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Re-Coinage as a Monetary Tax: Conditions, Consequences and Comparisons with Debasement

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Abstract

Re-coinage implies that old coins are declared invalid and exchanged for new ones at fixed exchange rates and dates. Empirical evidence shows that re-coinage could occur as often as twice a year within a currency area in the Middle Ages. The exchange fee at re-coinage worked as a monetary tax for trade and inhabitants. The main purpose here is to set up a simple theory about short-lived coins, which has not been done before. It turns out that re-coinage works particularly well in relatively undeveloped economies. Such economies had a small volume of coins in circulation, which facilitates both re-minting and monitoring of a short-lived coinage system. Re-coinage had both positive and negative overlapping consequences: 1) a stable coinage with respect to weight and fineness, and no long-term inflation; 2) short-term disturbances in the velocity of money, price-levels and the volume of transactions; 3) the coins' function as a store of value deteriorated; and 4) inhibitions on trade, business and the division of labor. Debasement was the alternative method for collecting a monetary tax. It was less restrictive and had lower administrative costs for the coin issuer than re-coinage. Besides low monetization, the strong position of ecclesiastical coin issuers, who disliked manipulations of weights and fineness, was likely a factor in why re-coinage was preferred to debasement. However, the costs for society as a whole could be higher for secret debasements than routine calendar driven re-coinage, due to the high uncertainty.

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1. Introduction

In the Middle Ages there were numerous religious prohibitions against charging interests or earning unmotivated profits. However, these rules did not prevent the authorities from utilizing the coinage and other institutions for their own pecuniary purposes (Wood 2002). A main goal with coining in medieval Europe was to create a preference for the issuer's coins compared to competing foreign coins, with sustained acceptance enhancing the coin issuer's profit. To assure this, the authority enacted by law a determination of the legal tender, i.e. which coins were valid as a medium of exchange in the currency area. Thus, there was a geographical currency constraint where foreign coins were precluded from circulating, but along with raw silver (bullion) were to be exchanged for current coins at the mints. Here, the minting authority had an exchange monopoly and could thereby charge a *gross seignorage* (Kluge 2007:62–63). However, there were other revenues or taxes derived from minting.

One alternative way to achieve income from minting was to manipulate the weight and fineness of the coins. Such debasements often occurred in crises when finances were volatile and in disarray, e.g., in times of war or epidemic (Edvinsson 2011:168).¹ Profits from debasements were based on secrecy and asymmetric information about the fineness on the part of the coin issuer vis-à-vis the public. There were thus large transaction costs for people to detect debasements of fineness. Secret debasements are probably as old as coining itself. From the vantage point of today's economists a less well-known way to profit from minting was *re-coinage* (also known as *coin renewals* or lat. *renovatio monetae*), i.e. old coins were declared invalid and exchanged for new ones at fixed exchange rates and dates. In the Middle Ages re-coinage could occur as often as twice a year within a currency area. An exchange fee was charged as a way to tax trade and inhabitants.

Our interest in this paper is primarily re-coinage. For purposes of analysis the coinage systems in the High Middle Ages of Europe (1000–1300) are divided into two main systems (Kluge 2007:62ff). One system had long-lived coins that were valid during the whole reign of the coin issuer. Sometimes, successors minted variants of the same coin type. These are called *immobilized types* and could be valid for very long periods – occasionally centuries – surviving through the reigns of several new rulers. The other system had short-lived coins that

¹ The reason for debasement is likely either to make a higher profit from minting or to deflate debt.

were only valid for specific intervals in the time frame of the issuer's reign.² In the latter system frequent re-coinage occurred. The geographical currency constraint and exchange monopoly were applied in both monetary systems.

The disciplines of archaeology and numismatics have been long familiar with the various systems of short-lived coinage that defined legal tender for almost 200 years in large parts of medieval Europe. Yet remarkably this form of economic life is seldom if ever analyzed in the literature of economics or economic history. Neither Braudel (1979), Sargent and Velde (2002) nor Edvinsson *et al.* (2010) even mention re-coinage in their books. No economic theory has ever been put forward aiming to explain re-coinage. *The purpose of the present study is to make up for this absence and articulate a simple theory that explains the system of short-lived coinage.* Some fundamental issues I analyze include what qualities typically characterize and differentiate those regions that chose different coinage systems, and how monetary systems with short-lived coins were monitored and enforced. Furthermore, I will discuss the possible economic consequences of re-coinage and how debasements are linked to the coinage system.

The paper is organized as follows. In section 2, I discuss how to identify re-coinage and describe the extension of short-lived coinage systems through time and space in medieval Europe. The theory and conditions of short-lived coinage system are outlined in section 3. The consequences of re-coinage are analyzed in section 4. The choice between re-coinage and coin debasement as a monetary tax is discussed in section 5. The final section delineates the conclusions.

2. Short-lived coinage systems through time and space

2.1 Medieval coins

A coin is a piece of hard material that is standardized in weight and fineness. An authority guarantees the weight and fineness with a hallmark. To work as *general purpose money*, coins must perform three basic functions: as a medium of exchange, a standard of value/unit of

² The term “feudal pennies” refers to a system where the coins are limited through time and space. In this system the right to mint is delegated to civil and ecclesiastical authorities. The term “regional coins” is widely used instead for a short-lived coinage system. But the term “regional” is misleading inasmuch as also long-lived coins had a geographical constraint and were regional. For example, the two-faced French coins minted by civil authorities between 900 and 1200 were only valid in small regions. The large difference between different medieval coinage systems is their validity measured over time.

account and a store of value. Generally, coins in medieval Europe did all three jobs adequately, in the main as commodity money, i.e. the face value was very close to the intrinsic value. Fiat money where the value is not determined by the raw material value, but by the issuer's credibility or economy, did not exist in pure form.³ If the weight or the fineness of commodity money declines, then the purchasing power of the coins to buy goods, services and assets also decreases. Precious metals (gold and silver) best fulfilled these requirements and were used as raw materials in medieval coins.⁴ During the main period of the Middle Ages (700–1300), silver was almost the only key raw material in European coins. This depended on the existence of silver mines with a high supply of silver.

The face value of the medieval coins in areas where the coins were legal tender was higher than their intrinsic value; normally minted metal had premium value over un-minted metal, a disparity for which there are two basic economic explanations:

- First, minted silver works better as a medium of exchange and standard of value than does un-minted silver. For almost everyone when doing daily transactions it is manifestly easier to count coins than to weigh silver and try somehow to check the fineness. People are thus generally willing to pay a premium to have their silver transformed into standard coins (Sussman 1993:55).
- Second, coins are a typically "network good". The individual value of holding coins increases the more people accepts the coins as a medium of exchange and a value of account (Dowd and Greenaway 1993:1180ff). The coins will then work better both as a medium of exchange and a standard of value. Hence the premium component is reinforced and tends to grow.

In practice it is the agents in the market who determine the level of this premium component that enables the coin issuing authority to make a profit (*gross seignorage*) from minting.⁵

In the Middle Ages the right to mint was not unlike the right to charge market customs and run mines, belonging to the *droit de régale*, i.e. the king/emperor possessed these rights. The

³ Fiat money has historically been "money by decree". Authorities have through legal tender laws forced people to accept the fiat money as a medium of exchange.

⁴ The precious metals: 1) exist in limited quantities, and are 2) well-known, 3) of stable value and 4) relatively soft and thereby easy to work up. The last characteristic implies coins cannot contain 100 percent gold or silver. Instead, these precious metals are mixed with zinc or copper – as the coins otherwise would be worn down in routine use.

⁵ *Gross seignorage* = *net seignorage* + production costs. In the Middle Ages, the *gross seignorage* could vary substantially across time; for example, in Sweden from 5 to 50 percent between 1300 and 1500 (Edvinsson *et al.* 2010:102). Production costs were around 5 percent (Sussman 1993:55).

coinage right encompassed the right to (Kluge 2007:52): 1) decide which coins are *legal tender*, i.e. which coins are legitimate and valid as a medium of exchange, 2) determine the monetary standard, including denomination, weight, fineness, diameter and relief (but not the design), 3) coin and determine design and 4) make a profit from minting.

The right to mint for a region and make a profit could be delegated, sold or pawned to other authorities (laymen, churchmen, citizens) for a limited or unlimited time period (Kluge 2007:53).⁶ In general, these authorities had to observe the king's guidelines for valid coins and the monetary standard, but there were exceptions.⁷ The most common reason to delegate the coinage right was that a bishop or layman founded a town and thereby financed the associated costs. But delegation could also be exchanged for loyalty against the king/emperor. The rights to mint and charge market customs were typically delegated together, since the coin issuer also had to control the market. The market custom was a fee for the craftsmen and merchants' goods brought to and sold in the town market. This fee's stated purpose was to support the market, but it was also important recurring revenue for the authority.

The size of the currency areas bounding the right to mint could vary substantially in the Middle Ages. In England, Sweden and Denmark, the king normally retained the coinage right and had a pure monopoly. Exceptions were some mints controlled by bishops. The whole of England was a single currency area, while Sweden and Denmark each had 2–3 areas. The currency areas in these countries were thus relatively large, each having several mints. In contrast, in France the minting right was delegated to many civil authorities and there were many small currency areas. Germany in the High Middle Ages was extremely decentralized politically with a weak emperor. One method the German emperor used to strengthen feudal loyalties was to delegate land; another was to delegate the rights to mint and charge market customs. Unlike in France, ecclesiastical authorities in Germany frequently received the coinage rights. The best examples of many small currency areas can be found in Germany and eastern Europe where a city (mint) with its surroundings could constitute a currency area.

⁶ Pawning of the coinage right means that the possessor of the minting right borrows money from an external person. As a pawn for the loan, the pledgee runs the mint for a specific period and receives the minting revenues as a payback of the loan.

⁷ For many regions in Germany in the 12th and 13th centuries an ecclesiastical mint decided the monetary standard.

2.2 Methods to identify coin renewals

From archaeology and numismatics there are several basic methods for identifying re-coinage. In Table 1, I have ranked the methods. The most confident way to identify re-coinage is through written documents that may contain explicit information about dates of re-coinage and/or exchange rates. However, for most currency areas and mints there are no written sources about recurrent re-coinage and other methods must be used.

By classifying different coin types as originating from a specific coin issuer and mint, it is relatively straightforward to establish whether re-coinage must have occurred. When and if there is only one type per reign, the coinage system is long-lived. However, in the event there are as many types as years of a specific reign and mint, this evidence indicates annual renewals. If the number of types exceeds (falls short of) the number of years, the renewals are more (less) frequent.

Table 1. Methods to identify short-lived and long-lived coinage systems

Method	Long-lived coins	Short-lived coins	Confidence of method
Written documents	-----	-----	Very strong
Coin types per reign and currency area	One	At least two	Strong
Coin types in hoards	One or a few from each mint	Many from each mint, but a few late dominate	Medium
Imitations of popular types	Often	Rare	Weak

A third method for identifying re-coinage involves carefully analyzing the concentration and distribution of types in coin hoards. Coin hoards from the Middle Ages may contain few or many issues from each mint represented in the hoard. If re-coinage has occurred, one would expect many types in the hoard from a specific mint, but a few types to strongly dominate the composition of the hoard. These types in such cases would be relatively young, while older types should have a more sparse representation. In those cases where there are several coin hoards from a specific coin issuer, one can expect types existing in many hoards to be older and types in a few hoards to be younger.

A fourth method to identify the coinage system involves recognizing the existence of imitations. Some long-lived coin types with high silver content were viewed as so stable that they were imitated by other minting authorities (Kluge 2007:69). This occurred to some extent in the Early (800–1000) and High Middle Ages (1000–1300), but became even more

common in the Late Middle Ages (1300–1500).⁸ Far less common were imitations of short-lived coins. This is easy to understand – a coin that only lives for just one year will neither be well-known nor regarded as stable by neighboring mints or regions. The rule of thumb is that the higher the frequency of re-coinage (assuming stable weight and fineness), the lower the probability of imitations. This fourth method is the weakest since many long-lived coins were never imitated.

2.3 Geographical extension of short-lived and long-lived coinage systems

A rich numismatic literature has emerged based on the above methods. There is a consensus in drawing conclusions about the extension through time and space of long-lived and short-lived coinage systems. Long-lived coins were common in northern Italy, France and Christian Spain in the period 900–1300 (see Map 1). This system spread to England when the *sterling* was introduced during the second half of the 12th century. Long-lived coins were valid during at least the whole reign of the coin issuer (Kluge 2007:62ff). In areas with long-lived coins the same type was produced in all mints of the currency area. Examples are the *denier tournois* in France and *sterling* in England. The mint was marked on the coin, either as details in the field (e.g. French royal coins) or in the legends (e.g. English sterling). In France in the 11th and 12th centuries long-lived coins and immobilized types dominated in most regions where the rights to mint were distributed to many civil authorities (Kluge 2007:143). It was not until the 13th century that the French king expanded his control over the coinage (Kluge 2007:136). In northern Italy, where towns took over the minting rights from the 12th century, long-lived coins likewise dominated.

The purpose of long-lived coins was to create a high acceptance for the issuer's coins – both inside and beyond his own currency area. The issuer hoped his coins would be perceived as so stable that neighboring areas would confidently accept them as means of payment. The coin issuer would thus gain a larger circulation area for his coins. With this expansion he could strike more coins and make a higher profit. The most important source of income for the minting authority in such a system was probably the monopoly over the exchange of foreign coins and bullion for current local ones (Kluge 2007:62–63).

