

Periodic recoinage as a monetary tax: conditions for the rise and fall of the bracteate economy[†]

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Scholars in the fields of archaeology and numismatics have long been familiar with the phenomenon of periodic recoinage (*renovatio monetae*), which dominated monetary taxation in medieval Europe for almost 200 years. However, this form of monetary taxation is seldom, if ever, discussed in the literature of economics or economic history. No economic theory has ever been proposed to explain periodic recoinage. The present study aims to make up for this absence. It examines the qualities that typically differentiate regions with periodic recoinage from those with other monetary systems and analyses how periodic recoinage was monitored and enforced. The principal example of frequently renewed coins is uni-faced bracteates, which were often subject to annual or even biannual recoinages. Although bracteates were not the cause of periodic recoinage, their features facilitated frequent renewals. The study discusses the economic consequences of periodic recoinage and links the breakdown of this monetary system with the end of bracteates' role as the principal coin in the fourteenth century.

In the middle ages, there were numerous religious prohibitions against charging interest or otherwise earning unmotivated profits, but these rules did not prevent the authorities from utilizing coinage and other institutions for their own pecuniary purposes.¹ One goal of the minting authorities 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.² Therefore, laws typically stated that foreign coins and bullion were precluded from circulation and were to be exchanged for current coins at the mints.³ Here, the minting authority had an exchange monopoly and could thereby charge a gross seigniorage.⁴

However, other revenues were derived from minting, and a well-known fiscal policy was to manipulate the weight and fineness of coins. Such debasements often

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¹ Wood, *Medieval economic thought*, ch. 4.

² There are also other reasons for issuing coins, for example, to increase the prestige of the ruler and to use the design of the coins as a marketing platform for the ruler; Bolton, *Money*, p. 20. Another important reason for coining is to decrease transaction costs in economic life; see below, section I(i).

³ Kluge, *Numismatik*, pp. 62–3.

⁴ Gross seigniorage = net seigniorage + production costs.

occurred in times of war or epidemics, when finances were volatile and in disarray.⁵ Profits from debasements were partly based on secrecy and asymmetric information about the fineness on the part of the coin issuer vis-à-vis the public. Thus, there were large transaction costs for people to detect debasements of fineness. Profits were also based on increased reminting.⁶ However, debasement could also occur through monetary issues; for example, when there was an excess demand for money and a shortage of bullion, or to counter Gresham's law when old coins became worn or defective.⁷

From the vantage point of today's economists, a less well-known minting policy was periodic recoinage, also known as coin renewals or *renovatio monetae*, when old coins were declared invalid and exchanged for new ones at publicly announced exchange rates and dates. Empirical evidence shows that periodic recoinage was the dominant monetary taxation method for almost 200 years in large parts of medieval Europe.⁸ An exchange fee was charged as a way to tax trade and inhabitants. Recoinage could occur twice per year, and a common exchange fee was four old coins for three new ones.⁹ In practice, periodic recoinage in the middle ages was implemented by changing the main design when reminting the coins, whereas the monetary standard of the coinage (weight, fineness, diameter, shape of the flan) largely remained unchanged.¹⁰ Thereby, it was easy for the users of the coins to distinguish between valid and non-valid types.¹¹

The disciplines of archaeology and numismatics have long been familiar with periodic recoinage. Remarkably, however, this form of monetary tax is seldom, if ever, analysed in the literature on economics or economic history. No economic theory has ever been proposed that aims to explain periodic recoinage. The purpose of the present study is to make up for this absence and to articulate a theoretical framework that explains periodic recoinage.

The principal example of frequently renewed coins is uni-faced bracteates, which were often subject to annual or biannual recoinages.¹² Bracteates are thin, uni-faced silver coins that were struck with only one coin die.¹³ A piece of soft material, such as leather or lead, was placed under the thin flan (planchet) so that the design of

⁵ Edvinsson, 'Inflation', p. 168; Chilosi and Volckart, 'Good or bad money?', pp. 2–3.

⁶ If consumers used coins according to their face value, they would melt down old coins with high fineness and bring the bullion to the mint to have it re-minted into a larger nominal sum. Thereby, both reminting and seigniorage increased; Chilosi and Volckart, 'Good or bad money?', p. 3.

⁷ In the first case, the debasement of coins helps meet the excess demand for money. By lowering the silver fineness, more coins could be struck from a given amount of bullion. In the second case, wear and tear lower the intrinsic value of old coins, but they have the same face value as new ones. Old coins will then crowd out newly issued coins (Gresham's law). The stepwise debasement of new coins would counter this process and equalize the intrinsic value of old and new coins; *ibid.*, pp. 3–4.

⁸ See below, section I(ii).

⁹ Kluge, *Numismatik*, pp. 61–3; Röblitz, *Arnstadts*, p. 21.

¹⁰ Spufford, *Money*, p. 93; Hess, 'Münzverrufungen', pp. 13–14.

¹¹ Sporadic recoinage in the form of 'coinage reforms' often occurred in the middle ages, for example, in England in 1247, 1279, and 1351. Recoinage was then accomplished for debasement or adjustment of the physical specifications of the coinage. However, the key point here is that such coinage reforms were not 'periodic'.

¹² The Latin expression *bractea* (which means thin piece of metal) for these uni-faced coins is used for the first time in a document from 1368; Höfken, *Brakteatenkunde*, p. vi. At the end of the seventeenth century, the term 'bracteates' began to be used for these uni-faced coins in scientific publications; Olearius, *Isagoge*.

¹³ A coin die is a metallic cylinder that contains an engraved inverse image to be struck on the coin.

the obverse was a mirror image on the reverse of the bracteates.¹⁴ Although the leaf-thin bracteates are the most fragile coins in monetary history, they were the main coin type for almost two centuries (1140–1320) in central, northern, and eastern parts of medieval Europe.

In this study, the usefulness of the bracteates is linked to periodic recoinage. The analysis will demonstrate that periodic recoinage works particularly well in small currency areas and in economies that were undeveloped and had low monetization. These characteristics facilitate both re-minting and monitoring in such a monetary system. Empirical evidence from hoards shows that periodic recoinage worked better with longer intervals between recoinage dates. As long as bracteates were the principal coin, they were firmly connected to periodic recoinage. Bracteates were not the reason for periodic recoinage, but they facilitated frequent renewals. Periodic recoinage had several consequences: first, a stable coinage with respect to fineness and no *long-term* inflation; second, *short-term* disturbances in the velocity of money, price levels, and the volume of transactions; third, deterioration of the coins' function as a store of value; and fourth, inhibitions on trade, business, and the division of labour. When periodic recoinage broke down and the bracteates lost their role as the principal coin in the fourteenth century, it was probably due to increased monetization and trade.

The rest of the article is organized as follows. The fundamentals of medieval coins are discussed and the extension of periodic recoinage through time and space in medieval Europe is described in section I. The theoretical framework and conditions of periodic recoinage are outlined in section II. In section III, bracteates are linked to periodic recoinage. The consequences of periodic recoinage are analysed in section IV. The final section draws conclusions.

I

(i) *The fundamentals of medieval coins*

A coin is a piece of hard material of standardized weight and fineness, which are guaranteed/controlled by an authority with a hallmark.¹⁵ To work as 'general purpose money', coins must perform three basic functions: provide a medium of exchange, a standard of value/unit of account, and a store of value. Generally, coins in medieval Europe performed all three jobs adequately, primarily as commodity money; that is, the face value was very close to the intrinsic value, although this relationship became attenuated over time. Fiat money, where the value is not determined by the raw material value but by the issuer's credibility

¹⁴ Kühn, 'Mittelalterliche Prägungstechnik', p. 2. The diameter of the bracteates varies from 10 to 50mm, and the weight is between 0.05 and 1.00g. The bracteates are only 0.05 to 0.20mm in thickness. A high relief often stabilizes the bracteates. A common misunderstanding is that all uni-faced coins are bracteates. Uni-faced coins that have not been minted through the specific technology of using soft materials under the flan are not called bracteates.

