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**25 September and 2 October 2013**

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**ECONOMICS 301Y1**

**The Economic History of Later-Medieval and Early-Modern Europe**

**LECTURE TOPIC NO. 3:**

- II. MACRO- AND STRUCTURAL CHANGES IN THE EUROPEAN ECONOMY, 1300 - 1520**
- B. MONEY AND MONETARY CHANGES IN THE LATE MEDIEVAL ECONOMY**

## **II. MACRO- AND STRUCTURAL CHANGES IN THE EUROPEAN ECONOMY, 1290 - 1520**

### **B. Money and Monetary Changes in Western Europe, from c. 1290 - 1520**

#### **1. Money, Market, and Non-Market Economies in Medieval Europe:**

##### **a) money and monetary changes:**

##### **(i) the importance of moneys and coinage, of monetary systems, and monetary fluctuations, in the development of the pre-modern European economy:**

(1) monetary factors are absolutely vital in understanding the nature of prices;

(2) how can we understand any economic history involving markets and market institutions -- buying and selling goods and services, paying wages, rents, taxes, etc. -- without understanding prices?

##### **ii) the term 'prices' includes, of course: those paid for all goods and services, including those for the three factors of production**

(1) not only commodity prices, i.e., the price of a bushel of wheat as so many silver pennies or pence per bushel;

(2) and not only the prices for various services performed (including commercial financial services)

(3) but also wages: as the price of labour

(4) and thus also: rent and interest, as the prices respectively for the use of land and capital.

(5) In other words all factor costs – concerning land, labour, and capital – are thus also expressed as prices for the use of these inputs.

##### **iii) But, in one obvious way, money and prices are less important than demographic changes:**

(1) While demographic changes affected everybody, the entire society and economy, monetary changes obviously could have an impact only within a market or exchange economy, i.e., with monetized commercial transactions.

(2) As we shall soon see, when we look at feudal agrarian structures and peasant economies,

- many economic transactions took place outside the market and did not involve payments reckoned in money,

- but payments and specifically rents reckoned in labour services and in shares of the harvest transferred to the manorial lord, and to the Church (in tithes).

##### **b) The scope of market economies:**

(i) **was certainly much more limited in medieval and early-modern Europe than in subsequent industrial Europe**, for reasons that will be demonstrated in our subsequent topics on feudal and other agrarian barriers to economic growth.

ii) **But I must now insist that most textbooks and popular views, especially those influenced by Marxian concepts of feudalism**, have greatly exaggerated those limitations, have unduly circumscribed the scope of the market economy, of monetized transactions in pre-industrial Europe.

iii) **These widespread views are based on 19th century evolutionary dogma in terms of stage theories of economic development. Thus:**

(1) **Bruno Hildebrand**: Natural Economy (Barter Exchange) → Money Economy (Coin) → Credit Economy

(Paper Money, Paper Transfer Instruments)

(2) **Marx:** Slavery → Feudalism → Capitalism → Communism

iv) **There is no factual historical justification for these rigid stage models:**

(1) Money and indeed credit have been used in effecting commercial exchanges from ancient times;

(2) and at no time was money absent or even negligible in the economy.

(3) Even the most isolated feudal manors in medieval times required some commercial with the outside world that in turn required money.

(4) Example: salt, a basic necessity that was generally not produced locally.

(5) The role of money in the economy, its relative significance, has varied, however, expanding and contracting, according to varying circumstances.

## **2. Money, Coinage, and Credit in Late-Medieval, Early Modern Europe<sup>1</sup>**

a) **Four Functions of Money in the Economy:** to refresh your memory, since we will be analysing monetary changes in terms of these different functions:

(i) **Money as a Medium of Exchange:** i.e., money as coins, banknotes, to make payment in buying goods, paying wages, the rent, etc.

ii) **Money as a Standard of Value:** i.e., money as: ‘moneys-of-account.’

(1) money as an accounting system in order to establish relative values for goods and services;

(2) to price goods in some common denominator to make those prices comparable with values of other goods.

iii) **Money as a Store of Value:** money saved, money invested: i.e., money stored, set aside, as a claim to future purchasing power.

iv) **Money as a Standard of Deferred Payment:** money as a form of credit; i.e., as a promise to pay in the future for goods & services acquired now.

b) **The chief forms of money in medieval and early modern Europe:**

(i) **Coinage was the principal form of money -- coinage in the form of the two precious metals, gold and silver;**

(1) Of the two precious metals, silver was the more important for coinage: western Europe, for its domestic economic needs, principally used a silver coinage.