⁸ Examples from the 10th and 11th centuries are Saxony-pennies in Magdeburg and Otto-Adelheid-pennies in Goslar. Also Carolingian types were imitated by French laymen during extended time frames in this period. Commonly imitated late medieval coins included the French *Gross Tournois*, the Sicilian *Gigliato*, the Prague *Groschen* and the German *Witten* and *Heller* (Kluge 2007:69).

In central, northern and eastern Europe in the period 1000–1300 short-lived coinage systems were the dominant monetary system. A well-known example is England at the end of the 10th and beginning of the 11th century, where re-coinage occurred every sixth year at an exchange rate of four old coins for three new ones. The *gross seignorage* was thus 25 percent every sixth year.⁹ For about a century after 1035 the English kings renewed their coinage every second or third year. However, these coins were valid throughout England, i.e. a large geographical area (Spufford 1988:92).

Map 1. Short-lived and long-lived coinage systems in Europe 1140–1300.



Note: Eastern Götaland, Sweden, changed from long-lived to short-lived coins ca. 1250.

⁹ England had a relatively large volume of coins in circulation. Therefore, the time period between re-coinage was correspondingly long.

The best examples of short-lived and geographically constrained coins can be found in Germany and eastern Europe where currency areas were relatively small. Eastern parts of France and western parts of Germany had re-coinage in the 11th and 12th centuries (Hess 2004:19–20). In central and eastern parts of Germany, re-coinage started in the middle of the 12th century and lasted until around 1300. Here, re-coinage was especially frequent in areas where uni-faced bracteates were minted;¹⁰ usually annually but sometimes twice a year (Kluge 2007:63). Austria had annual re-coinage until the end of the 14th century and Brandenburg until 1369 (Kluge 2007:119), and the Teutonic Order in Eastern Prussia every tenth year between 1237 and 1364 (Paszkievicz 2008:178). Individual German mints had annual renewals until the beginning of the 15th century (e.g. Brunswick until 1412) (Kluge 2007:105).

Sweden had coin renewals of bracteates in two of three currency areas (especially in Svealand and to some extent in western Götaland) for more than a century, from 1180–1290. This conclusion is supported by evidence of numerous coin types per period and the composition of coin hoards (Svensson 2012:208ff). The king of Denmark introduced frequent re-coinage (mostly annual) in two of three currency areas from the mid of the 12th century that continued for 200 years with some interruptions (Grinder-Hansen 2000:61ff). In Poland the king debased the coinage at the beginning of the 12th century. King Boleslaw (1102–38) started with irregular re-coinages – every third to seventh year, but later these became far more frequent. Like Germany, Poland had many currency areas and minting authorities. At the end of the 12th century renewals were annual, and in the 13th century they occurred twice a year. Bohemia also had re-coinage at least once per year in the 12th and 13th centuries.

As in England, the exchange fee in Germany in general was four old coins for three new ones, i.e. a *gross seignorage* of 25 percent. This can be seen at work at the mint in Magdeburg (12 old for 9 new coins). In Denmark the fee for people – three old coins for three new ones – was higher, 33 percent. The Teutonic Order in Prussia had a relatively generous exchange fee of seven old coins for six new ones (Svensson 2012:95).

¹⁰ Bracteates are thin uni-faced coins that were struck with only one die. A piece of soft material, such as leather or lead, was placed under the thin flan. Consequently, the design of the obverse can be seen as a mirror image on the reverse of the bracteates.

3. Conditions and enforcement of short-lived coinage systems

3.1 Conditions for re-coinage

In a short-lived coinage system, the minting authority in competition with other coin issuers tries to create a monopoly position for its coins. Legal tender laws stated that foreign coins were *ipso facto* invalid and to be exchanged for local current coins along with the payment of an exchange fee, the amount determined by the coin issuer (exchange monopoly). The frequency and exchange fee of the re-coinage could and did vary. Re-coinage normally occurred on a specific date. Afterwards, new local coins were strict legal tender in the city, i.e. use of older local or foreign coins was prohibited.

In both long-lived and short-lived coinage systems, the following conditions must be fulfilled:

- No foreign coins can be allowed to circulate (geographical currency constraint).
- The coin issuer has an exchange monopoly.
- The coin issuing authority must control both the local market and the coinage. This is facilitated if the rights to charge market customs and to mint are possessed by a single authority, which in medieval Europe normally was the case (Kluge 2007:63).

For a short-lived coinage system to work there are some further conditions:

- Only one local coin type can be considered current. Exceptions were possible if more than one coin issuer had the right to mint in a currency area.
- Coin types representing various issues must have clearly visible markers differentiating them so people can easily distinguish between valid and invalid types.
- To manage completing re-minting in a currency area on a timely basis, an essential requirement is that the volume of coins in circulation is limited (Spufford 1988:94). This is a key factor.

The basic similarities and differences between regions that chose short-lived and long-lived coinage systems are shown in Table 2. A common characteristic for cities and regions where the short-lived coinage system was in force is that the local economy was relatively undeveloped (Spufford 1988:104). The historical records suggest it was often cities and regions with limited experience of coinage and local markets that started with re-coinage. In the High Middle Ages, these cities and regions could be found in the central, eastern and

northern parts of Europe (see Map 1 in section 2.3). Limited experience of coinage is also indirect evidence of a low division of labor, a low specialization of households and limited experience of local markets.

There are several explanations of why re-coinage works particularly well in relatively undeveloped economies. Such economies had a small volume of coins in circulation, which facilitates re-minting. Furthermore, there tend to be few places where coins are used for transactions and few groups in society who use the coins, i.e. low monetization. These two factors facilitate close monitoring of the coinage.

Re-coinage is also facilitated by small currency areas that make it easier to monitor the coin circulation. Above all, a weak central power and strong civil and ecclesiastical authorities favoured short-lived coins. The best examples of short-lived and geographically constrained coins can be found in Germany and eastern Europe where currency areas were relatively small (see section 2.1).

Table 2. Similarities and differences between long-lived and short-lived coinage systems

Characteristics	Long-lived coins	Short-lived coins
Geographical constraint (foreign coins non-valid)	Yes	Yes
Exchange monopoly	Yes	Yes
Profit of the coin issuer	Minting of bullion (<i>gross seignorage</i>)	Yes
	Re-minting of foreign coins (<i>gross seignorage</i>)	Yes
	Re-coinage and issues (exchange fee)	Only when shift of issuer
	Debasements of weight and fineness	Often
Number of coin types (same denomination) circulating simultaneous in a given currency area	One or few	One
Volume of coins circulating in the economy	Large	Small
Relative development of the economy	High	Low
Geographical area	Large or small	Preferably small
Number of mints in <i>large</i> currency areas	Few	Many

A general characteristic of large currency areas is that a system with short-lived coinage requires many mints and places of exchange, whereas a system with long-lived coinage needs but a few mints. When the volume of coins increases in a short-lived system, there is often a transition to a long-lived coinage that makes it possible to utilize scale economies and the division of labour in coin production (Spufford 1988:87, 202). This transformation allows

coining to be concentrated and centralized in selective key mints. The exemplary case is no doubt England. Around the millennium when England had short-lived coinage there were around 70 mints. However, by the 13th century when England had long-lived coinage there were only two principal mints (London and Canterbury) left along with a very few others that were temporary and minor. The volume of minting was much larger in the latter period.

The systems with short-lived coins typically only applied to a limited area such as a town or region. In Germany, the city-border demarcated the area that included the jurisdiction of the city. Therefore, the right to coin and the right to charge market customs in effect were closely intertwined. The use of foreign and retired local coins at the city's markets was forbidden. The geographical currency constraint was not limited to the city markets, but rather applied to the whole area within the city-border (Hess 2004:16).¹¹ A document from Erfurt (1248/51) shows that only current local coins could be used for transactions in the town, while retired local ones as well as foreign coins were allowed for transactions outside the city-border (Hess 2004:16). In 1231 the German king Henry VII (1222–35) published an edict in Worms stating that in towns in Saxony with their own mints goods could not be exchanged for anything other than the coins from the local mint. Those discovered using foreign coins (i.e. coins from other cities/regions) were henceforth to be regarded as engaged in counterfeiting (Mehl 2011:33). However, when this edict was published, the system with coins constrained through time and space had been in force for a century in large parts of Germany.

3.2 Efficiency of renewals

The coin hoards discovered to date can tell us a great deal about the efficiency of re-coinage. Hoards in Germany from this period (1100–1300) may contain many different issues of the local coinage, as well as many issues of foreign coinage, i.e. locally invalid coins (Haupt 1974:29, 32).¹² One common sense interpretation of these hoards would be that short-lived coinage systems were not as strict as previously assumed. However, this can only be true in exceptional cases. In practice systematic re-coinage must have been lucrative sources of revenue for minting authorities which they would have struggled to retain. The critical importance of these minting revenues is underscored by the value of pawned minting rights

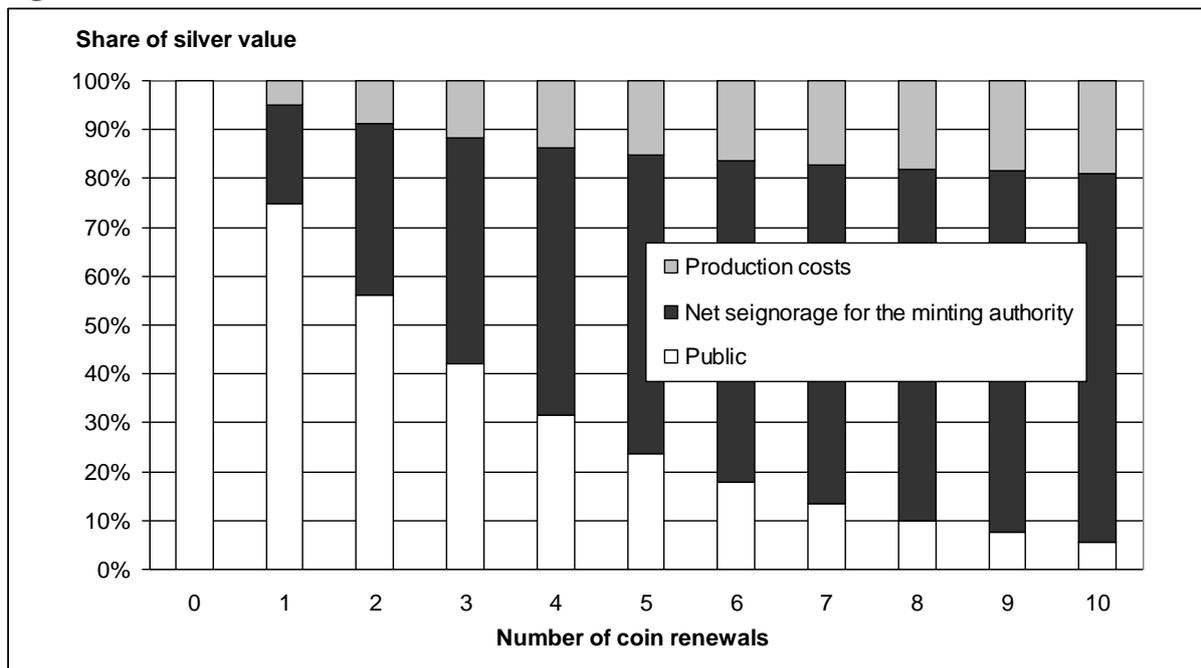
¹¹ This state of affairs is well documented in an 1188 letter from emperor Friedrich I (1152–90) to the bishop of Merseburg (Thuringia) regarding an extension of the city. The document plainly states that the market area boundary includes the whole city, and not just the physical marketplaces (Hess 2004:16).

¹² The coin hoards can either be categorized as *cross-regional hoards* or *local hoards*. The former hoards contain coins from different regions, while the latter are dominated by coins belonging to the same monetary standard. Very often, the German hoards are local (Gaettens 1963:12ff).

(Nau 1977:92) and the severe penalties for counterfeiting. Both together speak volumes about the value of minting (Nathorst-Böös 1973:51ff).

A more obvious interpretation of the mixed hoards is that people found it advantageous not to exchange invalid coins. Bearing the high exchange fees in mind, people may well have exchanged only as many coins as was absolutely necessary in the conduct of their affairs in the cash nexus of the town marketplace. If there was no immediate need to use coins for transactions, there would evolve a habitual reluctance to exchange them at every new issue. Irrespective of the age of the old coins, they possessed a constant intrinsic silver value. By skipping some coin renewals and saving their retired coins, people could accumulate silver. If the exchange fee, for example, is four old coins for three new ones and the owner exchanges all his coins at each renewal date, then after just five renewals he has just 24 percent of the coins left.¹³ How much silver the public keeps after a different number of coin renewals is illustrated in Figure 1.¹⁴

Figure 1. Distribution of silver value after recurrent coin renewals. Percent.



Note: Gross seignorage is 25 percent (i.e. four old for three new coins), net seignorage is 20 percent and production costs are 5 percent. The diagram assumes 100 percent compliance and that all coins are re-minted.

¹³ This percentage is calculated according to the formula $0.75^5 = 0.237$.

¹⁴ The figure is based on the assumption that the minting authority keeps his net seignorage. However, if he spends its net seignorage on wages, goods and services, his silver share will presumably be held constant in the long run.