¹⁵ In the middle ages, weight and fineness were not always carefully maintained for low-value coins. Laws stated that a specific number of coins were to be struck from a fixed amount of precious metal; Haupt, *Sächsische Münzkunde*, p. 24. Coins are usually made of metals, while tokens are coin-like objects that are made with either hard or soft material (such as card or leather). The key difference is that a coin is issued by a governmental, local, or national authority and is freely exchangeable for goods or other coins, whereas a token has a much more limited use and is often issued by a private company or association.

or economy, did not then exist in pure form. Precious metals (gold and silver) best fulfilled the requirements of commodity money; coins then became durable, portable, and of a size that could be stored easily.¹⁶ Silver was the most commonly used raw material for medieval coins because there was a relatively abundant supply of silver from several European mines.¹⁷

When conducting daily (small) transactions, it is easier to count coins than to weigh and ascertain the fineness of silver. This practice implies that the medium of exchange and standard of value functions are better performed by coins than by bullion. Therefore, people are generally willing to pay a premium to have their silver transformed into standard coins.¹⁸ The premium component also enables the coin-issuing authority to generate profits from minting (gross seigniorage).¹⁹ Although the monetization of society increased in medieval Europe, commodities other than coins were also used as money, or direct barter was employed. For larger transactions, silver ingots or bullion were often used.²⁰

Until around 1300, the king/emperor possessed the rights to mint, charge market dues, and operate mines.²¹ Coinage rights could be delegated, sold, or pawned to other authorities (laymen, church authorities, or citizens).²² In general, these authorities were required to observe the king's guidelines for valid coins and the monetary standard. The rights to mint and charge market customs were typically delegated together because the coin issuer also had to control the market.²³ The market due was a fee levied on artisans and merchants' goods brought to and sold in the town market. The stated purpose of this fee was to support the market, but it also served as important recurring revenue for the authority.

The size of the currency areas bounding the right to mint could vary substantially during the middle ages. In England, Sweden, and Denmark, the king normally retained coinage rights and maintained a pure monopoly, with the exception of some mints controlled by bishops. The whole of England was a single currency area, whereas Sweden and Denmark each had two to three areas. These large currency areas each had several mints.²⁴ In contrast, in Germany and France minting rights were delegated to many ecclesiastical and civil authorities,²⁵ and a city (mint) and its surroundings could constitute a single currency area.²⁶

¹⁶ Precious metals exist in limited quantities, are well known, are of a high value compared with their size, are resistant to corrosion and oxidation, and are relatively soft and thereby easy to manipulate. The last characteristic implies that gold or silver are mixed with zinc or copper when minting coins. Otherwise, the coins would become worn with routine use.

¹⁷ Spufford, *Money*, ch. 5.

¹⁸ Sussman, 'Debasements', p. 50.

¹⁹ Furthermore, coins are a typical network good. That is, the value (of holding coins) increases as more people accept coins as a medium of exchange and a standard of value, which reinforces and tends to increase the premium; Dowd and Greenaway, 'Currency', p. 1180.

²⁰ Buck, Büttner, and Kluge, *Goslar*, p. 28.

²¹ Coinage rights encompassed the right to decide which coins are legitimate and valid as a medium of exchange; to determine the monetary standard, including the denomination, weight, fineness, diameter, and relief; to mint the coin and determine the design; and to generate profits from minting. Kamp, *Moneta regis*, pp. 27–8; Kluge, *Numismatik*, p. 52.

²² Kluge, *Numismatik*, p. 53.

²³ *Ibid.*, p. 53.

²⁴ Allen, *Mints and money*, pp. 2–12; Jonsson, 'Utländsk metall', p. 51; Grindler-Hansen, *Kongemagtens krise*, pp. 53–60, 81–8.

²⁵ Kluge, *Numismatik*, pp. 96, 143.

²⁶ Spufford, *Money*, p. 100.

(ii) Geographical extension of short-lived and long-lived coinage systems

For purposes of analysis, the coinage systems in the high middle ages of Europe (c. 1000–1300) are divided into two main systems. One system had ‘long-lived coins’ that were valid during the whole reign of the coin issuer or longer.²⁷ The other system had ‘short-lived coins’ that were valid only for specific intervals of the issuer’s reign.²⁸ In the latter system, periodic recoinage occurred. In the numismatic literature, three methods have been used to identify periodic recoinage and its frequency (ranked by confidence): first, written documents; second, the number of coin types per ruler and year; and third, the distribution of coin types in hoards.²⁹

Based on these methods, there is a consensus in drawing conclusions about the extension through time and space of long-lived and short-lived coinage systems.³⁰ Long-lived coins were common in many parts of northern Italy, France, and Christian Spain from 1000 to 1300; see figure 1.³¹ This system spread to England when the ‘sterling’ was introduced during the second half of the twelfth century. In areas with long-lived coins, the same type was produced in all mints in the currency area. Examples are the ‘denier tournois’ in France and the sterling in England. The mint was marked on the coin either as details in the field (for example, French royal coins) or in the legends (for example, English sterling). In France in the eleventh and twelfth centuries, long-lived coins dominated in most regions where the rights to mint were distributed to many civil authorities.³² In northern Italy, where towns took over the minting rights in the twelfth century, long-lived coins also dominated.³³

The purpose of long-lived coins was to create a high degree of 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 neighbouring areas would confidently accept them as a 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 coins.³⁴

In central, northern, and eastern parts of Europe in the period from 1000 to 1300, short-lived coinage systems were the dominant monetary system. The first periodic recoinage in medieval Europe occurred in Normandy in the 930s and lasted until the end of the eleventh century. Coins were renewed every fifth year in the tenth century and even more frequently in the eleventh century.³⁵ A well-known example is England, where periodic recoinage occurred every sixth year between

²⁷ Sometimes, successors minted variants of the same coin type. These are called ‘immobilized types’ and could be valid for very long periods—occasionally centuries—and survive through the reigns of several rulers; Kluge, *Numismatik*, p. 63.

²⁸ The term ‘regional coins’ is widely used instead of short-lived coins in the numismatic literature. However, this term is misleading inasmuch as long-lived coins also had a geographic constraint and were regional.

²⁹ See app. I.

³⁰ Kluge, *Numismatik*, pp. 62–4.

³¹ It has been suggested that Aragon had a system with periodic recoinage in 1128 and 1135 and then every seventh year until 1174, but the evidence between 1135 and 1174 is weak; Bisson, *Conservation*, p. 75.

³² *Ibid.*, p. 143.

³³ Spufford, *Money*, p. 100.

³⁴ Kluge, *Numismatik*, p. 63.

³⁵ Moesgaard, ‘Saints, dukes and bishops’, pp. 197–207.

