-03-18	14 gulden (Hungarian fl.)	26½m.4sc. pr.	Thorn	L	(Ciesielska and Janosz-Biskupowa, 1964, p. 105)	49.1427	567.8613	11.56
1469-03-22	20 Hungarian fl.	35m. pr.	Thorn	L	(Ciesielska and Janosz-Biskupowa, 1964, p. 205)	70.2039	695.2964	9.90
1471-00-00	6 gulden (Hungarian fl.)	11m. pr.	Thorn	L	(Ciesielska and Janosz-Biskupowa, 1964, p. 197)	21.0612	219.3598	10.42
1474-01-21	2 gulden (Hungarian fl.)	3½m. pr.	Thorn	L	(Ciesielska and Janosz-Biskupowa, 1964, p. 41)	7.0204	69.7963	9.94
1474-05-29	2 gulden (Hungarian fl.)	3½m. pr.	Thorn	L	(Ciesielska and Janosz-Biskupowa, 1964, p. 148)	7.0204	69.7963	9.94
1475-06-12	1 Hungarian fl.	2m. pr.	Thorn	L	(Ciesielska and Janosz-Biskupowa, 1964, p. 79)	3.5102	39.8836	11.36
1485-02-28	3 Hungarian fl.	6m. pr.	Thorn	L	(Ciesielska and Janosz-Biskupowa, 1964, p. 31)	10.5306	97.0242	9.21
1497-12-05	193 Hungarian fl. – 1 ort	385½m. pr.	Thorn	L	(Ciesielska and Janosz-Biskupowa, 1964, p. 241 f)	676.5899	7631.0365	11.28

3. Monetary standards

Source type: A = modern analysis, CA = contemporary assay, H = historian, MA = mint account, MC = mint master contract, O = ordinance.

Gold

yyyy-mm-dd	coin	authority	unit of weight	taille	fineness	weight	gold content	source type	source
1484-00-00	Horngulden	bishop of Liège					1.2670	H	(Schrötter, 1930, p. 275)
1342-02-18	Lübeck fl.	city of Lübeck	239.112	67.00	1.0000	3.5688	3.5688	MA	(Dittmer, 1860, p. 62)
1351-12-09	Lübeck fl.	city of Lübeck	239.112	68.50	1.0000	3.4907	3.4907	MA	(Dittmer, 1860, p. 77)
1365-08-15	Lübeck fl.	city of Lübeck	239.112	69.00	1.0000	3.4654	3.4654	MA	(Dittmer, 1860, p. 77)
1365-08-29	Lübeck fl.	city of Lübeck	239.112	69.00	0.9861	3.4654	3.4173	MA	(Dittmer, 1860, p. 77)
1439-02-04	Lübeck fl.	city of Lübeck	233.888	65.00	0.9792	3.5983	3.5233	CA	(Ropp, 1878, p. 223 f.)
1492-05-24	Lübeck fl.	city of Lübeck	233.888	65.00	1.0000	3.5983	3.5983	O	(Schäfer, 1888, p. 71)
1349-05-06	Écu	count of Flanders	244.753	54.00	0.9688	4.5325	4.3908	H	(Blockmans and Blockmans, 1979, p. 86)
1354-12-20	Écu	count of Flanders	244.753	54.33	0.9271	4.5047	4.1762	H	(Blockmans and Blockmans, 1979, p. 86)
1361-09-16	Écu	count of Flanders	244.753	53.00	0.8958	4.6180	4.1369	H	(Blockmans and Blockmans, 1979, p. 87)
1361-09-16	Franc	count of Flanders	244.753	63.33	1.0000	3.8645	3.8645	H	(Blockmans and Blockmans, 1979, p. 87)
1364-02-10	Lion	count of Flanders	244.753	45.25	1.0000	5.4089	5.4089	H	(Blockmans and Blockmans, 1979, p. 87 f.)
1371-06-18	Écu	count of Flanders	244.753	54.50	1.0000	4.4909	4.4909	H	(Blockmans and Blockmans, 1979, p. 88)
1380-01-30	Écu	count of Flanders	244.753	54.50	0.9792	4.4909	4.3973	H	(Blockmans and Blockmans, 1979, p. 88)
1381-04-28	Écu	count of Flanders	244.753	54.50	0.9583	4.4909	4.3038	H	(Blockmans and Blockmans, 1979, p. 88)
1383-09-07	Écu	count of Flanders	244.753	54.50	0.8958	4.4909	4.0231	H	(Blockmans and Blockmans, 1979, p. 88)
1388-10-00	Noble	count of Flanders	244.753	31.67	0.9896	7.7290	7.6485	H	(Munro, 1972, p. 209)
1409-08-00	Écu	count of Flanders	244.753	54.00	0.9896	4.5325	4.4852	H	(Munro, 1972, p. 209)
1409-08-00	Noble	count of Flanders	244.753	31.67	0.9896	7.7290	7.6485	H	(Munro, 1972, p. 209)
1416-12-00	Noble	count of Flanders	244.753	36.00	0.9896	6.7987	6.7279	H	(Munro, 1972, p. 209)
1425-06-00	Noble	count of Flanders	244.753	35.50	0.9792	6.8945	6.7508	H	(Munro, 1972, p. 209)
1427-09-00	Noble	count of Flanders	244.753	35.25	0.9948	6.9433	6.9072	H	(Munro, 1972, p. 209)
1428-11-00	Noble	count of Flanders	244.753	35.25	0.9792	6.9433	6.7987	H	(Munro, 1972, p. 209)
1487-12-20	Noble	count of Flanders	244.753	33.00	1.0000	7.4168	7.4168	H	(Pusch, 1932, p. 81)
1344-07-09	Noble	king of England	349.920	39.50	1.0000	8.8587	8.8587	H	(Challis, 1992, p. 701)
1346-07-28	Noble	king of England	349.920	42.00	1.0000	8.3314	8.3314	H	(Challis, 1992, p. 701)