(2) The petty coinage, for very small transactions,

- was generally alloyed with the base metal copper;
- but in most countries, the petty coinage always contained at least some small amount of silver, until:
- the 16th century, when some pure copper coinages first appear, to supply the needs of petty coinage

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<sup>1</sup> For a fuller account of the nature of money, coinage, and moneys-of-account in medieval and Renaissance Europe, see my Home Page: ‘Money and Coinage in Late-Medieval and Early Modern Europe’: <http://www.economics.utoronto.ca/munro5/MONEYLEC2.pdf> [Also given as an appendix in this lecture]

(also called *base* coinage, because they contained so much copper, which is a base metal).<sup>2</sup>

(3) Gold coins were rarely used in domestic retail commerce and largely reserved as a supplemental coinage for wholesale commerce and international trade.

(4) Paper money: there were no paper banknotes or other forms of paper-credit money before the 17th century; and we shall discuss that subject in the section on Banking.

(5) Medieval and early-modern Europe thus largely operated on a silver standard: silver in transacting daily commercial transactions, almost all domestic retail trade, paying wages, and salaries, etc.

ii) **Gold coins:** as just noted,

(1) were largely reserved for much larger scale commercial and financial transactions: i.e., for wholesale trade, for international trade and finance, for warfare and diplomacy, for capital investments (in land and buildings), etc.

(2) The reason is simple: because gold was far rarer and thus so much more valuable than silver:

- roughly 12 times as valuable during most of the medieval era (though varying from a high of 14:1 to a low of 9.5:1).<sup>3</sup>
- also in Roman times roughly that ratio that same 12:1 bimetallic ratio,
- that means that a very large or high valued transaction could be effected with just 1/12th as much gold metal as with silver (or 12 times more weight in silver).
- that also meant that gold coins were normally of such high exchange value that they could not be used effectively in the domestic economy

(3) To understand better the relationship between the uses of gold and silver coins,

- we now have to turn now to the relationship between coined money (silver and gold) and the moneys-of-account
- and also see how the value of gold coins was reckoned in these money-of-account systems.<sup>4</sup>

b) **moneys-of-account and coined moneys:** the relationships with the silver coinage.

(i) **understanding both the economics and mechanics of coinage and their uses first requires**

(1) an understanding of the relationship between money as coinage and money as **a money-of-account**,

(2) i.e., an accounting system for recording prices and other monetary values in terms of coinage.

(3) This relationship will also demonstrate that most of western Europe, both late-medieval and early-modern

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<sup>2</sup> See John Munro, 'Deflation and the Petty Coinage Problem in the Late-Medieval Economy: The Case of Flanders, 1334 - 1484,' *Explorations in Economic History*, 25 (October 1988), 387-423; reprinted in John Munro, *Bullion Flows and Monetary Policies in England and the Low Countries, 1350 - 1500*, Variorum Collected Studies series CS 355 (Aldershot, Hampshire: Ashgate Publishing Ltd., 1992). The Habsburg Netherlands issued Europe's first entirely copper coinage in 1543; Spain, not until 1599; France, only in 1607; and England, not until 1672.

<sup>3</sup> This current year (2013) the gold:silver ratio has ranged from a low of 54.86 on 5 January to a high (so far) of 66.74 on 27 July.

<sup>4</sup> See also the separate appendix to this lecture (in pdf format only): on *Money and Coinage in Medieval and Early Modern Europe*.

Europe, had monetary and coinage systems that:

- operated essentially on a silver standard, supplemented by gold coinages,
  - whose values were always quoted in terms of silver coins and silver-based moneys-of-account.
- ii) **The most widespread and principal money-of-account system:** in virtually all countries, was one tied directly to the currently circulating silver coins, anchored in particular to the silver penny.

(1) Take for example, the famous pound sterling of England. What did that mean?