3.3 Monitoring and enforcement

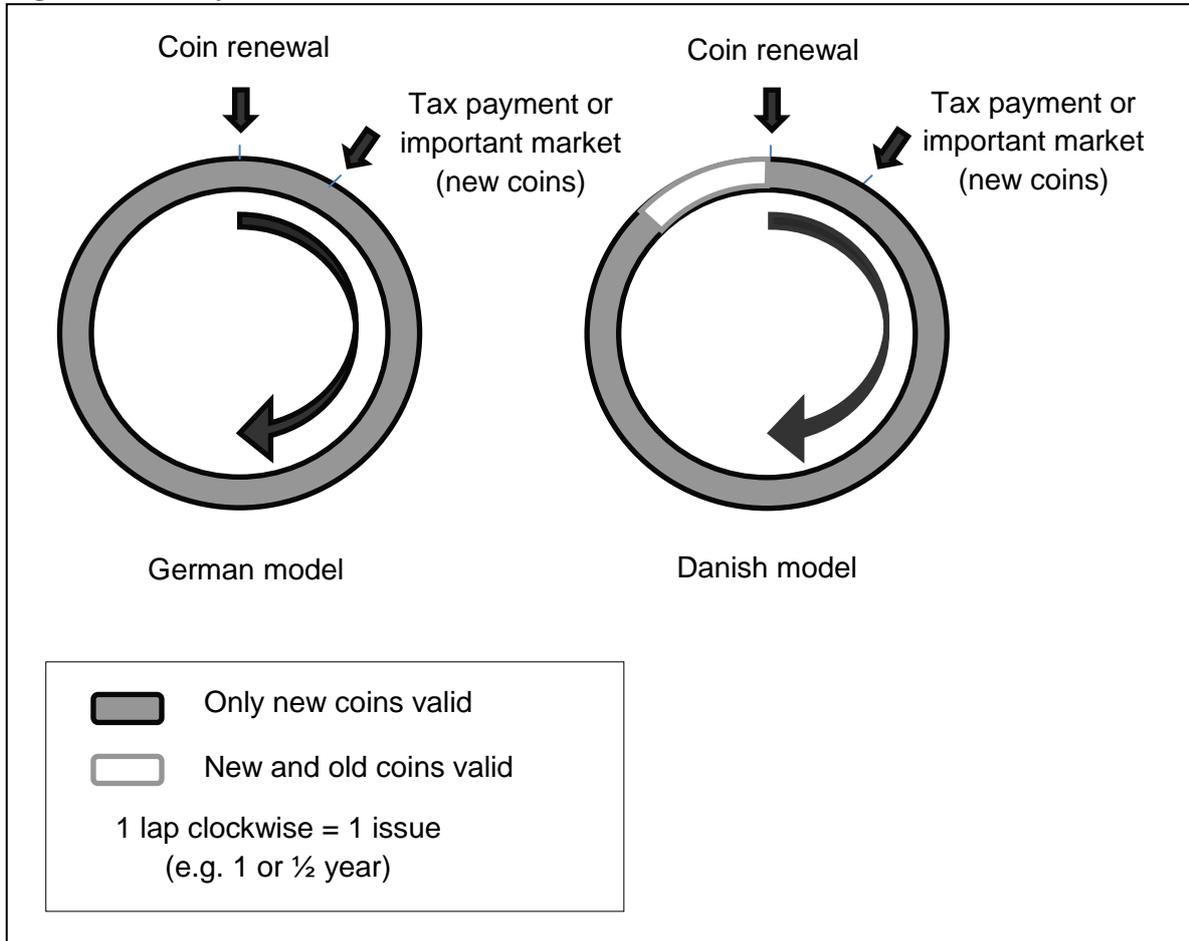
Monetization is low when there are few coins in circulation and places where they are used, and presumably few groups in society who use coins. Consequently the minting authority will find it easier to monitor and enforce re-coinage. On the other hand, in a fully monetized society it becomes difficult to directly monitor the coin circulation and undertake re-coinage.

In the city markets it is probable that the local minting authority managed to control the usage of current coins, being routinely assisted by exchangers and monitors. However, outside the city borders it must have been practically impossible to know whether invalid coins were being used for transactions – especially if it was a large sum changing hands. Unsurprisingly, in Germany the currency constraint only applied within the city borders. When the currency area included large regions of a state (e.g. Denmark) or whole states (e.g. England), it is impossible to determine from documents or other sources whether the currency constraint and re-coinage exclusively applied to the city markets or rather to the entire country/region, including the vast countryside and hinterlands. However, such large currency areas had many places where people could exchange old coins for new ones (Grinder-Hansen 2000:80), see section 3.1.

It was not the possession of invalid coins, but rather the usage that was deemed illegal and penalized. One can read in Freiberg's (Saxony) city laws from 1305 that neither the mint master nor the judge was allowed to enter homes and search for invalid coins (Haupt 1974:29). This prohibition sharply contrasts with use of force regarding re-coinage, where just 14 days after the issue of a new coinage the mint master had the right to seize and meltdown older coins that he found in the market (Hess 2004:16). The same city laws state that if an inhabitant used foreign coins for transactions and was detected, the penalty was as high as 60 shillings (720 pennies). A foreigner who did the same did not have to pay fines, but his coins were exchanged by force for their intrinsic value, which was always lower than the face value. Neither inhabitant nor foreigners who used invalid older local coins had to pay fines, but the mint master melted down their coins and then returned the silver (Haupt 1974:29). Thus the penalties for inhabitants/citizens were more severe when using foreign coins rather than invalid local ones. This differential sanction may at least in part help explain why for this period in many hoards older local coins are more frequent than foreign ones. Denmark had severe penalties for paying with invalid coins in the market – the offender not only lost those

coins he had used, but all the coins he had at the time in his possession (Grinder-Hansen 2000:69).

Figure 2. Life-cycle for short-lived coins.



However, the coin issuing authority could use an economic trick to make the re-coinage more efficient. By designating the date of re-coinage to be just prior to an important monetary event, the number of invalid coins exchanged for new ones could be substantially increased (see Figure 2). For example, the date of an important tax or fee must be paid to the king or the church could be designated shortly after the re-coinage date. This arrangement of course meant that taxes were then paid with new coins. This was the case in Denmark (Grinder-Hansen 2000:69).¹⁵ Another logical alternative was to designate the date of re-coinage in connection to an important annual market in the city, which was common in Germany (Svensson 2012:93). This juxtaposition guaranteed strong demand for new coins. The market custom would hit the sellers in the market, whereas the buyers had to pay the exchange fee.

¹⁵ To undertake re-coinage *after* such a tax payment would not be very clever. The coin issuer would then himself own those old coins that were subject to re-minting, substantially diminishing revenues from renewals.

The minting authority could also indirectly control the coin circulation in an area. Fees, rents and fines were to be paid with current coins, apart from traditional situations where payment in kind was possible. This was probably a more efficient and reliable way to enforce re-coinage and to monitor the coin circulation than having exchangers and other staff be involved in the daily traffic of goods and services in the market. In Denmark people had to pay taxes and fees with current coins. If a sheriff or other administrator accepted taxes or fees in invalid coins he was penalized 40 Mark (Grinder-Hansen 2000:69). In Cologne interest payments were to be paid with current coins, as documented in a judicial decision (Hess 2004:19).

In the vast archival (German) numismatic research literature it has been assumed that in a short-lived coinage system the new local coins are the only legal tender in the market during a specific life-cycle (see left part of Figure 2). At the end of the year when a new coin is introduced, the old coins could never be used again in the market. However, a written document from Denmark tells another story. During the last six weeks of the coin year, older coins could be used in the market (see right part of Figure 2). The likely reason was the king did not want older coins to be melted down or hoarded, but instead be used in the market where they would gradually be exchanged for new ones at the mint. During such a smooth transition, the king would be able to make a higher profit (Grinder-Hansen 2000:67ff). On the other hand, a countervailing consequence was that people then presumably had stronger incentives to save old coins, hoping to use them during the last six weeks of the next year. There were thus two contrary effects, and the net effect is unclear. Whether old local coins could be used as means of payment at the end of the year as well in other areas with short-lived coins is unknown, but this possibility cannot be excluded.

3.4 Break-down of the short-lived coinage system

The system with short-lived coins and recurrent issues continued in Germany until the end of the 13th or beginning of the 14th century. The decline of the short-lived coins depended on developing economies, growing cities and increased local and inter-regional trade. It was not uncommon that citizens paid a fee to escape re-coinage (see section 4.2). Another reason was that a growing number of peasants paid rents and taxes in coins to their landlords and kings, rather than in kind or in services. This general evolution from a *gemeinschaft* to a *gesellschaft* culture required more coins in circulation, progressively making short-lived coins with

geographical constraints impractical (Haupt 1974:59–60). There was neither sufficient time to re-mint all the circulating coins nor the capacity to monitor the increased volume of coins in circulation. Finally, and this of course typifies the burgeoning prosperity of a society undergoing urbanization, there was a rapid expansion in the use of coins with higher denominations and without regional constraints, e.g. *Schilling, Heller, Groschen, Goldgulden, Ducats*. These coins often crowded out local coins and were used more and more in international trade. These factors all blended together and made it near impossible for abbeyes and laymen to hold on to their local coin monopolies.

The Heller was the two-faced coin type that caused a decline of bracteates and other short-lived coins in southern and central Germany. The most notable attributes of the Heller, first struck in the imperial mint Hall in Swabia, were the enormous volume minted and far lower fineness (50 percent) than the bracteates. In the period 1225–50 it had trespassed upon other currency areas in southern Germany – both where two-faced coins from Worms, Speyer, Mainz, Tübingen and Würzburg were the current coins and in part where bracteates from the Bodensee region, eastern Swabia and southern Hessen were the current ones. Gradually, Nuremberg took over the mass striking of the Heller. It became a kind of national coin type without any domestic geographical constraints (Nau 1977:97).

4. Consequences

It is hard to empirically estimate the economic consequences of re-coinage. The main reason is that data on e.g. prices, number of transactions and velocity of money from the Middle Ages is lacking. However, the coins themselves in terms of design, weight and fineness as well as written documents tell us something about the consequences.

4.1 Functions of coins

The chief negative consequence of frequent re-coinage was that the traditional function of money as a store of value deteriorated. People had little incentive to save their current coins. If old invalid coins were *always* exchanged for their intrinsic value irrespective of age, they could still work as a store of value. In that case the age of old invalid coins would not matter since they always had their intrinsic silver value. If re-coinage was undertaken in combination with debasements (fineness), then people had incentives to hoard old coins with higher fineness (Gresham's law). This could explain why coin types from older issues are commonly found in hoards.

Let us look closer at what could happen with, the volume of coins in the economy (M), the velocity of money (V), the price level (P) and the volume of transactions (T) when the date of renewal approaches. We turn to the formalism of the equation of exchange (Bordo 1987:75ff):

$$M \times V = P \times T \quad .$$

This formula must always be correct. The right-hand side, $P \times T$, indicates the value of all transactions made with the coins. In the case of renewals, M is the same before and after re-coinage – the exchange fee meaning that some coins earlier belonging to people are now possessed by the coin issuer. *Thus, re-coinage did not cause long-term inflation.*

Nevertheless, it is not implausible that when the date of re-coinage approached people wanted to spend their money, since nobody wanted to pay an extra tax (exchange fee). Thus, V should increase, i.e. the left-hand side acquires a higher value, and the right-hand side then also has to increase. A likely outcome is that P increase more or less to the same degree. The alternative is that P and T both increase so that the equation holds. V , P and T could then increase slowly during the whole life-cycle of a current coin type, and should return to normal levels after the renewal date. The intrinsic silver value of the coins and the *gross seignorage* set the limits to how high or low prices can temporarily fluctuate (Sargent and Velde 2002).

That being said, there were always extenuating circumstances that determined the range of valuation. For example, there was the commonplace situation in which some people in society had no choice but to exchange their expired coins for new ones (see section 3.3). This could be the case if an important tax payment was set after the renewal, or if the renewal occurred in connection with an important annual market. The effects on V , P and T should then be smaller when the date of re-coinage approaches.

4.2 Tax for ordinary people and inhibited trade

The exchange fee was in principle a value-added tax on coins, but it was only applied at the date of re-coinage. This can be compared to the value-added tax of today (often 10–25 percent of the net price), which has to be paid every time *new* produced goods or services are sold. The fact that foreign tradesmen when travelling had to constantly exchange their coins and bullion to do business must have had a negative impact on both trade and business.

The exchange fees at re-coinage fell particularly hard on common people and small-scale trading, since large-scale trading and the trade-houses legally used silver ingots for larger transactions (Haupt 1974:32). Pennies and other small coins were of course impractical for large transactions. If coins were used for larger transactions, they were weighed rather than counted (Gaettens 1963:13). Weighing of large sums cannot have been a problem as long as the coins had a uniform silver fineness. Written documents in medieval Germany normally refer to larger payments and treaties in terms of silver ingots or bullion rather than coins. They are almost always mentioned as the means of payment or standard of value. But coins are also mentioned in such documents for smaller transactions (Buck *et al.* 1995:28).

There was a contradiction for the market and minting authority to tax trade and common people via renewals. This method created larger revenues for the ruler in feudal society, but detrimental for trade, business, local markets and division of labour. Economic activity was thereby normally inhibited in the region with such renewals. This was probably the reason why at the close of the 13th century some minting authorities chose to give priority to trade and growth rather than re-coinage.