yyyy-mm-dd	coin	authority	unit of weight	taille	fineness	weight	gold content	source type	source
1349-01-27	Noble	king of England	349.920	42.00	0.9705	8.3314	8.0855	H	(Challis, 1992, p. 702)
1351-06-20	Noble	king of England	349.920	45.00	0.9705	7.7760	7.5465	H	(Challis, 1992, p. 703)
1409-00-00	Noble	king of England	349.920	48.00	0.9705	7.2900	7.0748	H	(Challis, 1992, p. 708)
1413-04-14	Noble	king of England	349.920	50.00	0.9705	6.9984	6.7919	H	(Challis, 1992, p. 708)
1464-08-13	Noble	king of England	349.920	50.00	0.9705	6.9984	6.7919	H	(Challis, 1992, p. 712)
1465-03-06	New noble (rosenoble, ryal)	king of England	349.920	45.00	0.9705	7.7760	7.5465	H	(Challis, 1992, p. 713)
1465-03-06	Angel	king of England	349.920	67.50	0.9705	5.1840	5.0310	H	(Challis, 1992, p. 713)
1266-08-15	Ecu d'or	king of France	244.753	58.33	1.0000	4.1958	4.1958	H	(Blanchet and Dieudonné, 1912, p. 225)
1337-01-00	Ecu d'or	king of France	244.753	54.00	1.0000	4.5325	4.5325	H	(Blanchet and Dieudonné, 1912, p. 247)
1340-01-29	Couronne d'or	king of France	244.753	45.00	1.0000	5.4390	5.4390	H	(Blanchet and Dieudonné, 1912, p. 247)
1343-04-10	Ecu d'or	king of France	244.753	54.00	1.0000	4.5325	4.5325	H	(Blanchet and Dieudonné, 1912, p. 248)
1349-05-06	Ecu d'or	king of France	244.753	54.00	0.8750	4.5325	3.9659	H	(Blanchet and Dieudonné, 1912, p. 248)
1351-07-25	Ecu d'or	king of France	244.753	54.00	0.8333	4.5325	3.7771	H	(Blanchet and Dieudonné, 1912, p. 255)
1360-03-15	Florin	king of France	244.753	70.00	1.0000	3.4965	3.4965	H	(Blanchet and Dieudonné, 1912, p. 256)
1360-12-05	Franc d'or à cheval	king of France	244.753	63.00	1.0000	3.8850	3.8850	H	(Blanchet and Dieudonné, 1912, p. 256)
1365-04-20	Franc d'or à pied	king of France	244.753	64.00	1.0000	3.8243	3.8243	H	(Blanchet and Dieudonné, 1912, p. 267)
1385-03-11	Couronne d'or	king of France	244.753	60.00	1.0000	4.0792	4.0792	H	(Blanchet and Dieudonné, 1912, p. 270)
1389-09-11	Couronne d'or	king of France	244.753	64.00	1.0000	3.8243	3.8243	H	(Blanchet and Dieudonné, 1912, p. 270)
1419-03-07	Couronne d'or	king of France	244.753	64.00	0.9583	3.8243	3.6649	H	(Blanchet and Dieudonné, 1912, p. 271)
1420-12-19	Couronne d'or	king of France	244.753	66.00	1.0000	3.7084	3.7084	H	(Blanchet and Dieudonné, 1912, p. 271)
1423-01-00	Écu vieux	king of France	244.753	64.00	1.0000	3.8243	3.8243	H	(Blanchet and Dieudonné, 1912, p. 287)
1423-11-00	Franc d'or	king of France	244.753	80.00	1.0000	3.0594	3.0594	H	(Blanchet and Dieudonné, 1912, p. 287)
1424-08-00	Écu vieux	king of France	244.753	70.00	0.9583	3.4965	3.3508	H	(Blanchet and Dieudonné, 1912, p. 287)
1429-01-00	Écu vieux	king of France	244.753	70.00	0.7500	3.4965	2.6224	H	(Blanchet and Dieudonné, 1912, p. 287)
1436-01-28	Écu à la couronne	king of France	244.753	70.00	1.0000	3.4965	3.4965	H	(Blanchet and Dieudonné, 1912, p. 288)
1474-01-04	Écu à la couronne nouveau	king of France	244.753	72.00	0.9635	3.3993	3.2754	H	(Blanchet and Dieudonné, 1912, p. 298)
1494-08-13	Écu soleil	king of France	244.753	70.00	0.9635	3.4965	3.3690	H	(Blanchet and Dieudonné, 1912, p. 303)
1519-05-18	Écu soleil	king of France	244.753	71.50	0.9479	3.4231	3.2448	H	(Blanchet and Dieudonné, 1912, p. 314)
1519-07-21	Écu soleil	king of France	244.753	71.17	0.9583	3.4392	3.2959	H	(Blanchet and Dieudonné, 1912, p. 314)
1561-08-30	Écu d'or	king of France	244.753	72.50	0.9583	3.3759	3.2352	H	(Blanchet and Dieudonné, 1912, p. 329)
1325-00-00	Hungarian ducat	king of Hungary	244.753	69.00	0.9896	3.5471	3.5102	H	(Huszár, 1970-72, p. 72)
1342 to 1382	Hungarian ducat	king of Hungary			0.9931	3.5830	3.5581	A	(Hegel, 1862/1961, p. 230)
1387 to 1437	Hungarian ducat	king of Hungary			0.9931	3.5620	3.5373	A	(Hegel, 1862/1961, p. 230)
1452 to 1457	Hungarian ducat	king of Hungary			0.9931	3.5560	3.5313	A	(Hegel, 1862/1961, p. 230)