- Originally, at the time of William the Conqueror (the Norman Conquest of 1066), it represented the value of a pound weight of pure silver [Tower Pound of 12 oz = 349.9144 grams, compared to 453.592 g in the pound *avoirdupois* with 16 oz]
- but there was then never any silver coin representing that pound.
- in fact, for several centuries the largest and principal silver coin was the penny (1d).
- For the sake of simplicity in accounting or reckoning, 12 of those pennies were called a shilling;
- and 20 of those shillings were valued as a pound (which thus contained 20\*12) 240 pence.
- In the ancient Roman world, in which the gold silver:ratio was about 12:1, 12 silver *denarius* pennies (*denarii*) equalled in value one gold *solidus*;
- and from *denarius* we get the initial d. to symbolize the penny - *deniers*, in French;
- and from *solidus*, the Roman gold coin, we get the initial s. to represent the shilling, as a unit worth 12d.
- And the French word for a shilling (12d) -- *sol*, *sou* -- is obviously derived from *solidus*.
- Also the mystical significance of 12: for example, 12 apostles; 12 months, etc.; and our common concept of the dozen.
- This method of reckoning in fact combined the ancient (Babylonian) system of counting in twelves with the Gallic or Celtic-Frankish system of counting in twenties: e.g. in French the number eighty is expressed as *quatre-vingt*, i.e., 4 twenties; and in medieval French (and Flemish) documents it was written as *iiii<sup>xx</sup>*.
- To repeat, therefore, the pound weight of silver originally contained 240 silver pennies: i.e., 20 \* 12 = 240.

(2) **Charlemagne's monetary reforms:** King of the Franks (768-800), and Holy Roman Emperor (800-814)

- It was Charlemagne's officials (in the 790s) who created this monetary system of pounds, shillings, and pence: which lasted for almost a thousand years, until the French Revolution of 1789.
- In seeking to restore the old Roman Empire, in the West, at least, he resorted to elements of the Roman monetary and coinage systems.
- Thus he took the Roman pound weight of commercially fine silver to be the pound, as the new monetary unit of account: though in fact he made his new silver pound 1.5 times heavier (489.6 grams vs the 327.5 grams in the Roman pound)
- For purely accounting purposes, he divided that silver pound into 20 units, based on the Roman gold coin, the *solidus*: hence 20 shillings, as *solidi*, or *sols*
- Each of these shillings was divided into 12 pennies (pence): i.e., the Roman *denarius* – *denarii*;

which became *denier* in French (with d. as the universal abbreviation)

- But no silver coins worth a shilling, let alone a pound, were ever issued in his era: so that the silver penny or *denarius* was the largest coin
- In the 13<sup>th</sup> century, however, first the Italians and then the French did issue much larger silver coins – called *grossi* or *gros* (i.e. large) – with the value of a shilling = 12d.
- But in England, there was no shilling coin (i.e., worth 12d) until much later, in the early 16th century (1542).<sup>5</sup>

(3) For the history of the English pound sterling, from William Conqueror (1066) to 1971, it is important to know that the pound sterling always represented a fixed, unvarying 240 current pennies. (4) In 1971, the United Kingdom finally adopted a metric currency, but still retained the pound sterling as the unit of account. (5) Thus, a sum of money expressed as say, 6s. 8d., always represented, therefore, 80 current pennies [(6x12) + 8 = 80d.], which were silver up to the 19th century (and then copper).

- That was the value of the English gold noble, first struck in 1344: which was designed to be worth one-third of the pound sterling: i.e. 240 divided by 3 = 80d. See Table 8 in the Appendix
- originally containing 8.858 grams of pure gold, that gold content was reduced, in two stages, to 7.776 grams of pure gold = 0.25 Troy ounce, in 1351, retaining that weight and content until 1411 (and reduced to 4.608 grams by 1526).
- and note once again – the repetition is important to make this crucial point – that almost everywhere, the values of gold coins were necessarily always expressed in terms of this silver-based money-of-account, in order to express their exchange values.

(6) The following example, to explain this relationship, also explains why such gold coins were rarely used in the domestic economies:

- in England in the late 14th century, the very smallest gold coin (not commonly struck), the *ferlin* or *quarter-noble*, was therefore worth 20d.,
- in turn, that was worth about 3 days wages for a master carpenter (at Oxford or Exeter or Canterbury, earning 6d per day, from the 1360s to the 1530s);
- or the price of almost two sheep.