Both re-coinage and debasements created discontent among inhabitants, tradesmen and other groups. When trade increased at the end of the 13th century, the pressure on short-lived coins from inter-regional coins increased. In this context the minting authorities often signed treaties that promised to preserve a stable value of the coinage in exchange for other taxes. This effort to defend the coinage had already emerged in 12th century France. The written sources are rare, but it is telling that the new taxes are called the same name as the minting tax – *monetarium* (Bisson 1979, Grindler-Hansen 2000:52).¹⁶

The coin issuing authority could also prolong the validity of the coins against a fee. Written documents from southern Germany show that the citizens in some towns could pay a fee to stop re-coinage.¹⁷ Another example is Denmark where King Valdemar II Sejr (1202–41)

¹⁶ In Erfurt, a document from 1341 shows that the archbishop was not allowed to change the coinage without permission from the citizens. Instead, the bishop would receive a tax which the document calls *monetarium* (Mäkeler 2010:35).

¹⁷ A couple of documents have been preserved from Augsburg (eastern Swabia) where Bishop Hartmann von Dillingen (1248–84) promised in 1272 not to change the coinage for three years for a fee. In 1277 he pawned the minting right for four years to the citizens for a fee of 80 pounds of silver. During this period, the coins (bracteates) were to be struck with the same design and dies. In 1284, the bishop promised once again not to

introduced a plough tax ca. 1234 in exchange for a stable coinage. The plough tax disappeared after 20 years and the coinage again became unstable (Grinder-Hansen 2000:64ff). Mäkeler (2010:37) claims that this period (the 13th and 14th centuries) in Europe is characterized by a dramatic change, from an approach claiming the coinage belonged to the ruler to one where it belonged to society. The philosopher Nicole Oresme in the 1350s argued that the king's control of the coinage was a duty rather than a right; their duty was to strike and maintain coins with a good intrinsic value (Estrup 1966:98ff).

5. The choice between re-coinage and debasements as a monetary tax

In the Middle Ages there were two main methods (besides re-minting of foreign coins and bullion) to use the coinage as a monetary tax: re-coinage and debasement. Re-coinage always occurs in a short-lived coinage system, but never in a long-lived system. Debasement can occur in all coinage systems. Thus, re-coinage and debasement are not mutually exclusive and can be applied simultaneously. For example, this was the case in Denmark during a civil war between 1260 and 1340 (Grinder-Hansen 2000).

5.1 Empirical observations

The minting authority in systems with long-lived coins normally had limited revenues, since a *gross seignorage* could only be charged when foreign coins were re-minted or people brought their bullion to the mint. On the other hand, in a system with short-lived coins the issuer stood to earn much more due to the additional revenues from the frequent renewals. Therefore, it is hardly surprising that coin debasements in terms of lower weight and fineness occurred primarily in regions with long-lived coins (Kluge 2007:64). In particular, both Spain and Italy are well-known for their debased medieval coins with lower weight and fineness than those of northern Europe. In England and the German mint Cologne, pennies weighed 1.4 g and had a fineness of 92 percent in the middle of the 12th century. This sharply contrasts with the Spanish pennies (*dinero*) that had a weight of 0.62 g and were 20 percent silver and the Italian pennies (*denaro*) with ca. 0.60 g and 50 percent silver.¹⁸ Debasements also explain why

change the coins (bracteates) – with respect to design, weight, fineness and size – for four years, in exchange for 90 pounds of silver from the citizens (Steinhilber 1955:42–43). In 1295 in the city of Konstanz (Bodensee) citizens paid a fee to be spared from re-coinage for 10 years (Cahn 1911:286).

¹⁸ It is fair to read from all the evidence in the historical record that the frequently re-minted German coins had a higher fineness than the long-lived coins in southern Europe. Given this state of affairs, the German coins became popular abroad and are often found in coin hoards in northern, eastern and southern Europe. The relatively low silver fineness of coins from southern Europe diminished their popularity abroad. They are only very seldom found in German hoards. At most they are found as singular specimens in burial finds (Nau 1977:88).

France (*Gross Tournois*), Italy (*Grossi*) and Spain (*Maravedi, Croat, Cornado*) earlier introduced coins with higher denominations than the penny (Kluge 2007:64).

For many regions of Germany as long as re-coinage occurred the silver fineness was sustained at a high level of at least 90 percent until the mid or end of the 13th century (see Appendix Table A1). In southern Hessen around 1230 the fineness was 943/1000 (15/16), and around 1270 still 900/1000 when the striking of bracteates came to an end (Hävernick 1936:20). Frequent re-coinage gave the issuer sufficient revenues so that debasements were unnecessary.

Table 3. Weight and fineness of north-German bracteates 1225-1492.

Year	Silver fineness (16 parts)	Gross weight (g)	Net weight silver (g)	Comments / main coin type
1225	15	0.57–0.56	0.54–0.53	
1255	15½	0.501	0.474	Monetary convention
1293	15½	0.487	0.470	
1304	14	0.469	0.410	
1325	14	0.469	0.410	
1350	13¼	0.405	0.335	
1373	----	0.405	----	Uncertain information / Witten
1392	9	0.418	0.235	Dreiling and Sechsling
1398	9	0.405	0.227	
1403	9	0.405	0.227	Witten
1406	9	0.405	0.227	
1422	8	0.340	0.170	Sechsling
1424	7¼	0.336	0.152	
1432	7	0.314	0.137	Schilling
1433	6½	0.304	0.124	
1492	6	0.270	0.101	Double schilling (since 1468)

Source: Jesse (1967:209).

Table 3 shows the development between 1225 and 1492 of the gross weight and the fineness for bracteates in northern Lower Saxony and Holstein. The theory's predictive power is verified by the fact that the fineness was constant until the end of the 13th century when the mints still had relatively frequent coin renewals. It is not until the 14th century, and especially following the introduction of higher denominations (Witten and Dreiling), that the fineness, gross weight and net weight all decreased.

5.2 Theoretical considerations of the choice

It was emphasized earlier (section 3.1) that re-coinage is only compatible with low monetization and limited economic development, whereas debasements can be applied

irrespective of whether the monetization is low or high. Practically, debasements were mostly used when monetization was high and in long-lived coinage systems (see section 5.1).

Both debasements and re-coinage aimed at increasing the profit of minting, but re-coinage had publically announced fixed exchange fees and dates, whereas debasements were undertaken in secret. The absence of transparency in the case of debasements created a higher uncertainty and on occasion could cause the entire coinage system to break down. However, the clear advantage for the coin issuer was that debasements had lower administrative costs. In general, debasement was a much more efficient way to collect a monetary tax. Of course the costs for the whole society could be higher.

Table 4. Re-coinage and debasement as a monetary tax.

Characteristics		Monetary tax	
		Re-coinage	Debasement
Monetary service		Medium of exchange and standard of value	Medium of exchange and standard of value
Monetization / economic development	Theoretically	Low	Low or high
	Empirically	Low	High
Uncertainty		Low	High
Risk of break down of monetary system		No	Yes
Administration costs for coin issuer		High	Low
Legal tender laws		Different face values for coins with the same intrinsic values	Same face values for coins with different intrinsic values
Old coins disappear from circulation through		Administrative re-minting at the mint	Melting down or hoarding through Gresham's law

A specific characteristic of re-coinage is that the issuer through legal tender laws tries to create different face values for coins with the same intrinsic value (old and new local coins). For transactions *new* coins *have to* be used exclusively. In the case of debasements, it is the other way around; legal tender laws instead state that coins with different intrinsic values should have the same face value. New (debased) coins *may* be used for transactions and should have the same face value as older ones. A system with re-coinage is thus inherently more restrictive and costly to run for the coin issuer.

Given these critical liabilities, it is puzzling why so many minting authorities in the High Middle Ages used re-coinage in areas with low monetization when they could have used the more efficient debasements to collect monetary taxes. To be sure, the church probably played

an important role. In the Holy Bible there are numerous prohibitions against manipulation of weights and fineness, and it was at this time that the Catholic Church had its strongest political and economic position (Woods 2002). Many ecclesiastical coin issuers (bishops, abbey, abbesses) had powerful positions in Germany and north-eastern Europe (see section 2.1). Furthermore, ecclesiastical issuers were dominant among those who applied re-coinage. Re-minting of coins with unchanged weight and fineness was not seen to conflict with the rules from the Holy Bible. When royal and civil authorities progressively took over the minting rights in the late middle Ages, the sway of ecclesiastical rules was considerably narrowed. Subsequently the more efficient debasements were applied.

It is interesting to note that old coins will be driven out of circulation irrespective of whether re-coinage or debasement is used as a monetary tax. In the former case, administrative re-minting will cause old coins to be melted down. In the latter case, Gresham's Law – where bad coins crowd out good ones – will likely cause older coins with higher fineness to be hoarded or melted down privately, and thereby be withdrawn from circulation. From this point of view, re-coinage is a more costly and less efficient monetary tax.

However, it is not certain that Gresham's Law was in force when debasement occurred. By valuing good coins at a premium it became possible for them to return into circulation as a stable currency. Attempts from the ruler by legal tender laws to require people to accept good and bad coins at their same face value could not prevent tradesmen from selling goods at a lower price for "good money" (Rolnick and Weber 1986:193).¹⁹ Rolnick and Weber (1986:186) argue that Gresham's Law will be in effect if there are substantial transaction costs to value good coins at a premium. If such overhead is low, bad coins will never drive out good ones. If this was not possible, good coins would be universally hoarded and withdrawn from circulation (Gresham's Law).

6. Conclusions

In a short-lived coinage system, old coins are declared invalid and exchanged for new ones at publically announced exchange rates and dates. An exchange fee is charged as a way to tax trade and inhabitants. Empirical observations show that re-coinage could occur as often as

¹⁹ The use of cash makes it easier than when using credit or promissory notes to circumvent the legal tender laws and avoid Gresham's law.

twice a year within a currency area in the Middle Ages. In contrast, a long-lived coinage system implies that the coins were valid at least for the entire duration of the reign of the coin issuer. I have presented methods to identify different coinage systems within these ideal types. Long-lived coins were common in western and southern Europe in the High Middle Ages, whereas, short-lived coins dominated in central, northern and eastern Europe. Although the short-lived coinage system defined legal tender for almost 200 years in large parts of medieval Europe, it has seldom if ever been mentioned or analyzed in the economic literature.

The main purpose of this study has been to set up for the first time a simple theory about, and basic conditions for, short-lived coinage systems. Both short-lived and long-lived coinage systems require a geographical currency constraint (foreign coins are invalid) and an exchange monopoly. In a short-lived coinage system, only one type may circulate in the currency area, and different types reflecting various issues need to be clearly distinguishable for the everyday users of the coins. Furthermore, it turns out that re-coinage works particularly well in relatively undeveloped economies. Such economies have a small volume of coins circulating which facilitates re-minting. There are also few places where coins are used for transactions and few groups in society who use coins, i.e. low monetization. These conditions facilitate monitoring and enforcement of the coinage system.

Typically a short-lived coinage system with only local new coins as legal tender was enforced only within a city's borders, and any coins could be used outside the city. The coin issuing authority had several methods to monitor and enforce the re-coinage. First, they had exchangers and other administrators at the city markets. Second, the re-coinage date was often designated just prior to an important annual market or payment date of an annual tax. Third, payment of any fees, taxes, rents, tithes or fines had to be made in new coins.

Re-coinage had both positive and negative economic consequences. First, it prevented long-term inflation, since the number of coins (and amount of silver) was the same after as before the re-coinage. Short-lived coins are associated with a stable coinage with respect to weight and fineness, evidenced by the coins themselves. Secondly, short-term disturbances should have occurred in the velocity of money, price level and number of transactions when the coinage date approached, since people did not want to pay the exchange fee. However, these effects were diminished if some people in society had to exchange their expired coins for new ones. This could be the case if an important monetary event, such as an annual tax payment or

market, was designated after the re-coinage. Thirdly, the coins' function as a store of value deteriorated. Finally, re-coinage as a monetary tax stymied economic activities such as trade and business, evidenced by complaints in written documents.

Re-coinage and coin debasement are not mutually exclusive as monetary taxes. Whereas re-coinage always occurred in short-lived coinage systems, empirical evidence shows that debasement mostly occurred in long-lived systems, where the issuer's revenue from minting was limited. Both types of monetary taxes will cause old coins to be driven out of circulation, either through administrative re-minting (re-coinage) or due to Gresham's Law (debasement). However, debasement is a more efficient monetary tax for the issuer, since it is less costly to enforce. The reason why many minting authorities nevertheless chose re-coinage before debasement in areas with low monetization can probably be best explained by the superior position of ecclesiastical coin issuers, and who invoked the numerous prohibitions of manipulation of weights and fineness contained in the Holy Bible. However, the costs for society as a whole could be higher for debasements than re-coinage, since the former tax occurs in secret and results in acute uncertainty.

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Appendix

Table A1. Silver fineness in German bracteates with different monetary standards 1140–1295.

Monetary standard/region	Year	Silver fineness	Hoard/method
	ca. 1225	93.8%	Hoard Bokel
Northern Lower Saxony	1255	96.9%	Monetary treaty
	1293	96.9%	-----
Southern Lower Saxony	1200	91.8%	Hoard Mödesse II
	1260	88.7–92.5%	Hoard Hildesheim
Thuringia	ca. 1150	93.8%	Hoard Gotha
	ca. 1200	91.5%	Hoard Seega
Saxony	ca. 1300–10	88.7–90.3%	Hoard Cröbern
Northern Hessen	ca. 1290	87.3–91.4%	Hoard Marburg
	1230	94.3%	
Southern Hessen	1270	90.0%	-----
	1230	91.3%	Test of fineness
Bodensee region	1240	98.4%	Monetary treaty
	1240	97.6%	Hoard Überlingen
Eastern Swabia	ca. 1200	ca. 92.8%	Hoard Wollishausen
	ca. 1250	85.0–92.7%	Hoard Füssener

Source: Svensson 2012:104.