yyyy-mm-dd	coin	authority	unit of weight	taille	fineness	weight	gold content	source type	source
1324-00-00	Florin	republic of Florence	339.542	96.33	0.9896	3.5247	3.4879	H	(Bernocchi, 1976, p. 66)
1390-00-00	Florin	republic of Florence	339.542	96.50	0.9833	3.5186	3.4599	H	(Bernocchi, 1976, p. 66)
1402-00-00	Florin	republic of Florence	339.542	101.67	0.8333	3.3398	2.7831	H	(Bernocchi, 1976, p. 66)
1402-06-10	Florin	republic of Florence	339.542	102.00	0.8229	3.3288	2.7394	H	(Bernocchi, 1976, p. 66; Grierson, 1981, p. 424)
1421-00-00	Florin	republic of Florence	339.542	96.00	0.8229	3.5369	2.9106	H	(Bernocchi, 1976, p. 66)
1422-00-00	Florin	republic of Florence	339.542	95.60	0.8042	3.5517	2.8562	H	(Bernocchi, 1976, p. 66)
1442-00-00	Florin	republic of Florence	339.542	96.00	0.8042	3.5369	2.8443	H	(Bernocchi, 1976, p. 66)
1460-00-00	Florin	republic of Florence	339.542	96.50	0.9833	3.5186	3.4599	H	(Bernocchi, 1976, p. 66)
1460-00-00	Florin	republic of Florence	339.542	96.33	0.9896	3.5247	3.4879	H	(Bernocchi, 1976, p. 66)
1461-00-00	Florin	republic of Florence	339.542	96.42	0.9896	3.5216	3.4849	H	(Grierson, 1981, p. 430)
1479-00-00	Florin	republic of Florence	339.542	96.25	0.9917	3.5277	3.4983	H	(Bernocchi, 1976, p. 66)
1510-00-00	Florin	republic of Florence	339.542	96.75	0.9771	3.5095	3.4291	H	(Bernocchi, 1976, p. 66)
1385-11-26	Rheingulden	rhenish electors	233.888	66.00	0.9583	3.5438	3.3961	O	(Weisenstein, 2002, pp. 106, 132)
1399-09-19	Rheingulden	rhenish electors	233.888	66.00	0.9375	3.5438	3.3223	O	(Weisenstein, 2002, pp. 106, 134)
1400-04-02	Rheingulden	rhenish electors	233.888	66.50	0.9167	3.5171	3.2240	CA	(Weisenstein, 2002, p. 134)
1401-04-29	Rheingulden	rhenish electors	233.888	67.50	0.9167	3.4650	3.1763	CA	(Weisenstein, 2002, p. 115)
1401-04-29	Rheingulden	rhenish electors	233.888	68.00	0.9167	3.4395	3.1529	CA	(Weisenstein, 2002, p. 115)
1402-06-23	Rheingulden	rhenish electors	233.888	66.00	0.9375	3.5438	3.3223	O	(Weisenstein, 2002, p. 116)
1407-01-25	Rheingulden	rhenish electors	233.888	66.00	0.9167	3.5438	3.2484	O	(Weisenstein, 2002, pp. 106, 135)
1417-12-02	Rheingulden	rhenish electors	233.888	66.00	0.8333	3.5438	2.9531	O	(Weisenstein, 2002, pp. 106, 136)
1419-03-20	Rheingulden	rhenish electors	350.831	100.00	0.7917	3.5083	2.7774	O	(Weisenstein, 2002, pp. 106, 137)
1454-10-29	Rheingulden	rhenish electors	350.831	102.00	0.7917	3.4395	2.7230	O	(Weisenstein, 2002, pp. 106, 138)
1464-10-11	Rheingulden	rhenish electors	350.831	103.00	0.7917	3.4061	2.6965	O	(Weisenstein, 2002, pp. 106, 138)
1477-06-29	Rheingulden	rhenish electors	350.831	104.00	0.7847	3.3734	2.6472	MC	(Weisenstein, 2002, pp. 106, 139)
1488-09-01	Rheingulden	rhenish electors	350.831	105.00	0.7708	3.3413	2.5755	O	(Weisenstein, 2002, pp. 106, 140)
1490-11-15	Rheingulden	rhenish electors	350.831	107.00	0.7708	3.2788	2.5274	O	(Weisenstein, 2002, pp. 106, 140)
1559-00-00	Rheingulden	rhenish electors	233.888	72.00	0.7708	3.2484	2.5040	H	(Weisenstein, 2002, p. 106)