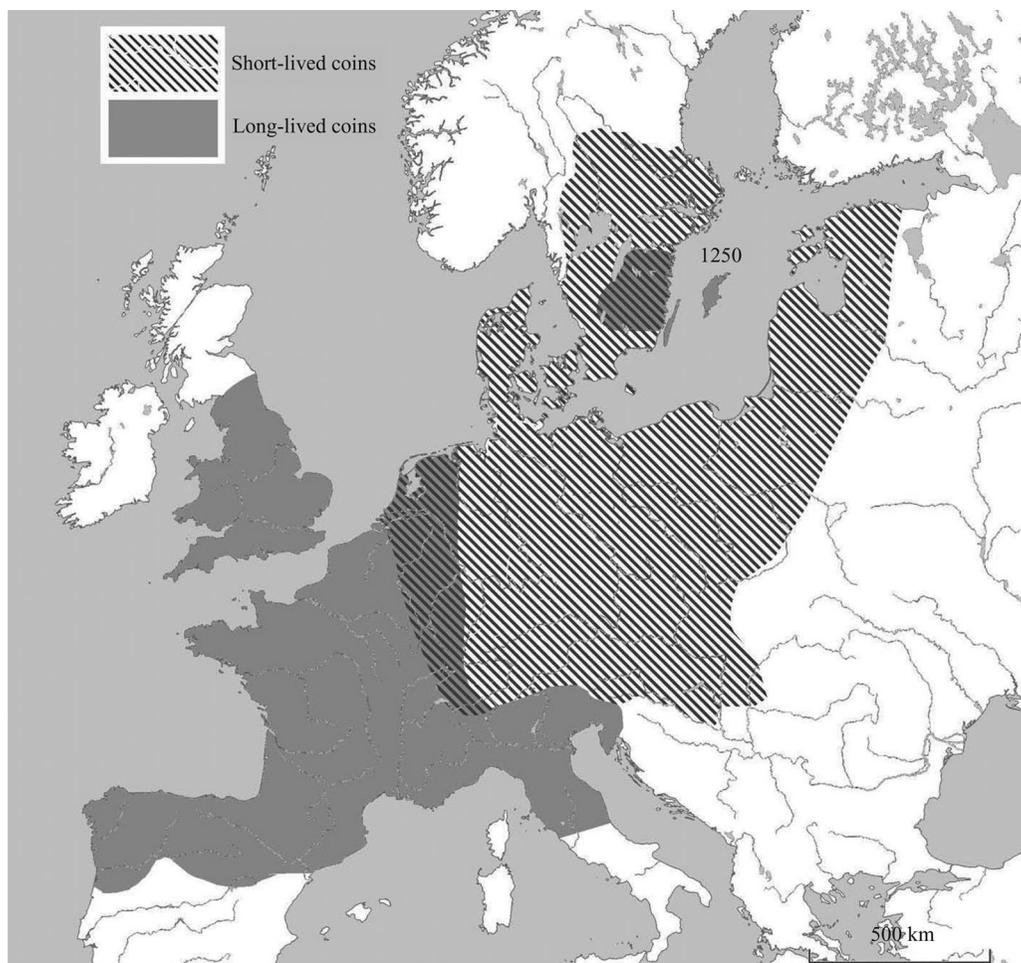


Figure 1. *Short-lived and long-lived coinage systems in Europe, 1140–1270*

Note: Eastern Götaland, Sweden, changed from long-lived to short-lived coins *c.* 1250. England operated a system with periodic recoinage from 973–1125.

973 and 1035. From 1035 to 1125, the coinage was renewed every second or third year.³⁶ However, these coins were valid throughout England, a large geographic area.

Eastern parts of France and western parts of Germany had periodic recoinage in the tenth, eleventh, and twelfth centuries.³⁷ However, the best examples of short-lived and geographically constrained coins can be found in central and eastern Germany and eastern parts of Europe, where currency areas were relatively small. Here, periodic recoinage started in the middle of the twelfth century and mostly lasted until *c.* 1290–1320; it was particularly frequent in areas where uni-faced

³⁶ Allen, *Mints and money*, pp. 35–6; Bolton, *Money*, pp. 99–106.

³⁷ Hess, 'Münzverrufenen', pp. 19–20.

bracteates were minted, usually annually but sometimes biannually.³⁸ Further, Austria had annual recoinage until the end of the fourteenth century, Brandenburg until 1369,³⁹ and the Teutonic Order in Eastern Prussia recoined every tenth year between 1237 and 1364.⁴⁰ Individual German mints could have annual renewals until the beginning of the fifteenth century (for example, Brunswick until 1412).⁴¹

Sweden operated a system with the periodic recoinage of bracteates in two of three currency areas (particularly in Svealand and, to some extent, in western Götaland) from 1180 to 1290. This conclusion is supported by evidence of numerous coin types per period and the composition of coin hoards.⁴² Denmark introduced periodic recoinage (mostly annual) in all currency areas in the middle of the twelfth century; it continued for 200 years, with some interruptions.⁴³ Similar to Germany, Poland had many currency areas and minting authorities. King Boleslaw (1102–38) started with irregular recoinage—every third to seventh year. At the end of the twelfth century, coin renewals were annual, and in the thirteenth century, they occurred twice per year.⁴⁴ Bohemia also had recoinage at least once per year in the twelfth and thirteenth centuries.⁴⁵

The exchange fee in Germany was generally four old coins for three new ones, which represents a gross seigniorage of 25 per cent.⁴⁶ This fee can be observed at work at the mint in Magdeburg (12 old for nine new coins).⁴⁷ In Denmark, the fee was higher—three old coins for two new ones—or 33 per cent.⁴⁸ In Cologne, the exchange fee was six old for five new coins.⁴⁹ The Teutonic Order in Prussia had a relatively generous exchange fee of seven old coins for six new ones.⁵⁰

II

(i) Conditions for periodic recoinage

In a short-lived coinage system, the minting authority in competition with other coin issuers tried to create a monopoly position for its coins. Laws stated that foreign coins were *ipso facto* invalid, and such coins had to be exchanged for current local coins along with the payment of an exchange fee in an amount determined by the coin issuer (exchange monopoly).⁵¹ Although the geographical currency constraint increased the seigniorage, it also made the currency more uniform, which facilitated daily transactions for common people.⁵² The frequency and exchange fee

³⁸ Kluge, *Numismatik*, p. 63.

³⁹ *Ibid.*, pp. 108, 119.

⁴⁰ Paszkiewicz, 'Chronology', p. 178.

⁴¹ Kluge, *Numismatik*, p. 105.

⁴² Svensson, 'Re-coinage in medieval Sweden', pp. 23–4.

⁴³ Grønder-Hansen, *Kongemagtens krise*, pp. 61–70.

⁴⁴ Suchodolski, 'Polityka', pp. 341–8.

⁴⁵ Sejbál, *Základy*, p. 83; Vorel, *Pražského*, p. 26.

⁴⁶ Röblitz, *Arnstadt*, p. 21. According to Spufford, *Money*, p. 92, four old coins were also exchanged for three new ones in England, but this conclusion is based on a rather uncertain weight analysis.

⁴⁷ Mehl, *Magdeburg*, p. 33.

⁴⁸ Grønder-Hansen, *Kongemagtens krise*, p. 85.

⁴⁹ Häverníck, 'Münzverrufungen', p. 135.

⁵⁰ Paszkiewicz, 'Chronology', p. 179.

⁵¹ Kluge, *Numismatik*, p. 63.

⁵² Kamp, *Moneta regis*, p. 365.

Table 1. *Similarities and differences between long-lived and short-lived coinage systems*

<i>Characteristics</i>	<i>Long-lived coins</i>	<i>Short-lived coins</i>
Geographic constraint (foreign coins should not be valid)	Yes	Yes
Exchange monopoly	Yes	Yes
Sources of coin issuer profit	Minting of bullion (gross seigniorage) Reminting of foreign coins (gross seigniorage)	Yes Yes
	Periodic recoinage and issues (exchange fee)	Only when shift of issuer Frequent
No. of coin types (same denomination) circulating simultaneously 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
Geographic area	Large or small	Preferably small
No. of mints in <i>large</i> currency areas	Few	Many

of periodic recoinage could and did vary.⁵³ Periodic recoinage normally occurred on a specific date. Afterward, the new local coins were the only valid coins for transactions in the city; the 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 should be allowed to circulate (geographical currency constraint); the coin issuer has an exchange monopoly; and the minting authority must control both the local market and the coinage. In medieval Europe, the rights to charge market customs and to mint were usually possessed by a single authority.⁵⁴

For a short-lived coinage system to work, some further conditions must be fulfilled. First, 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. Second, coin types representing various issues must have clearly visible markers to differentiate them so that people can easily distinguish between valid and invalid types. In general, the main design was changed, but the monetary standard (weight, fineness, diameter, and shape of the flan) largely remained unchanged between issues. Third, to complete reminting in a currency area on a timely basis, an essential requirement is that the volume of coins in circulation is limited.⁵⁵ 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 1. A common characteristic for cities and regions where a short-lived coinage system was in force is that the local economy was relatively undeveloped.⁵⁶ Historical records suggest that cities and regions with limited coinage experience and with markets that were focused on local trade often started with periodic recoinage.⁵⁷ In the high middle ages, these cities and regions could be found in the central, eastern, and northern parts of Europe (see figure 1).

⁵³ See above, section I(ii).

⁵⁴ Kluge, *Numismatik*, p. 63.

⁵⁵ Spufford, *Money*, p. 94.

⁵⁶ *Ibid.*, p. 104.

⁵⁷ Kluge, *Brakteaten*, p. 5.

There are several explanations as to why periodic recoinage works particularly well in relatively undeveloped economies. Such economies have a small volume of coins in circulation, which facilitates reminting.⁵⁸ Furthermore, when monetization is low, there tend to be few places where coins are used for transactions and few groups in society who use the coins. These factors facilitate close monitoring of the coinage.