Re-Coinage as a Monetary Tax: Conditions, Consequences and Comparisons with Debasement

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Abstract

Re-coinage implies that old coins are declared invalid and exchanged for new ones at fixed exchange rates and dates. Empirical evidence shows that re-coinage could occur as often as twice a year within a currency area in the Middle Ages. The exchange fee at re-coinage worked as a monetary tax for trade and inhabitants. The main purpose here is to set up a simple theory about short-lived coins, which has not been done before. It turns out that re-coinage works particularly well in relatively undeveloped economies. Such economies had a small volume of coins in circulation, which facilitates both re-minting and monitoring of a short-lived coinage system. Re-coinage had both positive and negative overlapping consequences: 1) a stable coinage with respect to weight and fineness, and no long-term inflation; 2) short-term disturbances in the velocity of money, price-levels and the volume of transactions; 3) the coins' function as a store of value deteriorated; and 4) inhibitions on trade, business and the division of labor. Debasement was the alternative method for collecting a monetary tax. It was less restrictive and had lower administrative costs for the coin issuer than re-coinage. Besides low monetization, the strong position of ecclesiastical coin issuers, who disliked manipulations of weights and fineness, was likely a factor in why re-coinage was preferred to debasement. However, the costs for society as a whole could be higher for secret debasements than routine calendar driven re-coinage, due to the high uncertainty.

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1. Introduction

In the Middle Ages there were numerous religious prohibitions against charging interests or earning unmotivated profits. However, these rules did not prevent the authorities from utilizing the coinage and other institutions for their own pecuniary purposes (Wood 2002). A main goal with coining in medieval Europe was to create a preference for the issuer's coins compared to competing foreign coins, with sustained acceptance enhancing the coin issuer's profit. To assure this, the authority enacted by law a determination of the legal tender, i.e. which coins were valid as a medium of exchange in the currency area. Thus, there was a geographical currency constraint where foreign coins were precluded from circulating, but along with raw silver (bullion) were to be exchanged for current coins at the mints. Here, the minting authority had an exchange monopoly and could thereby charge a *gross seignorage* (Kluge 2007:62–63). However, there were other revenues or taxes derived from minting.

One alternative way to achieve income from minting was to manipulate the weight and fineness of the coins. Such debasements often occurred in crises when finances were volatile and in disarray, e.g., in times of war or epidemic (Edvinsson 2011:168).¹ Profits from debasements were based on secrecy and asymmetric information about the fineness on the part of the coin issuer vis-à-vis the public. There were thus large transaction costs for people to detect debasements of fineness. Secret debasements are probably as old as coining itself. From the vantage point of today's economists a less well-known way to profit from minting was *re-coinage* (also known as *coin renewals* or lat. *renovatio monetae*), i.e. old coins were declared invalid and exchanged for new ones at fixed exchange rates and dates. In the Middle Ages re-coinage could occur as often as twice a year within a currency area. An exchange fee was charged as a way to tax trade and inhabitants.

Our interest in this paper is primarily re-coinage. For purposes of analysis the coinage systems in the High Middle Ages of Europe (1000–1300) are divided into two main systems (Kluge 2007:62ff). One system had long-lived coins that were valid during the whole reign of the coin issuer. Sometimes, successors minted variants of the same coin type. These are called *immobilized types* and could be valid for very long periods – occasionally centuries – surviving through the reigns of several new rulers. The other system had short-lived coins that

¹ The reason for debasement is likely either to make a higher profit from minting or to deflate debt.

were only valid for specific intervals in the time frame of the issuer's reign.² In the latter system frequent re-coinage occurred. The geographical currency constraint and exchange monopoly were applied in both monetary systems.

The disciplines of archaeology and numismatics have been long familiar with the various systems of short-lived coinage that defined legal tender for almost 200 years in large parts of medieval Europe. Yet remarkably this form of economic life is seldom if ever analyzed in the literature of economics or economic history. Neither Braudel (1979), Sargent and Velde (2002) nor Edvinsson *et al.* (2010) even mention re-coinage in their books. No economic theory has ever been put forward aiming to explain re-coinage. *The purpose of the present study is to make up for this absence and articulate a simple theory that explains the system of short-lived coinage.* Some fundamental issues I analyze include what qualities typically characterize and differentiate those regions that chose different coinage systems, and how monetary systems with short-lived coins were monitored and enforced. Furthermore, I will discuss the possible economic consequences of re-coinage and how debasements are linked to the coinage system.

The paper is organized as follows. In section 2, I discuss how to identify re-coinage and describe the extension of short-lived coinage systems through time and space in medieval Europe. The theory and conditions of short-lived coinage system are outlined in section 3. The consequences of re-coinage are analyzed in section 4. The choice between re-coinage and coin debasement as a monetary tax is discussed in section 5. The final section delineates the conclusions.

2. Short-lived coinage systems through time and space

2.1 Medieval coins

A coin is a piece of hard material that is standardized in weight and fineness. An authority guarantees the weight and fineness with a hallmark. To work as *general purpose money*, coins must perform three basic functions: as a medium of exchange, a standard of value/unit of

² The term “feudal pennies” refers to a system where the coins are limited through time and space. In this system the right to mint is delegated to civil and ecclesiastical authorities. The term “regional coins” is widely used instead for a short-lived coinage system. But the term “regional” is misleading inasmuch as also long-lived coins had a geographical constraint and were regional. For example, the two-faced French coins minted by civil authorities between 900 and 1200 were only valid in small regions. The large difference between different medieval coinage systems is their validity measured over time.

account and a store of value. Generally, coins in medieval Europe did all three jobs adequately, in the main as commodity money, i.e. the face value was very close to the intrinsic value. Fiat money where the value is not determined by the raw material value, but by the issuer's credibility or economy, did not exist in pure form.³ If the weight or the fineness of commodity money declines, then the purchasing power of the coins to buy goods, services and assets also decreases. Precious metals (gold and silver) best fulfilled these requirements and were used as raw materials in medieval coins.⁴ During the main period of the Middle Ages (700–1300), silver was almost the only key raw material in European coins. This depended on the existence of silver mines with a high supply of silver.

The face value of the medieval coins in areas where the coins were legal tender was higher than their intrinsic value; normally minted metal had premium value over un-minted metal, a disparity for which there are two basic economic explanations:

- First, minted silver works better as a medium of exchange and standard of value than does un-minted silver. For almost everyone when doing daily transactions it is manifestly easier to count coins than to weigh silver and try somehow to check the fineness. People are thus generally willing to pay a premium to have their silver transformed into standard coins (Sussman 1993:55).
- Second, coins are a typically "network good". The individual value of holding coins increases the more people accepts the coins as a medium of exchange and a value of account (Dowd and Greenaway 1993:1180ff). The coins will then work better both as a medium of exchange and a standard of value. Hence the premium component is reinforced and tends to grow.

In practice it is the agents in the market who determine the level of this premium component that enables the coin issuing authority to make a profit (*gross seignorage*) from minting.⁵

In the Middle Ages the right to mint was not unlike the right to charge market customs and run mines, belonging to the *droit de régale*, i.e. the king/emperor possessed these rights. The

³ Fiat money has historically been "money by decree". Authorities have through legal tender laws forced people to accept the fiat money as a medium of exchange.

⁴ The precious metals: 1) exist in limited quantities, and are 2) well-known, 3) of stable value and 4) relatively soft and thereby easy to work up. The last characteristic implies coins cannot contain 100 percent gold or silver. Instead, these precious metals are mixed with zinc or copper – as the coins otherwise would be worn down in routine use.

⁵ *Gross seignorage* = *net seignorage* + production costs. In the Middle Ages, the *gross seignorage* could vary substantially across time; for example, in Sweden from 5 to 50 percent between 1300 and 1500 (Edvinsson *et al.* 2010:102). Production costs were around 5 percent (Sussman 1993:55).

coinage right encompassed the right to (Kluge 2007:52): 1) decide which coins are *legal tender*, i.e. which coins are legitimate and valid as a medium of exchange, 2) determine the monetary standard, including denomination, weight, fineness, diameter and relief (but not the design), 3) coin and determine design and 4) make a profit from minting.

The right to mint for a region and make a profit could be delegated, sold or pawned to other authorities (laymen, churchmen, citizens) for a limited or unlimited time period (Kluge 2007:53).⁶ In general, these authorities had to observe the king's guidelines for valid coins and the monetary standard, but there were exceptions.⁷ The most common reason to delegate the coinage right was that a bishop or layman founded a town and thereby financed the associated costs. But delegation could also be exchanged for loyalty against the king/emperor. The rights to mint and charge market customs were typically delegated together, since the coin issuer also had to control the market. The market custom was a fee for the craftsmen and merchants' goods brought to and sold in the town market. This fee's stated purpose was to support the market, but it was also important recurring revenue for the authority.

The size of the currency areas bounding the right to mint could vary substantially in the Middle Ages. In England, Sweden and Denmark, the king normally retained the coinage right and had a pure monopoly. Exceptions were some mints controlled by bishops. The whole of England was a single currency area, while Sweden and Denmark each had 2–3 areas. The currency areas in these countries were thus relatively large, each having several mints. In contrast, in France the minting right was delegated to many civil authorities and there were many small currency areas. Germany in the High Middle Ages was extremely decentralized politically with a weak emperor. One method the German emperor used to strengthen feudal loyalties was to delegate land; another was to delegate the rights to mint and charge market customs. Unlike in France, ecclesiastical authorities in Germany frequently received the coinage rights. The best examples of many small currency areas can be found in Germany and eastern Europe where a city (mint) with its surroundings could constitute a currency area.

⁶ Pawning of the coinage right means that the possessor of the minting right borrows money from an external person. As a pawn for the loan, the pledgee runs the mint for a specific period and receives the minting revenues as a payback of the loan.

⁷ For many regions in Germany in the 12th and 13th centuries an ecclesiastical mint decided the monetary standard.

2.2 Methods to identify coin renewals

From archaeology and numismatics there are several basic methods for identifying re-coinage. In Table 1, I have ranked the methods. The most confident way to identify re-coinage is through written documents that may contain explicit information about dates of re-coinage and/or exchange rates. However, for most currency areas and mints there are no written sources about recurrent re-coinage and other methods must be used.

By classifying different coin types as originating from a specific coin issuer and mint, it is relatively straightforward to establish whether re-coinage must have occurred. When and if there is only one type per reign, the coinage system is long-lived. However, in the event there are as many types as years of a specific reign and mint, this evidence indicates annual renewals. If the number of types exceeds (falls short of) the number of years, the renewals are more (less) frequent.

Table 1. Methods to identify short-lived and long-lived coinage systems

Method	Long-lived coins	Short-lived coins	Confidence of method
Written documents	-----	-----	Very strong
Coin types per reign and currency area	One	At least two	Strong
Coin types in hoards	One or a few from each mint	Many from each mint, but a few late dominate	Medium
Imitations of popular types	Often	Rare	Weak

A third method for identifying re-coinage involves carefully analyzing the concentration and distribution of types in coin hoards. Coin hoards from the Middle Ages may contain few or many issues from each mint represented in the hoard. If re-coinage has occurred, one would expect many types in the hoard from a specific mint, but a few types to strongly dominate the composition of the hoard. These types in such cases would be relatively young, while older types should have a more sparse representation. In those cases where there are several coin hoards from a specific coin issuer, one can expect types existing in many hoards to be older and types in a few hoards to be younger.

A fourth method to identify the coinage system involves recognizing the existence of imitations. Some long-lived coin types with high silver content were viewed as so stable that they were imitated by other minting authorities (Kluge 2007:69). This occurred to some extent in the Early (800–1000) and High Middle Ages (1000–1300), but became even more

common in the Late Middle Ages (1300–1500).⁸ Far less common were imitations of short-lived coins. This is easy to understand – a coin that only lives for just one year will neither be well-known nor regarded as stable by neighboring mints or regions. The rule of thumb is that the higher the frequency of re-coinage (assuming stable weight and fineness), the lower the probability of imitations. This fourth method is the weakest since many long-lived coins were never imitated.

2.3 Geographical extension of short-lived and long-lived coinage systems

A rich numismatic literature has emerged based on the above methods. There is a consensus in drawing conclusions about the extension through time and space of long-lived and short-lived coinage systems. Long-lived coins were common in northern Italy, France and Christian Spain in the period 900–1300 (see Map 1). This system spread to England when the *sterling* was introduced during the second half of the 12th century. Long-lived coins were valid during at least the whole reign of the coin issuer (Kluge 2007:62ff). In areas with long-lived coins the same type was produced in all mints of the currency area. Examples are the *denier tournois* in France and *sterling* in England. The mint was marked on the coin, either as details in the field (e.g. French royal coins) or in the legends (e.g. English sterling). In France in the 11th and 12th centuries long-lived coins and immobilized types dominated in most regions where the rights to mint were distributed to many civil authorities (Kluge 2007:143). It was not until the 13th century that the French king expanded his control over the coinage (Kluge 2007:136). In northern Italy, where towns took over the minting rights from the 12th century, long-lived coins likewise dominated.

The purpose of long-lived coins was to create a high acceptance for the issuer's coins – both inside and beyond his own currency area. The issuer hoped his coins would be perceived as so stable that neighboring areas would confidently accept them as means of payment. The coin issuer would thus gain a larger circulation area for his coins. With this expansion he could strike more coins and make a higher profit. The most important source of income for the minting authority in such a system was probably the monopoly over the exchange of foreign coins and bullion for current local ones (Kluge 2007:62–63).