Silver

yyyy-mm-dd	Coin	nominal value	authority	unit of weight	taille	fineness	weight	silver content	source type	source
1332-03-13	Grote	1d.	count of Flanders	244.753	56.50	0.8542	4.3319	3.7002	H	(Blockmans and Blockmans, 1979, p. 83)
1337-05-25	Grote	1d.	count of Flanders	244.753	66.00	0.6667	3.7084	2.4723	H	(Blockmans and Blockmans, 1979, p. 83)
1346-01-20	Grote	1d.	count of Flanders	244.753	66.00	0.6389	3.7084	2.3692	H	(Blockmans and Blockmans, 1979, p. 83)
1346-11-24	Grote	1d.	count of Flanders	244.753	66.00	0.5816	3.7084	2.1568	H	(Blockmans and Blockmans, 1979, p. 89)
1351-05-28	Grote	1d.	count of Flanders	244.753	66.00	0.5417	3.7084	2.0087	H	(Blockmans and Blockmans, 1979, p. 89)
1354-12-20	Grote	1d.	count of Flanders	244.753	69.00	0.5139	3.5471	1.8228	H	(Blockmans and Blockmans, 1979, p. 89)
1359-10-22	Grote	1d.	count of Flanders	244.753	70.00	0.5000	3.4965	1.7482	H	(Blockmans and Blockmans, 1979, p. 89)
1361-12-04	Grote	1d.	count of Flanders	244.753	72.00	0.5000	3.3993	1.6997	H	(Blockmans and Blockmans, 1979, p. 89)
1365-04-12	Lion		count of Flanders	244.753	57.00	0.6667	4.2939	2.8626	H	(Blockmans and Blockmans, 1979, p. 89)
1368-01-28	Lion		count of Flanders	244.753	57.00	0.6250	4.2939	2.6837	H	(Blockmans and Blockmans, 1979, p. 89)
1369-04-21	Lion		count of Flanders	244.753	57.00	0.5972	4.2939	2.5644	H	(Blockmans and Blockmans, 1979, p. 89)
1369-09-22	Grote	1d.	count of Flanders	244.753				1.1900	H	(van der Wee, 1963, p. 125)
1373-06-18	Grote	1d.	count of Flanders	244.753				1.1100	H	(van der Wee, 1963, p. 125)
1380-01-30	Double grote	2d.	count of Flanders	244.753	58.00	0.5000	4.2199	2.1099	H	(Blockmans and Blockmans, 1979, p. 89)
1383-09-12	Double grote	2d.	count of Flanders	244.753	58.00	0.4792	4.2199	2.0220	H	(Blockmans and Blockmans, 1979, p. 89)
1384-07-00	Double grote	2d.	count of Flanders	244.753	50.00	0.5000	4.8951	2.4475	H	(Munro, 1972, p. 211)
1386-04-00	Double grote	2d.	count of Flanders	244.753	52.00	0.5000	4.7068	2.3534	H	(Munro, 1972, p. 211)
1386-10-00	Double grote	2d.	count of Flanders	244.753	57.00	0.5000	4.2939	2.1470	H	(Munro, 1972, p. 211)
1387-04-00	Double grote	2d.	count of Flanders	244.753	59.50	0.4306	4.1135	1.7711	H	(Munro, 1972, p. 211)
1388-10-00	Double grote	2d.	count of Flanders	244.753	60.50	0.4028	4.0455	1.6294	H	(Munro, 1972, p. 211)
1389-12-00	Double grote	2d.	count of Flanders	244.753	57.00	0.5000	4.2939	2.1470	H	(Munro, 1972, p. 211)
1391-01-00	Double grote	2d.	count of Flanders	244.753	57.50	0.5000	4.2566	2.1283	H	(Munro, 1972, p. 211)
1393-06-00	Double grote	2d.	count of Flanders	244.753	57.00	0.5000	4.2939	2.1470	H	(Munro, 1972, p. 211)
1407-04-00 (c.)	Double grote	2d.	count of Flanders	244.753	53.00	0.5000	4.6180	2.3090	H	(Munro, 1972, p. 211)
1407-07-00	Double grote	2d.	count of Flanders	244.753	57.00	0.5000	4.2939	2.1470	H	(Munro, 1972, p. 211)
1409-08-00	Double grote	2d.	count of Flanders	244.753	49.00	0.5000	4.9950	2.4975	H	(Munro, 1972, p. 211)
1416-12-00	Double grote	2d.	count of Flanders	244.753	50.00	0.4167	4.8951	2.0396	H	(Munro, 1972, p. 211)
1418-06-12	Double grote	2d.	count of Flanders	244.753	68.00	0.5000	3.5993	1.7997	H	(Munro, 1972, p. 211)
1422-00-00	Double grote	2d.	count of Flanders	244.753	50.00	0.4167	4.8951	2.0396	H	(Munro, 1972, p. 211)
1425-07-00	Double grote	2d.	count of Flanders	244.753	53.00	0.4167	4.6180	1.9242	H	(Munro, 1972, p. 211)
1426-07-00	Double grote	2d.	count of Flanders	244.753	53.00	0.4115	4.6180	1.9001	H	(Munro, 1972, p. 211)
1426-12-00	Double grote	2d.	count of Flanders	244.753	54.00	0.4132	4.5325	1.8728	H	(Munro, 1972, p. 211)