Periodic recoinage is also facilitated by small currency areas, which make it easier to monitor coin circulation. Above all, a weak central power and strong civil and ecclesiastical authorities lead to small currency areas. The small currency areas in Germany and Poland had the highest frequency of renewals.

Systems with short-lived coins typically applied to only a limited area, such as a town or a 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.⁵⁹ A document from Erfurt (1248/51) shows that only current local coins could be used for transactions in the town, but retired local coins and foreign coins were allowed for transactions outside the city border.⁶⁰ In 1231, the German King Henry VII (1222–35) published an edict in Worms stating that in towns in Saxony with their own mint, goods could not be exchanged for anything other than the coins from the local mint.⁶¹ 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.

Periodic recoinage in large currency areas requires many mints and places of exchange, whereas such areas with long-lived coins need only a few mints. When the volume of coins increases in a short-lived system, there is often a transition to a long-lived coinage system, which makes it possible to utilize scale economies and the division of labour in coin production.⁶² This transformation allows coining to be concentrated and centralized in selected, key mints. The exemplary case is no doubt England.⁶³ Around the millennium, when England had short-lived coinage, there were more than 70 mints.⁶⁴ However, by the thirteenth century, when England had long-lived coinage, there were only two principal mints (London and Canterbury) left, along with very few others that were temporary and minor.⁶⁵ The volume of minting was considerably larger in the latter period.⁶⁶

⁵⁸ Spufford, *Money*, p. 94.

⁵⁹ This state of affairs is well documented in an 1188 letter from Emperor Friedrich I (1152–90) to the bishop of Merseburg 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, 'Münzverrufenen', p. 16.

⁶⁰ *Ibid.*, p. 16.

⁶¹ Mehl, *Magdeburg*, p. 33.

⁶² Spufford, *Money*, pp. 191–4.

⁶³ A similar pattern can be observed in Bohemia. In the thirteenth century, there were many mints because frequent recoinages occurred. In the fourteenth century, when the long-lived Prague Groschen was introduced, minting was concentrated in Kutná Hora; *ibid.*, p. 193.

⁶⁴ Four or five of the mints accounted for more than 50% of the total mint output. Many mints were probably active at the recoinages and at market days but otherwise were used sporadically; Allen, *Mints and money*, pp. 20–1.

⁶⁵ *Ibid.*, pp. 396–7.

⁶⁶ Bolton, *Money*, pp. 25–7.

Table 2. *The composition of English coin hoards from 979 to 1125*

Dating of coin hoards		979–1035		1036–1125	
		6 years		2–3 years	
No. of years between recoinages		No. of hoards	%	No. of hoards	%
Hoards with	1 type	25	83.3	19	33.3
	2 types	2	6.7	11	19.3
	3 types	1	3.3	10	17.5
	>3 types	2	6.7	17	29.8
Total no. of coin hoards		30	100.0	57	100.0
		No. of coins	%	No. of coins	%
Coins from	Last issue	886	86.5	8,771	54.3
	Second-to-last issue	137	13.4	1,724	10.7
	Third-to-last issue	1	0.1	698	4.3
	Earlier issues	0	0.0	4,964	30.7
Total no. of coins		1,024 ^a	100.0	16,157 ^b	100.0

Notes: Each coin hoard must contain at least three coins to be included in the table. Therefore, five hoards from 973–1035 and 11 hoards from 1036–1125 with only two coins are excluded. For some coin hoards, the exact number of coins is not available.

^aBased on 27 hoards. There are several thousand coins from the remaining three hoards that cannot be attributed to different issues, particularly two large hoards (the Kingsholm and Cnut hoards) that contain more than three types.

^bBased on 53 hoards. There are c. 1,850 coins from the remaining four hoards that cannot be attributed to different issues.

Source: Calculations are based on Allen, *Mints and money*, pp. 520–3.

(ii) *Efficiency of periodic recoinage*

The coin hoards discovered to date can tell us a great deal about the efficiency of periodic recoinage. Hoard evidence from England indicates that periodic recoinage was partly successful. Table 2 shows that 83 per cent of the coin hoards from 973 to 1035 contain only one coin type, compared with 33 per cent of the hoards from 1036 to 1125. In terms of the number of coins, 86 per cent of the coins are of the last issue in hoards from 973 to 1035, whereas 54 per cent of the coins are of the last issue in hoards from 1036 to 1125. This difference indicates that the system worked well when coins were exchanged every sixth year (973–1035) but worse when coins were exchanged every second or third year (1036–1125). One reason for this is that the seigniorage for the latter period was higher due to the shorter period between recoinage dates (at an unchanged exchange fee).

Recoinage was even more frequent in Germany.⁶⁷ Hoards in Germany from the recoinage period (1150–1325) mostly contain many different issues of the local coinage and many issues of foreign coinage, that is, locally invalid coins.⁶⁸ In fact, only five of 83 hoards from Thuringia, where recoinage was annual, contain less than three coin types; see table 3.⁶⁹ For hoards found in Upper Lusatia, only one of 28 hoards has less than three types, and small hoards with three to 10 coins often contain several types. Although the size of the currency areas in England

⁶⁷ See above, section I(ii).

⁶⁸ Haupt, *Sächsische Münzkunde*, pp. 29, 32; Hess, 'Münzverrufungen', p. 18.

⁶⁹ One common-sense interpretation of these hoards would be that short-lived coinage systems were not as strict as previously assumed. However, periodic recoinages must have been lucrative sources of revenue for minting authorities that they would have struggled to retain. The critical importance of these minting revenues is underscored by the value of pawned minting rights in mints that operated periodic recoinage; Nau, 'Münzen und Geld', p. 92.

Table 3. *The composition of German coin hoards in Thuringia from 1156 to 1325 and in Upper Lusatia from 1200 to 1300*

Region Dating of coin hoards		Thuringia 1156–1325		Upper Lusatia 1200–1300	
		1 year		1 year	
No. of years between recoinages		No. of hoards	%	No. of hoards	%
Hoards with	1 type	2	2.4	0	0.0
	2 types	3	3.6	1	3.6
	3 types	9	10.8	4	14.3
	>3 types	69	83.2	23	82.1
Total no. of coin hoards		83	100.0	28	100.0

Note: Each coin hoard must contain at least three coins to be included in the table.

Sources: Calculations are based on Hävernack, *Mittelalterlichen Münzfunde*, pp. 26–79; Haupt, ‘Oberlausitzer Brakteatenfunde’, pp. 516–81.

and Germany were considerably different, more frequent renewals seem to make people less willing to re-mint their coins. Thus, higher tax rates make periodic recoinage less efficient.

An 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 to conduct their affairs in the cash nexus of the town marketplace. By skipping some recoinages and saving their retired coins, people could accumulate silver. Irrespective of their age, old coins possessed intrinsic silver value. If the exchange fee, for example, is four old coins for three new ones, and the owner exchanges all of his coins at each recoinage, then after just five renewals, he has only 24 per cent of the coins left.⁷⁰

(iii) *Monitoring and enforcement*

In the city markets, the minting authority probably managed to control the usage of current coins with the routine assistance of exchangers and monitors. However, outside the city borders, it must have been practically impossible to control which coins were used for transactions. Unsurprisingly, in Germany, the currency constraint applied only within the city borders.⁷¹ When the currency area included large regions of a state (as in the case of Denmark) or entire states (such as England), documents do not tell us whether periodic recoinage exclusively applied to the city markets or to the entire country/region.

It was not the possession of invalid coins but their usage that was deemed illegal and was 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.⁷² These city laws state that the penalties were more severe when using foreign coins rather than invalid local coins, and more severe for citizens than for

⁷⁰ This percentage is calculated according to the formula $0.75^5 = 0.237$.

⁷¹ Hess, ‘Münzverrufungen’, p. 16.

⁷² Haupt, *Sächsische Münzkunde*, p. 29.