⁸ Examples from the 10th and 11th centuries are Saxony-pennies in Magdeburg and Otto-Adelheid-pennies in Goslar. Also Carolingian types were imitated by French laymen during extended time frames in this period. Commonly imitated late medieval coins included the French *Gross Tournois*, the Sicilian *Gigliato*, the Prague *Groschen* and the German *Witten* and *Heller* (Kluge 2007:69).

In central, northern and eastern Europe in the period 1000–1300 short-lived coinage systems were the dominant monetary system. A well-known example is England at the end of the 10th and beginning of the 11th century, where re-coinage occurred every sixth year at an exchange rate of four old coins for three new ones. The *gross seignorage* was thus 25 percent every sixth year.⁹ For about a century after 1035 the English kings renewed their coinage every second or third year. However, these coins were valid throughout England, i.e. a large geographical area (Spufford 1988:92).

Map 1. Short-lived and long-lived coinage systems in Europe 1140–1300.



Note: Eastern Götaland, Sweden, changed from long-lived to short-lived coins ca. 1250.

⁹ England had a relatively large volume of coins in circulation. Therefore, the time period between re-coinage was correspondingly long.

The best examples of short-lived and geographically constrained coins can be found in Germany and eastern Europe where currency areas were relatively small. Eastern parts of France and western parts of Germany had re-coinage in the 11th and 12th centuries (Hess 2004:19–20). In central and eastern parts of Germany, re-coinage started in the middle of the 12th century and lasted until around 1300. Here, re-coinage was especially frequent in areas where uni-faced bracteates were minted;¹⁰ usually annually but sometimes twice a year (Kluge 2007:63). Austria had annual re-coinage until the end of the 14th century and Brandenburg until 1369 (Kluge 2007:119), and the Teutonic Order in Eastern Prussia every tenth year between 1237 and 1364 (Paszkievicz 2008:178). Individual German mints had annual renewals until the beginning of the 15th century (e.g. Brunswick until 1412) (Kluge 2007:105).

Sweden had coin renewals of bracteates in two of three currency areas (especially in Svealand and to some extent in western Götaland) for more than a century, from 1180–1290. This conclusion is supported by evidence of numerous coin types per period and the composition of coin hoards (Svensson 2012:208ff). The king of Denmark introduced frequent re-coinage (mostly annual) in two of three currency areas from the mid of the 12th century that continued for 200 years with some interruptions (Grinder-Hansen 2000:61ff). In Poland the king debased the coinage at the beginning of the 12th century. King Boleslaw (1102–38) started with irregular re-coinages – every third to seventh year, but later these became far more frequent. Like Germany, Poland had many currency areas and minting authorities. At the end of the 12th century renewals were annual, and in the 13th century they occurred twice a year. Bohemia also had re-coinage at least once per year in the 12th and 13th centuries.

As in England, the exchange fee in Germany in general was four old coins for three new ones, i.e. a *gross seignorage* of 25 percent. This can be seen at work at the mint in Magdeburg (12 old for 9 new coins). In Denmark the fee for people – three old coins for three new ones – was higher, 33 percent. The Teutonic Order in Prussia had a relatively generous exchange fee of seven old coins for six new ones (Svensson 2012:95).

¹⁰ Bracteates are thin uni-faced coins that were struck with only one die. A piece of soft material, such as leather or lead, was placed under the thin flan. Consequently, the design of the obverse can be seen as a mirror image on the reverse of the bracteates.

3. Conditions and enforcement of short-lived coinage systems

3.1 Conditions for re-coinage

In a short-lived coinage system, the minting authority in competition with other coin issuers tries to create a monopoly position for its coins. Legal tender laws stated that foreign coins were *ipso facto* invalid and to be exchanged for local current coins along with the payment of an exchange fee, the amount determined by the coin issuer (exchange monopoly). The frequency and exchange fee of the re-coinage could and did vary. Re-coinage normally occurred on a specific date. Afterwards, new local coins were strict legal tender in the city, i.e. use of older local or foreign coins was prohibited.

In both long-lived and short-lived coinage systems, the following conditions must be fulfilled:

- No foreign coins can be allowed to circulate (geographical currency constraint).
- The coin issuer has an exchange monopoly.
- The coin issuing authority must control both the local market and the coinage. This is facilitated if the rights to charge market customs and to mint are possessed by a single authority, which in medieval Europe normally was the case (Kluge 2007:63).

For a short-lived coinage system to work there are some further conditions:

- Only one local coin type can be considered current. Exceptions were possible if more than one coin issuer had the right to mint in a currency area.
- Coin types representing various issues must have clearly visible markers differentiating them so people can easily distinguish between valid and invalid types.
- To manage completing re-minting in a currency area on a timely basis, an essential requirement is that the volume of coins in circulation is limited (Spufford 1988:94). This is a key factor.

The basic similarities and differences between regions that chose short-lived and long-lived coinage systems are shown in Table 2. A common characteristic for cities and regions where the short-lived coinage system was in force is that the local economy was relatively undeveloped (Spufford 1988:104). The historical records suggest it was often cities and regions with limited experience of coinage and local markets that started with re-coinage. In the High Middle Ages, these cities and regions could be found in the central, eastern and

northern parts of Europe (see Map 1 in section 2.3). Limited experience of coinage is also indirect evidence of a low division of labor, a low specialization of households and limited experience of local markets.

There are several explanations of why re-coinage works particularly well in relatively undeveloped economies. Such economies had a small volume of coins in circulation, which facilitates re-minting. Furthermore, there tend to be few places where coins are used for transactions and few groups in society who use the coins, i.e. low monetization. These two factors facilitate close monitoring of the coinage.

Re-coinage is also facilitated by small currency areas that make it easier to monitor the coin circulation. Above all, a weak central power and strong civil and ecclesiastical authorities favoured short-lived coins. The best examples of short-lived and geographically constrained coins can be found in Germany and eastern Europe where currency areas were relatively small (see section 2.1).

Table 2. Similarities and differences between long-lived and short-lived coinage systems

Characteristics	Long-lived coins	Short-lived coins
Geographical constraint (foreign coins non-valid)	Yes	Yes
Exchange monopoly	Yes	Yes
Profit of the coin issuer	Minting of bullion (<i>gross seignorage</i>)	Yes
	Re-minting of foreign coins (<i>gross seignorage</i>)	Yes
	Re-coinage and issues (exchange fee)	Only when shift of issuer
	Debasements of weight and fineness	Often
Number of coin types (same denomination) circulating simultaneous in a given currency area	One or few	One
Volume of coins circulating in the economy	Large	Small
Relative development of the economy	High	Low
Geographical area	Large or small	Preferably small
Number of mints in <i>large</i> currency areas	Few	Many

A general characteristic of large currency areas is that a system with short-lived coinage requires many mints and places of exchange, whereas a system with long-lived coinage needs but a few mints. When the volume of coins increases in a short-lived system, there is often a transition to a long-lived coinage that makes it possible to utilize scale economies and the division of labour in coin production (Spufford 1988:87, 202). This transformation allows

coining to be concentrated and centralized in selective key mints. The exemplary case is no doubt England. Around the millennium when England had short-lived coinage there were around 70 mints. However, by the 13th century when England had long-lived coinage there were only two principal mints (London and Canterbury) left along with a very few others that were temporary and minor. The volume of minting was much larger in the latter period.

The systems with short-lived coins typically only applied to a limited area such as a town or region. In Germany, the city-border demarcated the area that included the jurisdiction of the city. Therefore, the right to coin and the right to charge market customs in effect were closely intertwined. The use of foreign and retired local coins at the city's markets was forbidden. The geographical currency constraint was not limited to the city markets, but rather applied to the whole area within the city-border (Hess 2004:16).¹¹ A document from Erfurt (1248/51) shows that only current local coins could be used for transactions in the town, while retired local ones as well as foreign coins were allowed for transactions outside the city-border (Hess 2004:16). In 1231 the German king Henry VII (1222–35) published an edict in Worms stating that in towns in Saxony with their own mints goods could not be exchanged for anything other than the coins from the local mint. Those discovered using foreign coins (i.e. coins from other cities/regions) were henceforth to be regarded as engaged in counterfeiting (Mehl 2011:33). However, when this edict was published, the system with coins constrained through time and space had been in force for a century in large parts of Germany.

3.2 Efficiency of renewals

The coin hoards discovered to date can tell us a great deal about the efficiency of re-coinage. Hoards in Germany from this period (1100–1300) may contain many different issues of the local coinage, as well as many issues of foreign coinage, i.e. locally invalid coins (Haupt 1974:29, 32).¹² One common sense interpretation of these hoards would be that short-lived coinage systems were not as strict as previously assumed. However, this can only be true in exceptional cases. In practice systematic re-coinage must have been lucrative sources of revenue for minting authorities which they would have struggled to retain. The critical importance of these minting revenues is underscored by the value of pawned minting rights

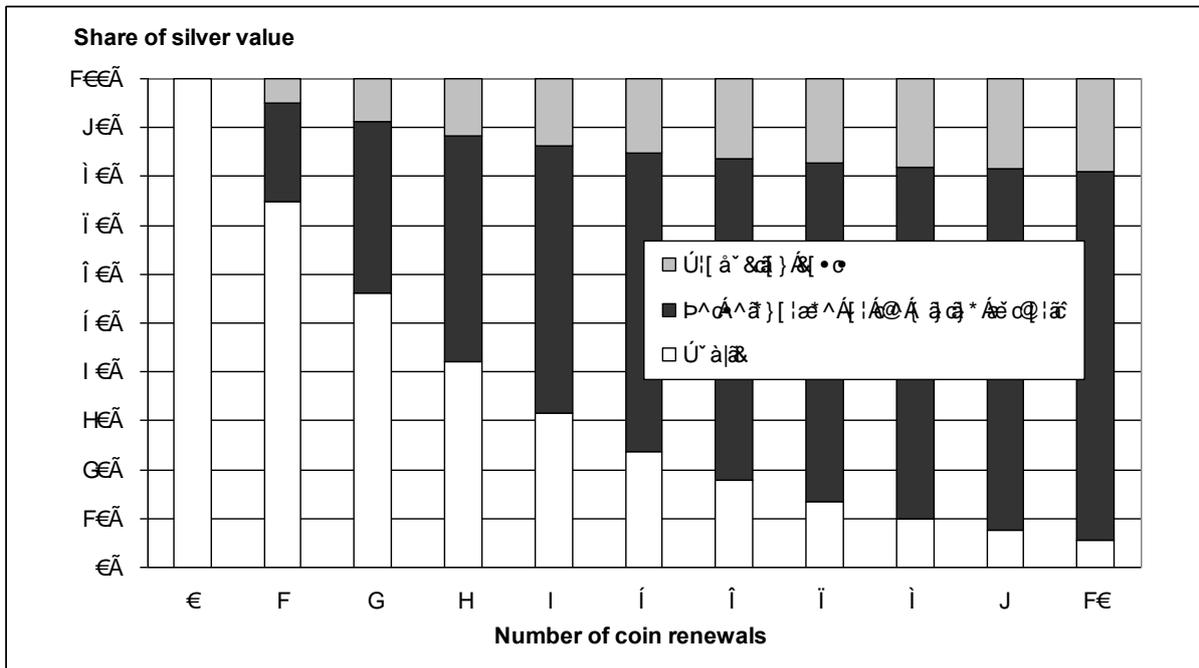
¹¹ This state of affairs is well documented in an 1188 letter from emperor Friedrich I (1152–90) to the bishop of Merseburg (Thuringia) regarding an extension of the city. The document plainly states that the market area boundary includes the whole city, and not just the physical marketplaces (Hess 2004:16).

¹² The coin hoards can either be categorized as *cross-regional hoards* or *local hoards*. The former hoards contain coins from different regions, while the latter are dominated by coins belonging to the same monetary standard. Very often, the German hoards are local (Gaettens 1963:12ff).

(Nau 1977:92) and the severe penalties for counterfeiting. Both together speak volumes about the value of minting (Nathorst-Böös 1973:51ff).

A more obvious interpretation of the mixed hoards is that people found it advantageous not to exchange invalid coins. Bearing the high exchange fees in mind, people may well have exchanged only as many coins as was absolutely necessary in the conduct of their affairs in the cash nexus of the town marketplace. If there was no immediate need to use coins for transactions, there would evolve a habitual reluctance to exchange them at every new issue. Irrespective of the age of the old coins, they possessed a constant intrinsic silver value. By skipping some coin renewals and saving their retired coins, people could accumulate silver. If the exchange fee, for example, is four old coins for three new ones and the owner exchanges all his coins at each renewal date, then after just five renewals he has just 24 percent of the coins left.¹³ How much silver the public keeps after a different number of coin renewals is illustrated in Figure 1.¹⁴

Figure 1. Distribution of silver value after recurrent coin renewals. Percent.



Note: Gross seignorage is 25 percent (i.e. four old for three new coins), net seignorage is 20 percent and production costs are 5 percent. The diagram assumes 100 percent compliance and that all coins are re-minted.

¹³ This percentage is calculated according to the formula $0.75^5 = 0.237$.

¹⁴ The figure is based on the assumption that the minting authority keeps his net seignorage. However, if he spends its net seignorage on wages, goods and services, his silver share will presumably be held constant in the long run.