yyyy-mm-dd	Coin	nominal value	authority	unit of weight	taille	fineness	weight	silver content	source type	source
1428-06-00	Double grote	2d.	count of Flanders	244.753	54.00	0.3750	4.5325	1.6997	H	(Munro, 1972, p. 211)
1428-11-00	Double grote	2d.	count of Flanders	244.753	68.50	0.4444	3.5730	1.5880	H	(Munro, 1972, p. 211)
1429-01-00	Double grote	2d.	count of Flanders	244.753	54.00	0.3472	4.5325	1.5738	H	(Munro, 1972, p. 211)
1429-06-00	Double grote	2d.	count of Flanders	244.753	54.00	0.3333	4.5325	1.5108	H	(Munro, 1972, p. 211)
1431-12-00	Double grote	2d.	count of Flanders	244.753	54.00	0.3125	4.5325	1.4164	H	(Munro, 1972, p. 211)
1433-05-00	Double grote	2d.	count of Flanders	244.753	70.00	0.5000	3.4965	1.7482	H	(Munro, 1972, p. 211)
1433-10-00	Double grote	2d.	count of Flanders	244.753	72.00	0.5000	3.3993	1.6997	H	(Munro, 1972, p. 211)
1466-05-23	Patard	2d.	count of Flanders	244.753	82.50	0.5000	2.9667	1.4834	H	(Pusch, 1932, p. 79)
1467-10-13	Patard	2d.	count of Flanders	244.753	84.50	0.5000	2.8965	1.4482	H	(Pusch, 1932, p. 79)
1474-10-27	Double patard	4½d.	count of Flanders	244.753	72.50	0.9167	3.3759	3.0946	H	(Pusch, 1932, p. 80)
1477-11-10	Double stuyver	5d.	count of Flanders	244.753	79.50	0.9583	3.0787	2.9504	H	(Pusch, 1932, p. 80)
1485-08-06	Coin of 6gr.	6d.	count of Flanders	244.753	80.00	0.8333	3.0594	2.5495	H	(Pusch, 1932, p. 81)
1486-08-25	Double patard	5d.	count of Flanders	244.753	80.00	0.8333	3.0594	2.5495	H	(Pusch, 1932, p. 81)
1487-07-05	Réal	16d.	count of Flanders	244.753	34.00	0.9306	7.1986	6.6987	H	(Pusch, 1932, p. 81)
1488-12-08	Doubles	12d.	count of Flanders	244.753	66.00	0.8056	3.7084	2.9873	H	(Pusch, 1932, p. 82)
1489-12-14	Réal	9d.	count of Flanders	244.753	34.00	0.9306	7.1986	6.6987	H	(Pusch, 1932, p. 82)
1492-10-12	Double patard	4d.	count of Flanders	244.753	85.00	0.8333	2.8794	2.3995	H	(Pusch, 1932, p. 82)
1495-01-30	Double patards	4d.	count of Flanders	244.753	84.00	0.8333	2.9137	2.4281	H	(Pusch, 1932, p. 83)
1495-12-31	Réal	12d.	count of Flanders	244.753	34.00	0.9306	7.1986	6.6987	H	(Pusch, 1932, p. 83)
1496-04-10	Toison d'argent	6d.	count of Flanders	244.753	72.00	0.9167	3.3993	3.1161	H	(Munro, 2001, p. 105)
1500-02-20	Toison d'argent	6d.	count of Flanders	244.753	72.00	0.9167	3.3993	3.1161	H	(Munro, 2001, p. 105)
1500-02-20	Double patard	4d.	count of Flanders	244.753	79.00	0.6667	3.0981	2.0654	H	(Munro, 2001, p. 105)
1500-02-20	Double grote	2d.	count of Flanders	244.753	79.00	0.3333	3.0981	1.0327	H	(Munro, 2001, p. 105)
1505-09-00	Grote	1d.	count of Flanders	244.753	134.00	0.2708	1.8265	0.4947	H	(Munro, 2001, p. 105)
1506-02-14	Réal	6½d.	count of Flanders	244.753	71.25	0.9340	3.4351	3.2085	H	(Pusch, 1932, p. 83)
1506-02-14	Double carolus	6d.	count of Flanders	244.753	80.00	0.9340	3.0594	2.8576	H	(Pusch, 1932, p. 84)
1506-02-14	Carolus	3d.	count of Flanders	244.753	78.50	0.4583	3.1179	1.4290	H	(Munro, 2001, p. 105)
1506-02-14	Double grote	2d.	count of Flanders	244.753	80.00	0.3090	3.0594	0.9454	H	(Munro, 2001, p. 105)
1525-11-25	Double carolus	6½d.	count of Flanders	244.753	80.00	0.9340	3.0594	2.8576	H	(Pusch, 1932, p. 84)