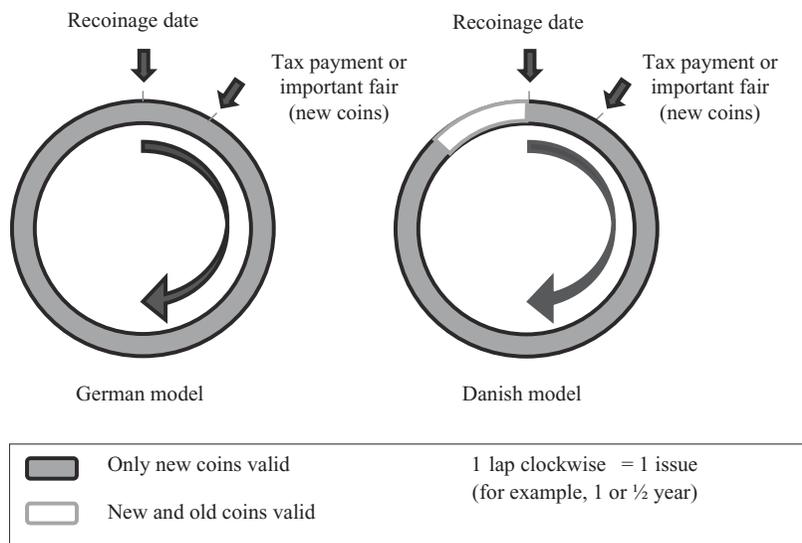


Figure 2. *Life cycle for short-lived coins*

foreigners when using invalid coins.⁷³ Denmark had severe penalties for paying with invalid coins in the market—the offender not only lost the coins he had used but all of the coins he had in his possession at the time.⁷⁴

However, the coin-issuing authority could use an economic trick to make periodic recoinage more efficient. By designating the date of recoinage as just prior to an important monetary event, the number of invalid coins exchanged for new coins could substantially increase; see figure 2. For example, the date of an important tax or fee that must be paid to the king or the church could be designated shortly after the recoinage date. Taxes then had to be paid with new coins. This strategy was used in Denmark.⁷⁵ Another logical alternative was to designate the date of recoinage in connection with an important annual fair in the city, which was common in Germany.⁷⁶

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 situations where payment in kind was possible. This practice was probably a more efficient and reliable way to enforce periodic recoinage than having exchangers and other staff at 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 Marks in pennies.⁷⁷ In Cologne, interest payments were to be paid with current coins.⁷⁸

⁷³ Ibid., p. 29.

⁷⁴ Grønder-Hansen, *Kongemagtens krise*, p. 69.

⁷⁵ Ibid., p. 69.

⁷⁶ Mehl, *Magdeburg*, p. 33.

⁷⁷ Grønder-Hansen, *Kongemagtens krise*, p. 69.

⁷⁸ Hess, 'Münzverrufungen', p. 19.

In the vast archival (German) numismatic research literature, it has been assumed that in a short-lived coinage system, new local coins were the only valid coins in the market during a specific life cycle; see the left part of figure 2. When a new coin was introduced, the old coins should never be used again in the market. However, a document from Denmark tells another story. During the last six weeks of the coin year, older coins could be used in the market; see the right part of figure 2.⁷⁹ The likely reason was that the king wanted older coins not to be melted down or hoarded but instead to be used in the market, where they would gradually be exchanged for new coins at the mint. During such a smooth transition, the king would make a higher profit. However, a countervailing consequence was that people then presumably had stronger incentives to save old coins in the hope that they could use them during the last six weeks of the next year. Thus, there were two contrary effects, and the net effect is unsettled. Whether old local coins could be used as a means of payment at the end of the year in other areas with short-lived coins is unknown, but this possibility cannot be excluded.

III

(i) *Extension of bracteates through time and space*

In the tenth century, Germany had a relatively uniform coinage with respect to weight and fineness, and the German emperor controlled the minting. Most mints in the tenth and eleventh centuries were located in the western parts of Germany.⁸⁰ The political decentralization in Germany in the eleventh and early twelfth centuries was reflected in the increased delegation of coinage rights to ecclesiastical and civil authorities.⁸¹ The Cologne penny was the most important coin; other mints related their coins to it with respect to weight and fineness, but the decentralization of the coinage implied that more mints issued coins with various monetary standards.⁸² Some mints coined 'half-bracteates' from 1050 to 1200. Half-bracteates were thin, two-faced coins where the obverse and reverse designs were superimposed upon each other. There are many examples of mints with two-faced coins that had temporal and spatial constraints from 1000 to 1150.⁸³ The number of German mints increased substantially, from 80 (970–1000) to 215 (1140–97) to 414 (1197–1270), which reflects the opening of new silver mines in Harz and Saxony-Meissen and the founding of new towns.⁸⁴

The first bracteates were minted in Thuringia and Meissen (central and eastern Germany) from 1120 to 1140. Less than a dozen different bracteate types are known from this early period.⁸⁵ However, the spread of bracteates exploded in 1140 and subsequent years. In the period from 1140 to 1320, several thousand different bracteate types are known from Germany and central, eastern, and northern parts

⁷⁹ Grindler-Hansen, *Kongemagtens krise*, p. 69.

⁸⁰ Suhle, *Geldgeschichte*, maps I and II.

⁸¹ Hess, 'Münzverrufungen', p. 11; Kluge, *Numismatik*, p. 96.

⁸² Spufford, *Money*, p. 104.

⁸³ Hess, 'Münzverrufungen', pp. 19–20.

⁸⁴ Spufford, *Money*, p. 76; Nau, 'Münzen und Geld', p. 89.

⁸⁵ Kühn, 'Anfänge der Brakteatenprägung', pp. 20–1, 31–3.

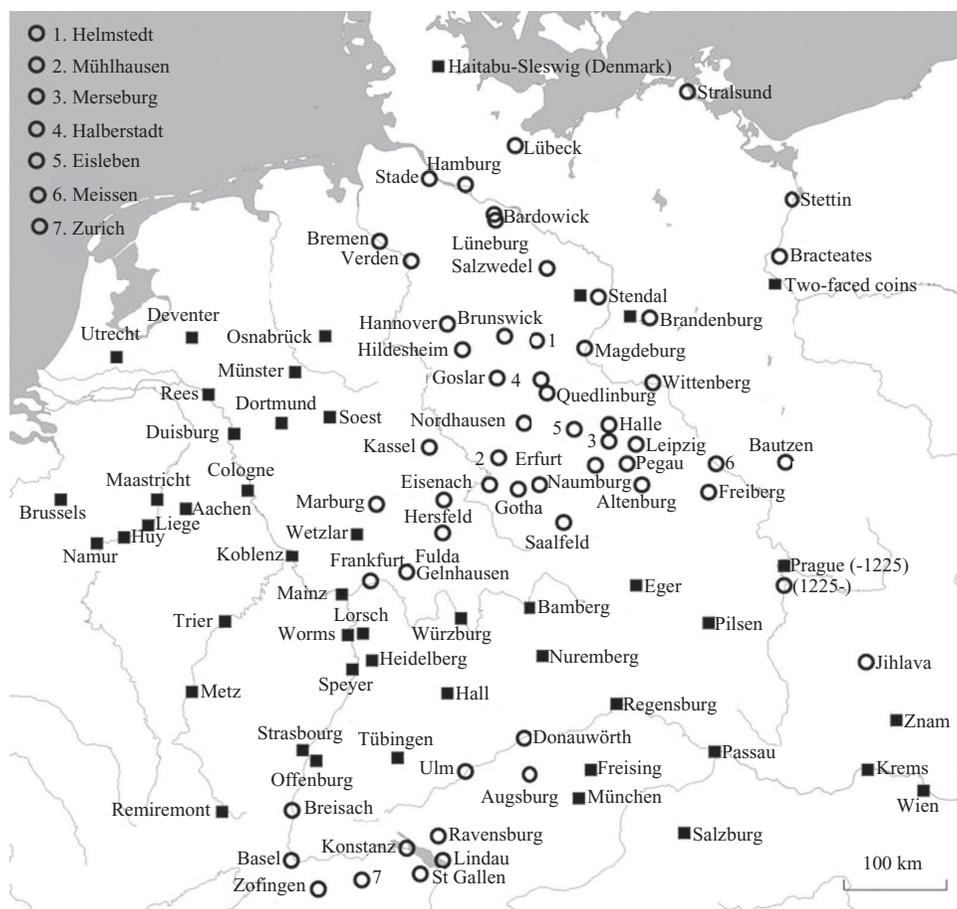


Figure 3. *German mints from 1140–1270 that primarily struck bracteates and two-faced coins*

Note: The map shows only important mints. In Brandenburg and Stendal, only bracteates were minted from 1150–1200 and 1180–1200, respectively. Bracteates and two-faced coins were simultaneously minted from 1200 to 1250; afterward, only two-faced coins were minted. Prague shifted from two-faced coins to bracteates c. 1225.

of Europe.⁸⁶ In these areas, the bracteate was the principal coin type for almost 200 years.