3.3 Monitoring and enforcement

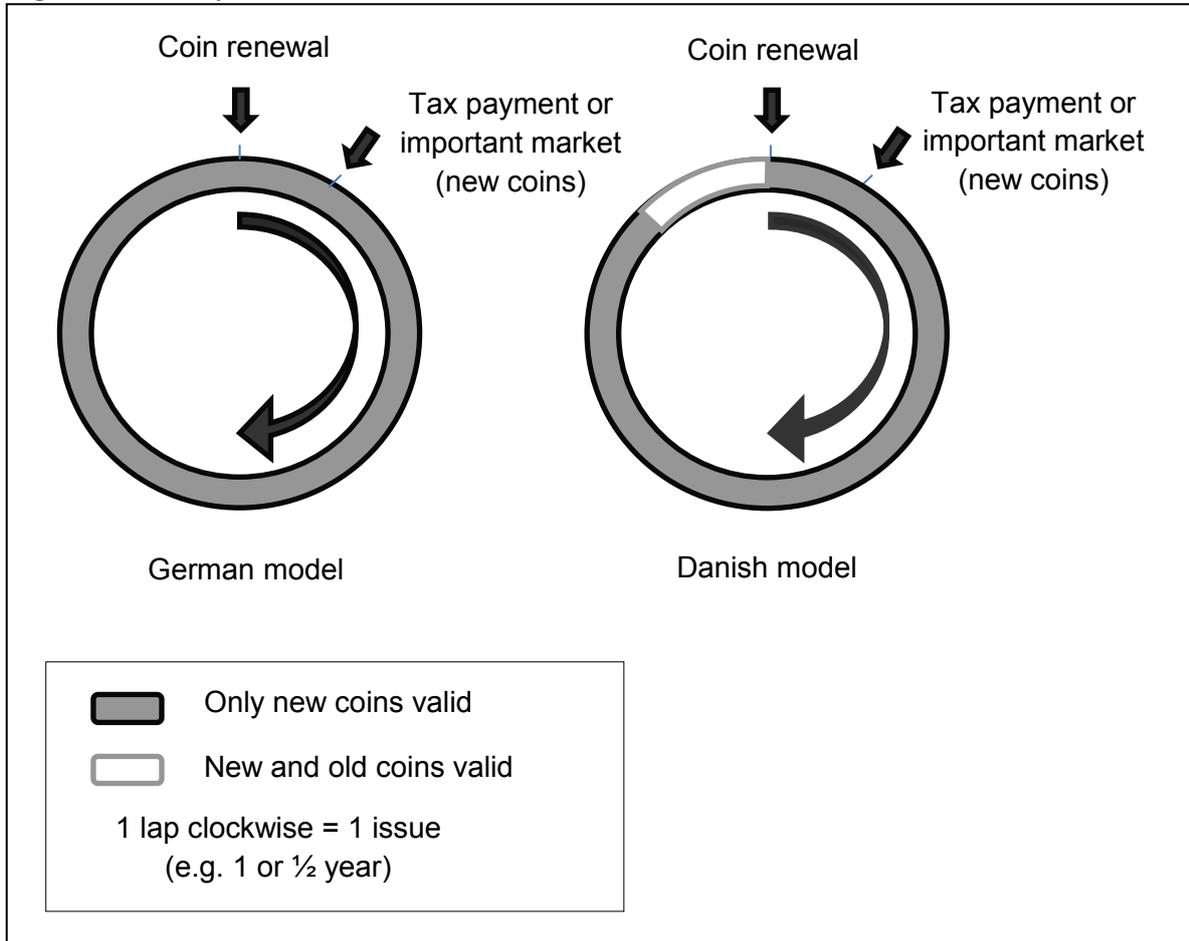
Monetization is low when there are few coins in circulation and places where they are used, and presumably few groups in society who use coins. Consequently the minting authority will find it easier to monitor and enforce re-coinage. On the other hand, in a fully monetized society it becomes difficult to directly monitor the coin circulation and undertake re-coinage.

In the city markets it is probable that the local minting authority managed to control the usage of current coins, being routinely assisted by exchangers and monitors. However, outside the city borders it must have been practically impossible to know whether invalid coins were being used for transactions – especially if it was a large sum changing hands. Unsurprisingly, in Germany the currency constraint only applied within the city borders. When the currency area included large regions of a state (e.g. Denmark) or whole states (e.g. England), it is impossible to determine from documents or other sources whether the currency constraint and re-coinage exclusively applied to the city markets or rather to the entire country/region, including the vast countryside and hinterlands. However, such large currency areas had many places where people could exchange old coins for new ones (Grinder-Hansen 2000:80), see section 3.1.

It was not the possession of invalid coins, but rather the usage that was deemed illegal and penalized. One can read in Freiberg's (Saxony) city laws from 1305 that neither the mint master nor the judge was allowed to enter homes and search for invalid coins (Haupt 1974:29). This prohibition sharply contrasts with use of force regarding re-coinage, where just 14 days after the issue of a new coinage the mint master had the right to seize and meltdown older coins that he found in the market (Hess 2004:16). The same city laws state that if an inhabitant used foreign coins for transactions and was detected, the penalty was as high as 60 shillings (720 pennies). A foreigner who did the same did not have to pay fines, but his coins were exchanged by force for their intrinsic value, which was always lower than the face value. Neither inhabitant nor foreigners who used invalid older local coins had to pay fines, but the mint master melted down their coins and then returned the silver (Haupt 1974:29). Thus the penalties for inhabitants/citizens were more severe when using foreign coins rather than invalid local ones. This differential sanction may at least in part help explain why for this period in many hoards older local coins are more frequent than foreign ones. Denmark had severe penalties for paying with invalid coins in the market – the offender not only lost those

coins he had used, but all the coins he had at the time in his possession (Grinder-Hansen 2000:69).

Figure 2. Life-cycle for short-lived coins.



However, the coin issuing authority could use an economic trick to make the re-coinage more efficient. By designating the date of re-coinage to be just prior to an important monetary event, the number of invalid coins exchanged for new ones could be substantially increased (see Figure 2). For example, the date of an important tax or fee must be paid to the king or the church could be designated shortly after the re-coinage date. This arrangement of course meant that taxes were then paid with new coins. This was the case in Denmark (Grinder-Hansen 2000:69).¹⁵ Another logical alternative was to designate the date of re-coinage in connection to an important annual market in the city, which was common in Germany (Svensson 2012:93). This juxtaposition guaranteed strong demand for new coins. The market custom would hit the sellers in the market, whereas the buyers had to pay the exchange fee.

¹⁵ To undertake re-coinage *after* such a tax payment would not be very clever. The coin issuer would then himself own those old coins that were subject to re-minting, substantially diminishing revenues from renewals.

The minting authority could also indirectly control the coin circulation in an area. Fees, rents and fines were to be paid with current coins, apart from traditional situations where payment in kind was possible. This was probably a more efficient and reliable way to enforce re-coinage and to monitor the coin circulation than having exchangers and other staff be involved in the daily traffic of goods and services in the market. In Denmark people had to pay taxes and fees with current coins. If a sheriff or other administrator accepted taxes or fees in invalid coins he was penalized 40 Mark (Grinder-Hansen 2000:69). In Cologne interest payments were to be paid with current coins, as documented in a judicial decision (Hess 2004:19).

In the vast archival (German) numismatic research literature it has been assumed that in a short-lived coinage system the new local coins are the only legal tender in the market during a specific life-cycle (see left part of Figure 2). At the end of the year when a new coin is introduced, the old coins could never be used again in the market. However, a written document from Denmark tells another story. During the last six weeks of the coin year, older coins could be used in the market (see right part of Figure 2). The likely reason was the king did not want older coins to be melted down or hoarded, but instead be used in the market where they would gradually be exchanged for new ones at the mint. During such a smooth transition, the king would be able to make a higher profit (Grinder-Hansen 2000:67ff). On the other hand, a countervailing consequence was that people then presumably had stronger incentives to save old coins, hoping to use them during the last six weeks of the next year. There were thus two contrary effects, and the net effect is unclear. Whether old local coins could be used as means of payment at the end of the year as well in other areas with short-lived coins is unknown, but this possibility cannot be excluded.

3.4 Break-down of the short-lived coinage system

The system with short-lived coins and recurrent issues continued in Germany until the end of the 13th or beginning of the 14th century. The decline of the short-lived coins depended on developing economies, growing cities and increased local and inter-regional trade. It was not uncommon that citizens paid a fee to escape re-coinage (see section 4.2). Another reason was that a growing number of peasants paid rents and taxes in coins to their landlords and kings, rather than in kind or in services. This general evolution from a *gemeinschaft* to a *gesellschaft* culture required more coins in circulation, progressively making short-lived coins with

geographical constraints impractical (Haupt 1974:59–60). There was neither sufficient time to re-mint all the circulating coins nor the capacity to monitor the increased volume of coins in circulation. Finally, and this of course typifies the burgeoning prosperity of a society undergoing urbanization, there was a rapid expansion in the use of coins with higher denominations and without regional constraints, e.g. *Schilling, Heller, Groschen, Goldgulden, Ducats*. These coins often crowded out local coins and were used more and more in international trade. These factors all blended together and made it near impossible for abbeyes and laymen to hold on to their local coin monopolies.

The Heller was the two-faced coin type that caused a decline of bracteates and other short-lived coins in southern and central Germany. The most notable attributes of the Heller, first struck in the imperial mint Hall in Swabia, were the enormous volume minted and far lower fineness (50 percent) than the bracteates. In the period 1225–50 it had trespassed upon other currency areas in southern Germany – both where two-faced coins from Worms, Speyer, Mainz, Tübingen and Würzburg were the current coins and in part where bracteates from the Bodensee region, eastern Swabia and southern Hessen were the current ones. Gradually, Nuremberg took over the mass striking of the Heller. It became a kind of national coin type without any domestic geographical constraints (Nau 1977:97).

4. Consequences

It is hard to empirically estimate the economic consequences of re-coinage. The main reason is that data on e.g. prices, number of transactions and velocity of money from the Middle Ages is lacking. However, the coins themselves in terms of design, weight and fineness as well as written documents tell us something about the consequences.

4.1 Functions of coins

The chief negative consequence of frequent re-coinage was that the traditional function of money as a store of value deteriorated. People had little incentive to save their current coins. If old invalid coins were *always* exchanged for their intrinsic value irrespective of age, they could still work as a store of value. In that case the age of old invalid coins would not matter since they always had their intrinsic silver value. If re-coinage was undertaken in combination with debasements (fineness), then people had incentives to hoard old coins with higher fineness (Gresham's law). This could explain why coin types from older issues are commonly found in hoards.

Let us look closer at what could happen with, the volume of coins in the economy (M), the velocity of money (V), the price level (P) and the volume of transactions (T) when the date of renewal approaches. We turn to the formalism of the equation of exchange (Bordo 1987:75ff):

$$M \times V = P \times T \quad .$$

This formula must always be correct. The right-hand side, $P \times T$, indicates the value of all transactions made with the coins. In the case of renewals, M is the same before and after re-coinage – the exchange fee meaning that some coins earlier belonging to people are now possessed by the coin issuer. *Thus, re-coinage did not cause long-term inflation.*

Nevertheless, it is not implausible that when the date of re-coinage approached people wanted to spend their money, since nobody wanted to pay an extra tax (exchange fee). Thus, V should increase, i.e. the left-hand side acquires a higher value, and the right-hand side then also has to increase. A likely outcome is that P increase more or less to the same degree. The alternative is that P and T both increase so that the equation holds. V , P and T could then increase slowly during the whole life-cycle of a current coin type, and should return to normal levels after the renewal date. The intrinsic silver value of the coins and the *gross seignorage* set the limits to how high or low prices can temporarily fluctuate (Sargent and Velde 2002).

That being said, there were always extenuating circumstances that determined the range of valuation. For example, there was the commonplace situation in which some people in society had no choice but to exchange their expired coins for new ones (see section 3.3). This could be the case if an important tax payment was set after the renewal, or if the renewal occurred in connection with an important annual market. The effects on V , P and T should then be smaller when the date of re-coinage approaches.

4.2 Tax for ordinary people and inhibited trade

The exchange fee was in principle a value-added tax on coins, but it was only applied at the date of re-coinage. This can be compared to the value-added tax of today (often 10–25 percent of the net price), which has to be paid every time *new* produced goods or services are sold. The fact that foreign tradesmen when travelling had to constantly exchange their coins and bullion to do business must have had a negative impact on both trade and business.

The exchange fees at re-coinage fell particularly hard on common people and small-scale trading, since large-scale trading and the trade-houses legally used silver ingots for larger transactions (Haupt 1974:32). Pennies and other small coins were of course impractical for large transactions. If coins were used for larger transactions, they were weighed rather than counted (Gaettens 1963:13). Weighing of large sums cannot have been a problem as long as the coins had a uniform silver fineness. Written documents in medieval Germany normally refer to larger payments and treaties in terms of silver ingots or bullion rather than coins. They are almost always mentioned as the means of payment or standard of value. But coins are also mentioned in such documents for smaller transactions (Buck *et al.* 1995:28).

There was a contradiction for the market and minting authority to tax trade and common people via renewals. This method created larger revenues for the ruler in feudal society, but detrimental for trade, business, local markets and division of labour. Economic activity was thereby normally inhibited in the region with such renewals. This was probably the reason why at the close of the 13th century some minting authorities chose to give priority to trade and growth rather than re-coinage.