yyyy-mm-dd	Coin	nominal value	authority	unit of weight	taille	fineness	weight	silver content	source type	source
1527-03-01	Double carolus	6d.	count of Flanders	244.753	80.00	0.9340	3.0594	2.8576	H	(Pusch, 1932, p. 85)
1528-05-20	6-gröscher	108d.	duke of Prussia	197.980	37.00	0.8750	5.3510	4.6820	O	(Volckart, 1997, p. 70)
1300-00-00	Prague groat	1gr.	king of Bohemia				3.9000	3.6000	H	(Sprenger, 2002, p. 75)
1310-00-00	Prague groat	1gr.	king of Bohemia				3.6000	3.4000	H	(Sprenger, 2002, p. 75)
1335-00-00	Prague groat	1gr.	king of Bohemia				3.5000	3.2000	H	(Sprenger, 2002, p. 75)
1348-00-00 (c.)	Prague groat	1gr.	king of Bohemia				3.4000	3.0000	H	(Sprenger, 2002, p. 75)
1380-00-00 (c.)	Prague groat	1gr.	king of Bohemia				2.9000	2.4000	H	(Sprenger, 2002, p. 75)
1405-00-00 (c.)	Prague groat	1gr.	king of Bohemia				2.7000	1.8000	H	(Sprenger, 2002, p. 75)
1407-00-00	Prague groat	1gr.	king of Bohemia				2.7000	1.6000	H	(Sprenger, 2002, p. 75)
1470-00-00 (c.)	Prague groat	1gr.	king of Bohemia				2.7000	1.7000	H	(Sprenger, 2002, p. 75)
1485-00-00	Prague groat	1gr.	king of Bohemia				2.7000	1.2000	H	(Sprenger, 2002, p. 75)
1540-00-00 (c.)	Prague groat	1gr.	king of Bohemia				2.0000	0.8000	H	(Sprenger, 2002, p. 75)
1344-07-09	Penny	1d.	king of England	349.920	266.00	0.9250	1.3155	1.2168	H	(Challis, 1992, p. 701)
1345-06-23	Penny	1d.	king of England	349.920	268.00	0.9250	1.3057	1.2077	H	(Challis, 1992, p. 701)
1346-07-28	Penny	1d.	king of England	349.920	270.00	0.9250	1.2960	1.1988	H	(Challis, 1992, p. 701)
1351-06-20	Groat	4d.	king of England	349.920	75.00	0.9250	4.6656	4.3157	H	(Challis, 1992, p. 703)
1409-00-00	Groat	4d.	king of England	349.920	84.00	0.9250	4.1657	3.8533	H	(Challis, 1992, p. 708)
1413-04-14	Groat	4d.	king of England	349.920	90.00	0.9250	3.8880	3.5964	H	(Challis, 1992, p. 708)
1464-08-13	Groat	4d.	king of England	349.920	112.50	0.9250	3.1104	2.8771	H	(Challis, 1992, p. 712)
1533-04-06	Groat	4d.	king of England	373.242	135.00	0.9250	2.7648	2.5574	H	(Challis, 1992, p. 720)
1542-05-16	Testoon	12d.	king of England	373.242	48.00	0.7583	7.7759	5.8967	H	(Challis, 1992, p. 721)
1547-04-05	Testoon	12d.	king of England	373.242	48.00	0.3333	7.7759	2.5920	H	(Challis, 1992, p. 723)
1551-10-05	Crown	60s.	king of England	373.242	12.00	0.9208	31.1035	28.6411	H	(Challis, 1992, p. 727)
1553-08-20	Groat	4d.	king of England	373.242	180.00	0.9167	2.0736	1.9008	H	(Challis, 1992, p. 727)
1457-00-00	Shilling	6d.	royal Prussia (Danzig)	190.034	135.75	0.3050	1.3999	0.4270	A	(Kubiak, 1986, p. 185)
1457-00-00	Shilling	6d.	royal Prussia (Elbing)	190.034	142.00	0.3000	1.3383	0.4015	A	(Kubiak, 1986, p. 185)
1454-00-00	Shilling	6d.	royal Prussia (estates)	190.034	112.50	0.5600	1.6892	0.9459	A	(Kubiak, 1986, p. 184)
1454-00-00	Shilling	6d.	royal Prussia (estates)	190.034	110.50	0.5950	1.7198	1.0233	A	(Kubiak, 1986, p. 184)
1457-00-00	Shilling	6d.	royal Prussia (Thorn)	190.034	142.00	0.2965	1.3383	0.3968	A	(Kubiak, 1986, p. 184)
1374-00-00 (c.)	Shilling	12d.	Teutonic Order	190.034	112.00	0.8455	1.6967	1.4346	A	(Vossberg, 1843/1970, p. 208)
1374-00-00 (c.)	Halbscoter	15d.	Teutonic Order	190.034	62.00	0.6319	3.0651	1.9369	A	(Vossberg, 1843/1970, p. 208)
1380-02-02	Shilling	12d.	Teutonic Order	190.034	112.00	0.7292	1.6967	1.2372	O	(Volckart, 1996, p. 396)
1382-00-00 (c.)	Shilling	12d.	Teutonic Order	190.034	120.00	0.8229	1.5836	1.3032	A	(Vossberg, 1843/1970, p. 208)