In Germany (1140–1320), bracteates dominated in the northern and central parts; see figure 3. Mints in southern Germany and northern Switzerland also coined bracteates. In the rest of Germany—particularly in Rhineland, Westphalia, and Franconia—the traditional two-faced penny dominated. Bracteates also spread to Poland, Norway, and Sweden in the twelfth century and to Bohemia, Moravia, Austria, Hungary, Eastern Prussia (Teutonic Order), and the Baltic Area (Livonian Order) in the thirteenth century.⁸⁷

⁸⁶ The exact number is unknown because a complete reference publication does not exist. Most bracteates are anonymous because they do not have any legends, which makes categorization difficult; Kluge, *Numismatik*, pp. 99, 101.

⁸⁷ *Ibid.*, pp. 99–102, 117–19, 160–70.

(ii) The first bracteates

It is not clearly established why the first bracteates were minted. An interesting explanation for why the first bracteates in Thuringia were minted has been presented by Kühn.⁸⁸ He argues that the first bracteates were a temporary solution to provide a medium of exchange in the growing local markets in Thuringia. In the early twelfth century, increased population growth in Germany accelerated the cultivation of more land and the division of labour. For new, specialized occupational groups, such as craftsmen, it was necessary to obtain food in exchange for handicraft products at weekly or monthly local markets. These markets were often located close to administrative centres (bishops' residences, monasteries, or castles), which quickly matured into small towns. If the local markets were to work efficiently, coins were needed that had the functions of being both a medium of exchange and a standard of value. However, the new towns struggled to find any well-apprenticed mint personnel. In the beginning of the twelfth century, there were only a few mints in Thuringia, which were unable to satisfy the demand for coins in the whole region.⁸⁹

This problem was possibly solved by a couple of monasteries in Thuringia (for example, Pegau and Nordhausen) that stored relatively large deposits of silver and had goldsmiths available. These goldsmiths had never minted coins but had a long tradition of engraving thin panels of precious metals using a soft material such as leather or lead under the panels.⁹⁰ Hoard evidence shows that the first bracteates in Thuringia were minted between *c.* 1120 and 1130.⁹¹ Technical analysis shows that these early bracteates may have been struck by individuals with limited prior apprenticeship in coining.⁹²

Another more traditional explanation is that the first bracteates were direct successors of the half-bracteates minted in Germany between 1050 and 1200. Imagine that a mint master—either with knowledge of goldsmith technology or assisted by a goldsmith—one day decided to use only one die and a soft material under the flan, thinking thereby that the design would be better and that the minting would become more efficient. This explanation is possible for the early bracteates struck by the margraves in Meissen.⁹³ Here, it is important to emphasize that half-bracteates and bracteates were minted with quite different technologies. Irrespective of which explanation is true, the bracteates were minted with a technology similar to that used by goldsmiths.

As in western parts of Germany, there was a geographic currency constraint. Thus, the bracteates were from the beginning valid in a limited, local circulation area. It must be stressed, however, that there is absolutely nothing in the historical

⁸⁸ Kühn, 'Anfänge der Brakteatenprägung', pp. 15–20. I have removed some inaccuracies in Kühn's publication, so his explanation is slightly modified.

⁸⁹ *Ibid.*, p. 17.

⁹⁰ This manufacturing technique is similar to that used to decorate panels on reliquaries; *ibid.*, p. 18.

⁹¹ *Ibid.*, pp. 20–2. The first European bracteate was probably struck in Pegau in 1115/20 by Count Wiprecht von Groitzsch (also Sheriff of Pegau).

⁹² For example, on some bracteates, the legend is retrograde. On other bracteates, the main design has a relief that is higher than the surrounding circle of pearls. This type of elevation is very rare because the perimeter should protect the main design from being worn down. Finally, some bracteates have been struck with a positive die from the reverse. All of these bracteates were struck with a soft material under the flan; *ibid.*, pp. 26–9.

⁹³ However, few or no half-bracteates have been minted by these margraves in Meissen; Haupt, *Sächsische Münzkunde*, plates 1–5.

record to indicate that the first bracteates were linked to periodic recoinage. To the contrary, they seem to have circulated during relatively long periods based on evidence of many die variants of specific issues.⁹⁴ Furthermore, coin hoards show that the earliest bracteates circulated for long periods,⁹⁵ and only a few bracteate types were issued during two decades (1120–40).⁹⁶ However, the inherent fragility of the bracteates was thereby an endemic problem that forced the issuer to substitute new for damaged bracteates from the same issue.⁹⁷

(iii) Bracteates as short-lived coins

Many researchers and collectors have wondered why such thin coins were minted over such a long time period—from 1120 to *c.* 1630, serving as the principal coin *c.* 1140–1320. Many pieces of the puzzle fall into place once bracteates are linked to periodic recoinage, which required a continuous reminting of coins. Even if the first bracteates had nothing to do with periodic recoinage, bracteates turned out to be well suited to function as short-lived coins, for several reasons. First, only one die was needed, which reduced production costs and time. Second, bracteate dies lasted longer than those used for two-faced coins for two reasons. The soft material (leather or lead) under the thin flan implied that the hammer hit was cushioned, and the thin flan required less power when striking coins. Thus, a far larger number of coins could be minted with a specific die. Third, the relatively large diameter (up to 50 mm) made it possible to display various images on the coins, which made recognition of valid and invalid coins fast and reliable. Fourth, old bracteates were easy to hammer out and overstrike.⁹⁸ Finally, the bracteates were fragile but were not in circulation for a long period due to routine, frequent renewals.

There may well also have been political motives for striking bracteates. Artistically designed bracteates from 1150 to 1200 were excellent marketing instruments for the coin issuer. The artistic style deteriorated after 1200, but bracteates were still the principal coin for approximately 100 years. The thin flan also proved practical because it made it easy to cut the bracteates into halves (*‘Hälblinge’*) or quarters (*‘Vierlinge’*) when the need arose. Sometimes, these cuts were performed at the mint.⁹⁹ Halved bracteates are common in German coin hoards.¹⁰⁰

It is possible that after *c.* 1250, multiple bracteates were simultaneously struck by placing several flans above each other, which would increase the efficiency of coining. This technique is particularly valuable when renewals are frequent. However, nobody has yet been able to demonstrate persuasively that this method of coining occurred.¹⁰¹

Another economic motive might have been that the minting authority hoped the fragile coins would be damaged when circulating. In that circumstance, they could then be exchanged at a discount, which would give the issuer an extra profit.

⁹⁴ Röblitz, ‘Umbruch’, pp. 14–15.

⁹⁵ *Ibid.*, p. 16.

⁹⁶ Kühn, ‘Anfänge der Brakteatenprägung’, pp. 20–1, 31–3.

⁹⁷ *Ibid.*, p. 19; Röblitz, ‘Umbruch’, p. 16.

⁹⁸ Dobras, *Mainzer Erzbischöfe*, p. 9.

⁹⁹ *Ibid.*, p. 9.

¹⁰⁰ Hävernich, *Mittelalterlichen Münzfunde*, pp. 26–79; Gaettens, *Wirtschaftsgebiete*, p. 18.

¹⁰¹ Kühn, ‘Mittelalterliche Prägungstechnik’, p. 13.

During the middle ages, people routinely clipped silver from the edges of their coins, which over time could yield a tidy sum. Bracteates were so fragile that it was almost impossible to clip silver from the edge without damaging the whole coin. By virtue of coining bracteates, mints severely hindered silver thieves.