Both re-coinage and debasements created discontent among inhabitants, tradesmen and other groups. When trade increased at the end of the 13th century, the pressure on short-lived coins from inter-regional coins increased. In this context the minting authorities often signed treaties that promised to preserve a stable value of the coinage in exchange for other taxes. This effort to defend the coinage had already emerged in 12th century France. The written sources are rare, but it is telling that the new taxes are called the same name as the minting tax – *monetarium* (Bisson 1979, Grindler-Hansen 2000:52).¹⁶

The coin issuing authority could also prolong the validity of the coins against a fee. Written documents from southern Germany show that the citizens in some towns could pay a fee to stop re-coinage.¹⁷ Another example is Denmark where King Valdemar II Sejr (1202–41)

¹⁶ In Erfurt, a document from 1341 shows that the archbishop was not allowed to change the coinage without permission from the citizens. Instead, the bishop would receive a tax which the document calls *monetarium* (Mäkeler 2010:35).

¹⁷ A couple of documents have been preserved from Augsburg (eastern Swabia) where Bishop Hartmann von Dillingen (1248–84) promised in 1272 not to change the coinage for three years for a fee. In 1277 he pawned the minting right for four years to the citizens for a fee of 80 pounds of silver. During this period, the coins (bracteates) were to be struck with the same design and dies. In 1284, the bishop promised once again not to

introduced a plough tax ca. 1234 in exchange for a stable coinage. The plough tax disappeared after 20 years and the coinage again became unstable (Grinder-Hansen 2000:64ff). Mäkeler (2010:37) claims that this period (the 13th and 14th centuries) in Europe is characterized by a dramatic change, from an approach claiming the coinage belonged to the ruler to one where it belonged to society. The philosopher Nicole Oresme in the 1350s argued that the king's control of the coinage was a duty rather than a right; their duty was to strike and maintain coins with a good intrinsic value (Estrup 1966:98ff).

5. The choice between re-coinage and debasements as a monetary tax

In the Middle Ages there were two main methods (besides re-minting of foreign coins and bullion) to use the coinage as a monetary tax: re-coinage and debasement. Re-coinage always occurs in a short-lived coinage system, but never in a long-lived system. Debasement can occur in all coinage systems. Thus, re-coinage and debasement are not mutually exclusive and can be applied simultaneously. For example, this was the case in Denmark during a civil war between 1260 and 1340 (Grinder-Hansen 2000).

5.1 Empirical observations

The minting authority in systems with long-lived coins normally had limited revenues, since a *gross seignorage* could only be charged when foreign coins were re-minted or people brought their bullion to the mint. On the other hand, in a system with short-lived coins the issuer stood to earn much more due to the additional revenues from the frequent renewals. Therefore, it is hardly surprising that coin debasements in terms of lower weight and fineness occurred primarily in regions with long-lived coins (Kluge 2007:64). In particular, both Spain and Italy are well-known for their debased medieval coins with lower weight and fineness than those of northern Europe. In England and the German mint Cologne, pennies weighed 1.4 g and had a fineness of 92 percent in the middle of the 12th century. This sharply contrasts with the Spanish pennies (*dinero*) that had a weight of 0.62 g and were 20 percent silver and the Italian pennies (*denaro*) with ca. 0.60 g and 50 percent silver.¹⁸ Debasements also explain why

change the coins (bracteates) – with respect to design, weight, fineness and size – for four years, in exchange for 90 pounds of silver from the citizens (Steinhilber 1955:42–43). In 1295 in the city of Konstanz (Bodensee) citizens paid a fee to be spared from re-coinage for 10 years (Cahn 1911:286).

¹⁸ It is fair to read from all the evidence in the historical record that the frequently re-minted German coins had a higher fineness than the long-lived coins in southern Europe. Given this state of affairs, the German coins became popular abroad and are often found in coin hoards in northern, eastern and southern Europe. The relatively low silver fineness of coins from southern Europe diminished their popularity abroad. They are only very seldom found in German hoards. At most they are found as singular specimens in burial finds (Nau 1977:88).

France (*Gross Tournois*), Italy (*Grossi*) and Spain (*Maravedi, Croat, Cornado*) earlier introduced coins with higher denominations than the penny (Kluge 2007:64).

For many regions of Germany as long as re-coinage occurred the silver fineness was sustained at a high level of at least 90 percent until the mid or end of the 13th century (see Appendix Table A1). In southern Hessen around 1230 the fineness was 943/1000 (15/16), and around 1270 still 900/1000 when the striking of bracteates came to an end (Hävernack 1936:20). Frequent re-coinage gave the issuer sufficient revenues so that debasements were unnecessary.

Table 3. Weight and fineness of north-German bracteates 1225-1492.

Year	Silver fineness (16 parts)	Gross weight (g)	Net weight silver (g)	Comments / main coin type
1225	15	0.57–0.56	0.54–0.53	
1255	15½	0.501	0.474	Monetary convention
1293	15½	0.487	0.470	
1304	14	0.469	0.410	
1325	14	0.469	0.410	
1350	13¼	0.405	0.335	
1373	----	0.405	----	Uncertain information / Witten
1392	9	0.418	0.235	Dreiling and Sechsling
1398	9	0.405	0.227	
1403	9	0.405	0.227	Witten
1406	9	0.405	0.227	
1422	8	0.340	0.170	Sechsling
1424	7¼	0.336	0.152	
1432	7	0.314	0.137	Schilling
1433	6½	0.304	0.124	
1492	6	0.270	0.101	Double schilling (since 1468)

Source: Jesse (1967:209).

Table 3 shows the development between 1225 and 1492 of the gross weight and the fineness for bracteates in northern Lower Saxony and Holstein. The theory's predictive power is verified by the fact that the fineness was constant until the end of the 13th century when the mints still had relatively frequent coin renewals. It is not until the 14th century, and especially following the introduction of higher denominations (Witten and Dreiling), that the fineness, gross weight and net weight all decreased.

5.2 Theoretical considerations of the choice

It was emphasized earlier (section 3.1) that re-coinage is only compatible with low monetization and limited economic development, whereas debasements can be applied

irrespective of whether the monetization is low or high. Practically, debasements were mostly used when monetization was high and in long-lived coinage systems (see section 5.1).

Both debasements and re-coinage aimed at increasing the profit of minting, but re-coinage had publically announced fixed exchange fees and dates, whereas debasements were undertaken in secret. The absence of transparency in the case of debasements created a higher uncertainty and on occasion could cause the entire coinage system to break down. However, the clear advantage for the coin issuer was that debasements had lower administrative costs. In general, debasement was a much more efficient way to collect a monetary tax. Of course the costs for the whole society could be higher.

Table 4. Re-coinage and debasement as a monetary tax.

Characteristics		Monetary tax	
		Re-coinage	Debasement
Monetary service		Medium of exchange and standard of value	Medium of exchange and standard of value
Monetization / economic development	Theoretically	Low	Low or high
	Empirically	Low	High
Uncertainty		Low	High
Risk of break down of monetary system		No	Yes
Administration costs for coin issuer		High	Low
Legal tender laws		Different face values for coins with the same intrinsic values	Same face values for coins with different intrinsic values
Old coins disappear from circulation through		Administrative re-minting at the mint	Melting down or hoarding through Gresham's law

A specific characteristic of re-coinage is that the issuer through legal tender laws tries to create different face values for coins with the same intrinsic value (old and new local coins). For transactions *new* coins *have to* be used exclusively. In the case of debasements, it is the other way around; legal tender laws instead state that coins with different intrinsic values should have the same face value. New (debased) coins *may* be used for transactions and should have the same face value as older ones. A system with re-coinage is thus inherently more restrictive and costly to run for the coin issuer.

Given these critical liabilities, it is puzzling why so many minting authorities in the High Middle Ages used re-coinage in areas with low monetization when they could have used the more efficient debasements to collect monetary taxes. To be sure, the church probably played

an important role. In the Holy Bible there are numerous prohibitions against manipulation of weights and fineness, and it was at this time that the Catholic Church had its strongest political and economic position (Woods 2002). Many ecclesiastical coin issuers (bishops, abbey, abbesses) had powerful positions in Germany and north-eastern Europe (see section 2.1). Furthermore, ecclesiastical issuers were dominant among those who applied re-coinage. Re-minting of coins with unchanged weight and fineness was not seen to conflict with the rules from the Holy Bible. When royal and civil authorities progressively took over the minting rights in the late middle Ages, the sway of ecclesiastical rules was considerably narrowed. Subsequently the more efficient debasements were applied.

It is interesting to note that old coins will be driven out of circulation irrespective of whether re-coinage or debasement is used as a monetary tax. In the former case, administrative re-minting will cause old coins to be melted down. In the latter case, Gresham's Law – where bad coins crowd out good ones – will likely cause older coins with higher fineness to be hoarded or melted down privately, and thereby be withdrawn from circulation. From this point of view, re-coinage is a more costly and less efficient monetary tax.

However, it is not certain that Gresham's Law was in force when debasement occurred. By valuing good coins at a premium it became possible for them to return into circulation as a stable currency. Attempts from the ruler by legal tender laws to require people to accept good and bad coins at their same face value could not prevent tradesmen from selling goods at a lower price for "good money" (Rolnick and Weber 1986:193).¹⁹ Rolnick and Weber (1986:186) argue that Gresham's Law will be in effect if there are substantial transaction costs to value good coins at a premium. If such overhead is low, bad coins will never drive out good ones. If this was not possible, good coins would be universally hoarded and withdrawn from circulation (Gresham's Law).

6. Conclusions

In a short-lived coinage system, old coins are declared invalid and exchanged for new ones at publically announced exchange rates and dates. An exchange fee is charged as a way to tax trade and inhabitants. Empirical observations show that re-coinage could occur as often as

¹⁹ The use of cash makes it easier than when using credit or promissory notes to circumvent the legal tender laws and avoid Gresham's law.

twice a year within a currency area in the Middle Ages. In contrast, a long-lived coinage system implies that the coins were valid at least for the entire duration of the reign of the coin issuer. I have presented methods to identify different coinage systems within these ideal types. Long-lived coins were common in western and southern Europe in the High Middle Ages, whereas, short-lived coins dominated in central, northern and eastern Europe. Although the short-lived coinage system defined legal tender for almost 200 years in large parts of medieval Europe, it has seldom if ever been mentioned or analyzed in the economic literature.

The main purpose of this study has been to set up for the first time a simple theory about, and basic conditions for, short-lived coinage systems. Both short-lived and long-lived coinage systems require a geographical currency constraint (foreign coins are invalid) and an exchange monopoly. In a short-lived coinage system, only one type may circulate in the currency area, and different types reflecting various issues need to be clearly distinguishable for the everyday users of the coins. Furthermore, it turns out that re-coinage works particularly well in relatively undeveloped economies. Such economies have a small volume of coins circulating which facilitates re-minting. There are also few places where coins are used for transactions and few groups in society who use coins, i.e. low monetization. These conditions facilitate monitoring and enforcement of the coinage system.

Typically a short-lived coinage system with only local new coins as legal tender was enforced only within a city's borders, and any coins could be used outside the city. The coin issuing authority had several methods to monitor and enforce the re-coinage. First, they had exchangers and other administrators at the city markets. Second, the re-coinage date was often designated just prior to an important annual market or payment date of an annual tax. Third, payment of any fees, taxes, rents, tithes or fines had to be made in new coins.

Re-coinage had both positive and negative economic consequences. First, it prevented long-term inflation, since the number of coins (and amount of silver) was the same after as before the re-coinage. Short-lived coins are associated with a stable coinage with respect to weight and fineness, evidenced by the coins themselves. Secondly, short-term disturbances should have occurred in the velocity of money, price level and number of transactions when the coinage date approached, since people did not want to pay the exchange fee. However, these effects were diminished if some people in society had to exchange their expired coins for new ones. This could be the case if an important monetary event, such as an annual tax payment or

market, was designated after the re-coinage. Thirdly, the coins' function as a store of value deteriorated. Finally, re-coinage as a monetary tax stymied economic activities such as trade and business, evidenced by complaints in written documents.

Re-coinage and coin debasement are not mutually exclusive as monetary taxes. Whereas re-coinage always occurred in short-lived coinage systems, empirical evidence shows that debasement mostly occurred in long-lived systems, where the issuer's revenue from minting was limited. Both types of monetary taxes will cause old coins to be driven out of circulation, either through administrative re-minting (re-coinage) or due to Gresham's Law (debasement). However, debasement is a more efficient monetary tax for the issuer, since it is less costly to enforce. The reason why many minting authorities nevertheless chose re-coinage before debasement in areas with low monetization can probably be best explained by the superior position of ecclesiastical coin issuers, and who invoked the numerous prohibitions of manipulation of weights and fineness contained in the Holy Bible. However, the costs for society as a whole could be higher for debasements than re-coinage, since the former tax occurs in secret and results in acute uncertainty.

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Appendix

Table A1. Silver fineness in German bracteates with different monetary standards 1140–1295.

Monetary standard/region	Year	Silver fineness	Hoard/method
	ca. 1225	93.8%	Hoard Bokel
Northern Lower Saxony	1255	96.9%	Monetary treaty
	1293	96.9%	-----
Southern Lower Saxony	1200	91.8%	Hoard Mödesse II
	1260	88.7–92.5%	Hoard Hildesheim
Thuringia	ca. 1150	93.8%	Hoard Gotha
	ca. 1200	91.5%	Hoard Seega
Saxony	ca. 1300–10	88.7–90.3%	Hoard Cröbern
Northern Hessen	ca. 1290	87.3–91.4%	Hoard Marburg
	1230	94.3%	
Southern Hessen	1270	90.0%	-----
	1230	91.3%	Test of fineness
Bodensee region	1240	98.4%	Monetary treaty
	1240	97.6%	Hoard Überlingen
Eastern Swabia	ca. 1200	ca. 92.8%	Hoard Wollishausen
	ca. 1250	85.0–92.7%	Hoard Füssener

Source: Svensson 2012:104.