yyyy-mm-dd	Coin	nominal value	authority	unit of weight	taille	fineness	weight	silver content	source type	source
1398-00-00 (c.)	Shilling	12d.	Teutonic Order	190.034	115.00	0.7014	1.6525	1.1590	A	(Vossberg, 1843/1970, p. 208)
1404-10-02	Shilling	12d.	Teutonic Order	190.034	112.00	0.7500	1.6967	1.2725	MA	(Volckart, 1996, p. 397)
1408-00-00 (c.)	Shilling	12d.	Teutonic Order	190.034	115.40	0.7083	1.6467	1.1664	A	(Vossberg, 1843/1970, p. 208)
1409-00-00 (c.)	Shilling	12d.	Teutonic Order	190.034	114.50	0.6667	1.6597	1.1065	A	(Vossberg, 1843/1970, p. 208)
1411-00-00	Shilling	12d.	Teutonic Order	190.034	122.00	0.4167	1.5577	0.6490	A	(Vossberg, 1843/1970, p. 208)
1414-00-00	Shilling	12d.	Teutonic Order	190.034	125.70	0.2622	1.5118	0.3963	A	(Vossberg, 1843/1970, p. 209)
1414-00-00	Shilling	12d.	Teutonic Order	190.034	120.00	0.1910	1.5836	0.3024	CA	(Ropp, 1878, p. 225)
1416-07-07	Shilling	12d.	Teutonic Order	190.034	112.00	0.5417	1.6967	0.9191	O	(Töppen, 1878, no. 226, p. 280)
1416-07-07	Shilling	12d.	Teutonic Order	190.034	113.00	0.5417	1.6817	0.9109	CA	(Ropp, 1878, p. 225)
1442-00-00 (c.)	Shilling	12d.	Teutonic Order	190.034	116.70	0.5008	1.6284	0.8155	A	(Vossberg, 1843/1970, p. 209)
1450-00-00 (c.)	Shilling	12d.	Teutonic Order	190.034	125.70	0.3414	1.5118	0.5162	A	(Vossberg, 1843/1970, p. 209)
1454-03-00 (c.)	Shilling	6d.	Teutonic Order	190.034	132.00	0.2465	1.4396	0.3549	A	(Vossberg, 1843/1970, p. 209)
1467-00-00	Shilling	6d.	Teutonic Order	190.034	140.50	0.2448	1.3526	0.3311	A	(Vossberg, 1843/1970, p. 209)
1470-00-00	Shilling	6d.	Teutonic Order	190.034	135.00	0.2361	1.4077	0.3324	A	(Vossberg, 1843/1970, p. 210)
1477-00-00	Shilling	6d.	Teutonic Order	190.034	142.00	0.2014	1.3383	0.2695	A	(Vossberg, 1843/1970, p. 210)
1489-00-00	Shilling	6d.	Teutonic Order	190.034	142.00	0.2014	1.3383	0.2695	A	(Vossberg, 1843/1970, p. 210)
1489-00-00	Shilling	5d.	Teutonic Order	190.034	142.00	0.2014	1.3383	0.2695	A	(Vossberg, 1843/1970, p. 210)
1489-00-00	Scoter	15d.	Teutonic Order	190.034	120.00	0.5208	1.5836	0.8248	A	(Vossberg, 1843/1970, p. 210)
1502-00-00	Scoter	15d.	Teutonic Order	190.034	120.00	0.5000	1.5836	0.7918	CA	(GSTA PK, XX. HA, OF 24a, p. 263)
1508-02-27	Groschen	18d.	Teutonic Order	190.034	129.00	0.5000	1.4731	0.7366	CA	(Volckart, 1996, p. 407)
1513-00-00	Groschen	18d.	Teutonic Order	190.034	131.00	0.5000	1.4506	0.7253	CA	(Hubatsch, 1968, p. 490)
1515-00-00	Groschen	18d.	Teutonic Order	190.034	131.00	0.4844	1.4506	0.7027	CA	(Hubatsch, 1968, p. 490)
1519-00-00	Groschen	18d.	Teutonic Order	190.034	93.00	0.3750	2.0434	0.7663	CA	(Hubatsch, 1968, p. 491)
1519-09-29	Groschen	18d.	Teutonic Order	190.034	131.00	0.4844	1.4506	0.7027	MC	(Hubatsch, 1968, p. 494)
1520-00-00	Groschen	18d.	Teutonic Order	190.034	131.00	0.3125	1.4506	0.4533	CA	(Hubatsch, 1968, p. 490)
1379-02-09	Witten	4d.	Wendish Union	233.888	176.00	0.8438	1.3289	1.1213	O	(Hanserecesse, 1872, no. 172, p. 187)
1384-00-00	Witten	4d.	Wendish Union	233.888	178.00	0.8438	1.3140	1.1087	CA	(Hanserecesse, 1872, no. 288, p. 341)
1384-00-00	Witten	4d.	Wendish Union	233.888	180.00	0.8438	1.2994	1.0963	CA	(Hanserecesse, 1872, no. 288, p. 341)
1392-03-10	Sechsling	6d.	Wendish Union	233.888	114.00	0.7500	2.0516	1.5387	O	(Hanserecesse, 1897, no. 949, p. 619)
1398-00-00	Witten	4d.	Wendish Union	233.888	193.00	0.8125	1.2119	0.9846	O	(Grauthoff, 1836, p. 190)
1403-02-06	Witten	4d.	Wendish Union	233.888	192.00	0.7813	1.2182	0.9517	O	(Verein für Lübeckische Geschichte und Alterthumskunde, 1
1406-03-31	Witten	4d.	Wendish Union	233.888	196.00	0.7500	1.1933	0.8950	O	(Hanserecesse, 1880, no. 310, p. 231)
1410-12-13	Witten	4d.	Wendish Union	233.888	200.00	0.7500	1.1694	0.8771	O	(Hanserecesse, 1880, no. 729, p. 565)
1411-00-00	Witten	4d.	Wendish Union	233.888	208.00	0.7500	1.1245	0.8433	O	(Grauthoff, 1836, p. 202)