Another factor that encouraged the minting of bracteates was that they were far more difficult to counterfeit than two-faced coins. One written document states that this reason was cited when Brandenburg planned to re-introduce bracteates (hohlpfennigs) instead of two-faced coins in the 1340s.¹⁰²

(iv) *Bracteates vis-à-vis two-faced coins*

Among established mints in the twelfth century, many in central Germany that had previously minted half-bracteates continued to mint bracteates,¹⁰³ which was certainly a consequence of the poor artistic design of the half-bracteates together with the fact that they were so weakly struck. Presumably, it was easier for people to accept the fragile bracteates in areas where coins had not circulated before or where weakly struck half-bracteates had circulated rather than stable two-faced coins. Otherwise, a rule of thumb is that bracteates gained a foothold in German regions with comparatively little recent experience with minting and a money economy, and where no monetary standard was established; see figure 3.¹⁰⁴

Comparing the spread of bracteates inside (figure 3) and outside¹⁰⁵ Germany with figure 1, it can easily be concluded that bracteates in their main period (1140–1320) were minted exclusively in relatively undeveloped areas with short-lived coinage systems. However, two-faced coins were also minted in areas with periodic recoinage, such as in western parts of Germany (Rhineland, Westphalia, and Franconia), Austria, and Denmark and in Bohemia and Moravia before 1225. Thus, although the minting of bracteates was clearly not a necessary condition in itself for periodic recoinage, it was in effect a sufficient condition. Whenever one finds a bracteate struck in central or eastern parts of Europe from 1140 to 1320, it is almost certainly linked to periodic recoinage.

Table 4 shows the basic differences between German mints that struck short-lived coins in the form of two-faced coins and bracteates. Bracteates were often annually or biannually re-minted, whereas the two-faced pennies were re-minted at longer intervals.¹⁰⁶ The higher frequency of recoinage in regions with bracteates is logical because these regions in central and eastern Germany were less economically developed and had fewer coins in circulation. The difference in monetary stocks is evidenced by the higher value of pawned minting rights in mints in western Germany (two-faced coins) than in eastern/central Germany

¹⁰² Mäkeler, *Reichsmünzwesen*, p. 36.

¹⁰³ For example, Magdeburg, Erfurt, Halberstadt, and Quedlinburg.

¹⁰⁴ The archbishops of Mainz controlled several mints. Mainz, which was home to their main mint, had extensive experience with monetary economics; hence, two-faced coins were routinely minted. However, in their mints in relatively undeveloped regions such as Thuringia and Hessen, bracteates were coined; Dobras, *Mainzer Erzbischöfe*, p. 9.

¹⁰⁵ See above, section III(i).

¹⁰⁶ Hävernich, 'Münzverrufungen', pp. 133–4; Kluge, *Numismatik*, p. 63. Cologne was the principal mint in western Germany. There should have been five to six years between renewals in Cologne during the period 1130–1250 based on the number of types per period; Hävernich, *Köln*, plates.

Table 4. *Characteristics of short-lived, two-faced coins and bracteates*

Characteristics	Short-lived coins	
	Two-faced coins	Bracteates
Frequency of recoinage	Several years to annually	Annually or biannually
Imitations	Sometimes	Rare
Level of region's economic development	Moderate	Low
Level of experience with own minting	Moderate/long	Low
No. of coins in circulation	Moderate/many	Few

(bracteates).¹⁰⁷ The fact is that when the bracteates started to spread in the eastern regions in the 1140s, the more developed western regions of Germany (such as Rhineland-Westphalia and Franconia) had already passed the zenith of periodic recoinage.¹⁰⁸

(v) *Breakdown of the short-lived coinage system and bracteates*

Periodic recoinage continued in Germany until the end of the thirteenth or the beginning of the fourteenth century. The decline of the short-lived coins depended on developing economies, growing cities, and increased local and inter-regional trade. 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.¹⁰⁹ This increased monetization required more coins in circulation, which progressively made short-lived coins with geographical constraints impractical.¹¹⁰ There was neither sufficient time to re-mint all of the circulating coins nor the capacity to monitor the increased volume of coins in circulation. Finally, there was a rapid expansion in the use of coins without regional constraints, both with higher (for example, sterling, Groschen, Goldgulden, and ducats) and lower (for example, Heller) denominations.¹¹¹ These coins often crowded out local coins and were increasingly used in international trade. Local minting authorities tried to counterstrike the influence of inter-regional coins by prolonging the interval between recoinage dates for their own coins, as evidenced by the fewer types in the second half of the thirteenth century.¹¹² However, these factors all blended together and made it nearly impossible for abbeyes and laymen to hold on to their local coin monopolies.

Even if periodic recoinage was mostly abolished in *c.* 1300, bracteates continued to be struck until the seventeenth century. From 1300 onward, the contraction in the diameter of the bracteates led to the minting of so-called 'hohlpfennigs', which were still bracteates.¹¹³ The extensive minting of hohlpfennigs mostly occurred

¹⁰⁷ Nau, 'Münzen und Geld', p. 92.

¹⁰⁸ Hess, 'Münzverrufungen', p. 21.

¹⁰⁹ Haupt, *Sächsische Münzkunde*, pp. 59–60.

¹¹⁰ The higher monetization is evidenced by the fact that the number of coin hoards from 1250 to 1300 more than tripled in Germany (Thuringia, Saxony, Westphalia, and Baden-Württemberg) compared with earlier 50-year periods; Fried, *Münzprägung*, pp. 107–8.

¹¹¹ Nau, 'Münzen und Geld', p. 97; Hess, 'Münzverrufungen', pp. 14–15.

¹¹² Hess, 'Münzverrufungen', p. 15.

¹¹³ Kluge, *Numismatik*, pp. 105–8. Hohlpfennigs are only 12 to 20mm in diameter and were struck with a very high relief. Normally, they weigh between 0.20 and 0.40g.

in northern and central Germany and in Scandinavia. The hohlpfennigs worked as small change for a larger two-faced coin type (Groschen, Witten, Schilling, or Örtug), which was a replacement for the bracteate as the main denomination. Hohlpfennigs were changed only when the coinage was reformed. Thus, they could circulate for many years, as indicated by the many worn specimens found in coin hoards. The high relief that had evolved came in handy to stabilize the hohlpfennigs, which passed through many hands and purses.

IV

It is difficult to estimate empirically the economic consequences of periodic recoinage because data on, for instance, prices, the number of transactions, and the velocity of money in the middle ages are lacking. However, the coins themselves (for example, their weight and fineness), coin hoards, written documents, and economic theory can tell us something about the consequences.

The chief negative consequence of periodic recoinage was that the traditional function of money as a store of value deteriorated. People had little incentive to save their current coins. Indeed, coin hoards from Germany contain many old issues.¹¹⁴ 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 because they always held their intrinsic silver value.

Let us look more closely at what could happen with the volume of coins (M), the velocity of money (V), the price level (P), and the volume of transactions (T) in an exchange when a recoinage date approaches. We turn to the formalism of the equation of exchange:¹¹⁵

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

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 periodic recoinage, M is the same before and after the recoinage date; the exchange fee indicates that some coins that belonged to people earlier are now possessed by the coin issuer. Thus, periodic recoinage did not cause long-term inflation.

The hypothesis that periodic recoinage is associated with a long-term stable coinage is supported by the coins themselves. In many areas with periodic recoinage, the silver fineness of the bracteates was sustained at a high level of at least 90 per cent until the middle or end of the thirteenth century. This was the case in, for example, northern (Lower Saxony/Holstein), central (Hessen), eastern (Magdeburg and Saxony), and southern Germany (Baden-Württemberg and Bavaria).¹¹⁶

Nevertheless, it is not implausible that when the date of recoinage approached, people wanted to spend their coins; nobody wanted to pay the extra tax (exchange fee). Thus, V should increase; that is, the left-hand side acquires a higher value,

¹¹⁴ See above, section II(ii).

¹¹⁵ Bordo, 'Equation of exchange'.