yyyy-mm-dd	Coin	nominal value	authority	unit of weight	taille	fineness	weight	silver content	source type	source
1423-07-16	Sechsling	6d.	Wendish Union	233.888	168.00	0.7500	1.3922	1.0441	O	(Hanserecesse, 1893, no. 609, p. 417)
1424-10-08	Sechsling	6d.	Wendish Union	233.888	168.00	0.7031	1.3922	0.9789	O	(Hanserecesse, 1893, no. 740, p. 498)
1432-09-18	Shilling	12d.	Wendish Union	233.888	92.00	0.6250	2.5423	1.5889	O	(Ropp, 1876, no. 148, p. 100)
1433-01-13	Shilling	12d.	Wendish Union	233.888	95.00	0.6250	2.4620	1.5387	O	(Bahrfeld, 1909, p. 207)
1439-02-04	Shilling	12d.	Wendish Union	233.888	98.00	0.6250	2.3866	1.4916	O	(Ropp, 1878, no. 302, p. 237)
1439-05-16	Shilling	12d.	Wendish Union	233.888	96.00				O	(Ropp, 1878, no. 302, p. 237)
1441-10-14	Shilling	12d.	Wendish Union	233.888	97.00	0.6250	2.4112	1.5070	O	(Ropp, 1878, no. 521, p. 444 f.)
1450-11-25	Shilling	12d.	Wendish Union	233.888	97.00	0.6250	2.4112	1.5070	O	(Ropp, 1881, no. 676, p. 515)
1461-12-07	Shilling	12d.	Wendish Union	233.888	104.00	0.5625	2.2489	1.2650	O	(Ropp, 1888, p. 105)
1461-12-07	Double shilling	24d.	Wendish Union	233.888	70.00	0.7500	3.3413	2.5059	O	(Ropp, 1888, p. 105)
1467-10-15	Double shilling	24d.	Wendish Union	233.888	67.50	0.8125	3.4650	2.8153	O	(Ropp, 1890, no. 57, p. 38)
1468-06-15	Double shilling	24d.	Wendish Union	233.888	69.00	0.7500	3.3897	2.5423	O	(Ropp, 1890, no. 92, p. 66 f.)
1492-05-23	Double shilling	24d.	Wendish Union	233.888	69.00	0.7500	3.3897	2.5423	O	(Schäfer, 1888, no. 86, p. 67)
1501-00-00	⅔ mark	128d.	Wendish Union	233.888	17.25	0.9375	13.5587	12.7113	H	(Jesse, 1928, p. 127).
1506-12-29	Mark	192d.	Wendish Union	233.888	12.00	0.9375	19.4906	18.2725	H	(Schäfer, 1894, no. 151, p. 251)
1512-00-00	Mark	192d.	Wendish Union	233.888	13.00	0.9063	17.9913	16.3047	H	(Jesse, 1928, p. 211).
1515-00-00	Mark	192d.	Wendish Union	233.888	12.00	0.9063	19.4906	17.6634	H	(Jesse, 1928, p. 211).
1543-00-00	Mark	192d.	Wendish Union	233.888	12.00	0.9375	19.4906	18.2725	H	(Jesse, 1928, p. 211).
1551-00-00	Mark	192d.	Wendish Union	233.888	12.00	0.9028	19.4906	17.5957	H	(Jesse, 1928, p. 211).

4. Prices of rye (Hamburg and Lüneburg) per wispel

year	Mark of Lübeck	year	Mark of Lübeck	year	Mark of Lübeck	year	Mark of Lübeck
1365	4.3750	1464	3.7500	1490	6.0000	1537	13.2505
1366	3.4375	1465		1491	15.3719	1538	
1367		1466		1492	12.7893	1539	13.1234
1368	3.7500	1467		1493		1540	13.5789
1369		1468		1494	5.8264	1541	13.5294
1370		1469		1495		1542	12.6395
1371		1470		1496	4.5000	1543	16.4146
1372	3.1250	1471	5.2254	1497		1544	14.2529
1373	3.1250	1472		1498		1545	15.8684
1374		1473		1499	4.9590	1546	25.1875
1375	5.0000	1474		1500	5.4098	1547	19.8326
1376	2.0313	1475	4.2500	1522	12.2500	1548	12.1790
1377	3.4063	1476	5.7917	1523		1549	19.5402
1378	3.0000	1477	5.9969	1524	11.9998	1550	17.3353
1379	2.9116	1478	5.5556	1525	12.0000	1551	26.6667
1380	2.9431	1479	6.1557	1526		1552	26.7177
1381	3.0078	1480	8.4615	1527	9.0000	1553	22.5000
1382	4.5313	1481	6.7090	1528	9.6725	1554	22.5000
1383	3.1250	1482	5.7292	1529	9.7500	1555	18.3333
1384	3.1250	1483	7.9327	1530	17.0858	1556	20.0000
1385	3.4927	1484		1531	20.0071	1557	
1386	3.5938	1485	6.2885	1532	16.7500	1558	
1387	3.4375	1486	5.2500	1533	8.2093	1559	
1461		1487	6.0000	1534	7.3750	1560	
1462	3.7500	1488	5.9504	1535	8.3969	1561	
1463		1489	5.6834	1536	12.0000	1562	

1 wispel = 840.33 litres (Witthöft, 1979, p. 521).

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