¹¹⁶ Jesse, *Wendische Münzverein*, p. 209; Hävernicks, *Wetterau*, p. 20; Matzke, 'Analysen', pp. 162–3, 170–85.

and the right-hand side then also must increase. A likely outcome is that P increases 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 the current coin type and should return to normal levels after the recoinage date. The intrinsic silver value of the coins and the gross seigniorage set the limits of how high or low prices can temporarily fluctuate.¹¹⁷

However, there was a commonplace situation in which some people in society had no choice but to exchange their expired coins for new ones; for example, if the recoinage occurred in connection with a tax payment or an annual fair.¹¹⁸ The effects on V , P , and T should then be smaller as the date of recoinage approaches.

The fact that foreign tradesmen, when travelling, constantly had to exchange their coins and bullion to do business must have had a negative effect on both trade and business. However, the exchange fees at periodic recoinages were particularly hard for common people and small-scale trading because large-scale trading and trading houses legally used silver ingots for larger transactions.¹¹⁹ Pennies and other small coins were, of course, impractical for such transactions. If coins were used for larger transactions, they were weighed rather than counted.¹²⁰

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

Both periodic recoinage and debasements created discontent among inhabitants and tradesmen. Written documents reveal complaints.¹²¹ When trade increased at the end of the thirteenth century, the pressure on short-lived coins from inter-regional coins increased. In this context, the minting authorities often signed agreements that promised to preserve a stable value of the coinage in exchange for other taxes. Such an effort to defend the coinage emerged in twelfth-century France. The written sources are rare, but it is telling that the new taxes were called by the same name as the minting tax—*monetagium*.¹²² Written documents from southern Germany show that citizens could pay a fee to prolong the validity of coins and avoid periodic recoinage for a certain period.¹²³ Another example is Denmark, where King Valdemar II Sejr (1202–41) introduced a plough tax *c.* 1234

¹¹⁷ The lower limit value of the coin is its intrinsic value, and the upper limit value is the intrinsic value + gross seigniorage; Sargent and Velde, *Big problem*, pp. 18–21.

¹¹⁸ See above, section II(iii).

¹¹⁹ Hävernack, 'Münzverrufungen', p. 139; Haupt, *Sächsische Münzkunde*, p. 32.

¹²⁰ Gaettens, *Wirtschaftsgebiete*, p. 13. The weighing of large sums is unproblematic if the coins have a uniform fineness, which was the case in Germany until *c.* 1250; Hess, 'Münzverrufungen', p. 21.

¹²¹ Hävernack, 'Münzverrufungen', pp. 135–6.

¹²² Bisson, *Conservation*, p. 7; Grinder-Hansen, *Kongemagtens krise*, p. 52. In Erfurt, a document from 1341 shows that the archbishops of Mainz were not allowed to change the coinage without permission from the citizens. Instead, the archbishops would receive a tax called *monetagium*; Mäkeler, *Reichsmünzwesen*, p. 35.

¹²³ Cahn, *Konstanz*, p. 286; Steinhilber, *Augsburgs*, pp. 42–3.

in exchange for a stable coinage. The plough tax disappeared after 20 years, and the coinage again became unstable.¹²⁴

V

Periodic recoinage was an important monetary taxation method for almost 200 years in large parts of medieval Europe. The main purpose of this study has been to establish for the first time a theoretical framework regarding the basic conditions for short-lived coinage systems. Both short-lived and long-lived coinage systems require a geographical currency constraint (foreign coins are invalid), an exchange monopoly, and control of marketplaces. In a short-lived coinage system, only one coin type should circulate in the currency area, and different types reflecting various issues need to be clearly distinguishable for the everyday users of the coins. Periodic recoinage could particularly be accomplished with a high frequency in small currency areas. Furthermore, it turns out that periodic recoinage works particularly well in relatively undeveloped economies. Such economies have a small volume of coins in circulation, which facilitates reminting. There are also few places where coins are used for transactions in these areas, and few groups in society who use coins, that is, low monetization. These conditions facilitate the monitoring and enforcement of periodic recoinage. Furthermore, periodic recoinage in large currency areas requires many mints.

Typically, periodic recoinage was enforced only within a city's borders (in Germany), and any coins could be used outside the city. The authorities had several methods to monitor and enforce periodic recoinage. First, they used exchangers and other administrators at the city markets. Second, the recoinage date was often designated as a date just prior to an important annual fair or the payment date of an annual tax. Third, the payment of any fees, taxes, rents, tithes, or fines had to be made in new coins. Empirical evidence from hoards shows that people were more willing to exchange their old coins for new ones when the interval between recoinage dates was longer. Thus, lower tax rates make periodic recoinage work better.

The principal example of frequently renewed coins is the thin, uni-faced bracteates. Although the first bracteates had nothing to do with renewals, they had several favourable characteristics for periodic recoinage: first, low production costs—only one die was needed, and the bracteate dies lasted longer than those used for two-faced coins; second, various pictures could be displayed given the relatively large diameter, thus making it easy to distinguish between valid and invalid types; and third, old bracteates were easy to hammer out and overstrike. Consequently, fragility was not a significant problem inasmuch as the issues of the bracteates were short-lived. In fact, bracteates were struck mostly in relatively undeveloped areas where periodic recoinage was undertaken. Bracteates were not the reason why periodic recoinage occurred, but they facilitated frequent renewals. The characteristics of the bracteates explain why they could be the principal coin for such a long period (1140–1320) in central, eastern, and northern Europe. When periodic recoinage broke down and the bracteates lost their role as the principal coin in c. 1300–25, it was probably due to increased monetization and trade.

¹²⁴ Grinder-Hansen, *Kongemagtens krise*, pp. 64–8.

Periodic recoinage had several consequences. First, it prevented *long-term* inflation because the number of coins (and the amount of silver) was the same after as before the recoinage date. Short-lived coins are associated with a stable coinage with respect to fineness, as evidenced by the coins themselves. Second, *short-term* disturbances should have occurred in the velocity of money, the price level, and the number of transactions as the recoinage date approached because 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, which could be the case if an important monetary event, such as an annual tax payment or fair, was designated after the recoinage date. Third, the coins' function as a store of value deteriorated. Finally, periodic recoinage as a monetary tax stymied economic activities such as trade and business, as evidenced by complaints in written documents.

In future research, it would be interesting to analyse the circumstances under which it is optimal for the minting authority to use periodic recoinage rather than debasement to generate seigniorage. Although debasement and periodic recoinage are not mutually exclusive,¹²⁵ Kluge has suggested that debasement primarily occurred in areas with long-lived rather than short-lived coins.¹²⁶

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¹²⁵ Both debasement and periodic recoinage occurred in Denmark from 1270 to 1330; Grindler-Hansen, *Kongemagtens krise*, pp. 238–9.

¹²⁶ Kluge, *Numismatik*, p. 64.

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APPENDIX I: METHODS FOR IDENTIFYING PERIODIC RECOINAGE

There are several basic methods for identifying periodic recoinage. In table A1, these methods are ranked by level of confidence. Identifying periodic recoinage through written documents that contain explicit information about dates of recoinage and/or exchange fees (method A) provides the most confidence. However, there are no written sources about periodic recoinage for many currency areas, and other methods must be used.

Table A1. *Methods to identify short- and long-lived coinage systems*

<i>Method</i>		<i>Long-lived coins</i>	<i>Short-lived coins</i>	<i>Confidence in method</i>
A	Written documents	—	—	Very strong
B	Coin types per reign and currency area	One	At least two	Strong
C	Coin types in hoards	One or a few from each mint	Many from each mint, but a few late types dominate	Medium

By classifying different coin types as originating from a specific coin issuer and mint (method B), it is easy to establish whether periodic recoinage occurred. If there is only one type per reign, the coinage system is long-lived. However, in the event that there are as many coin types as years of a specific reign and mint, the evidence indicates that annual renewals occurred. If the number of types exceeds (falls short of) the number of years, the renewals are more (less) frequent.¹²⁷

A third method for identifying recoinage involves carefully analysing the concentration and distribution of coin types in hoards (method C). Coin hoards from the middle ages may contain few or many issues from each mint represented in the hoard. If recoinage has occurred, one would expect a few types to dominate strongly the composition of the hoard. These types should be relatively young, whereas older types should have a more sparse representation. If there are several coin hoards from a specific coin issuer, one can expect the types existing in many hoards to be older and those in a few hoards to be younger.

¹²⁷ Hess, 'Münzverrufungen', p. 14.