(7) The gold noble (= 6s 8d = 80d, or 80 silver pence) was thus worth:

- just over two weeks wages, for that carpenter -- 13.333 days [at 12 hours per day in summer months] : i.e., 6 \* 13.333 = 80d
- or almost seven sheep.

(8) So obviously a gold coin would be useless in buying a loaf of bread: and a modern comparison,

- for a skilled carpenter's wages over the same period of 13.333 days, at \$36.91 per hour (Sept.

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<sup>5</sup> For the debate about when the English shilling coin was first introduced, see John Munro, 'The Coinages and Monetary Policies of Henry VIII (r. 1509-47)', in Charles Fantazzi (translator) and James Estes, ed., *The Collected Works of Erasmus: The Correspondence of Erasmus*, Vol. 14: *Letters 1926 to 2081, A.D. 1528* (Toronto: University of Toronto Press, 2011), pp. 423-76. The usual date given is 1504, a date that I dispute in this paper.

2013 data), the amount would be:<sup>6</sup>

- 13.333 days x \$36.91 per hour x 8 hours = \$3,936.97 (before taxes, and not including benefits) (9) but the current value of the gold today (21 Sept 2013), per Troy ounce (12 oz) is: \$1,325.60 USD = \$1,363.60 CAD.

(10) Thus for one quarter ounce (0.25) Troy, as the amount of gold in the 14<sup>th</sup> century noble, the value would today be far less: \$340.90.<sup>7</sup>

(11) We tend to think, in modern terms, that the price of gold has soared since President Nixon, in 1972, removed the fixed relationship of \$35.00 USD per Troy ounce;

(12) but in fact gold is relatively much cheaper today – certainly in relation to wages – than in the 14<sup>th</sup> century!

(13) Hence we must always take account of the changing purchasing power of precious metals, then and now, and also the changing relationships between the values of gold and silver

- In medieval Europe, the ratio of these values, gold to silver, was normally about 12 :1
- but sometimes those gold:silver ratios ranged from a high of 14.5:1, in the 14<sup>th</sup> century, and to a low of 9.5:1, in the 1390s.
- by the mid-17<sup>th</sup> century, the ratio had risen to about 16.5:1 (currently, as of 21 Sept 2013: 60.84:1).

(14) Gold coins in Europe were, therefore, only a supplemental coinage, supplementing silver;

(15) England in fact did not adopt a gold standard, a gold based monetary system, until the early 18<sup>th</sup> century (about 1713-17), indeed, by accident;

(16) and continental Europe, not until the mid to late 19<sup>th</sup> century.

**c) How could the metallic money supply be increased? In three ways:**

**(i) discovery of new gold and silver mines**

(1) as was the case in the later 15<sup>th</sup> and 16<sup>th</sup> century: South Germany, Central Europe, the Americas

(2) but most countries, obviously, did not possess such gold or silver mines.

**ii) Thus, increased exports in foreign trade was for most nations the chief alternative:**

(1) i.e., a surplus of earnings from the export of both goods and services over a nation's expenditures on foreign imports of goods and services;

(2) indeed such a view was the foundation of the Mercantilist philosophy in early-modern Europe:

- that if gold and silver were wealth, the only effective means of acquiring them was through the export trade, in this same fashion,
- thus requiring foreign buyers to make up the difference or balance in precious metals.

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<sup>6</sup> This information is taken from the website of Local 27, Toronto Carpenter's Union, at: <http://www.carpenterstraining.ca/general.html>. A master or 'journey person' carpenter, with 7200 hours of training in apprenticeship, today earns \$36.91 per hour (plus benefits), while a first time apprentice (0 - 1800 hours) earns about half that amount.

<sup>7</sup> Precious metals today are valued in terms of the Troy ounce = 31.1035 grams. One troy ounce of gold today [21 Sept. 2013] is worth \$1,325.60 USD = \$1,363.60 CAD. The 7.776 grams in the English gold noble =  $7.776/31.1035 = 0.25$  ounce Troy is thus worth \$1,363.60 \* 0.25 = \$340.90 CAD.

(3) We shall examine this view more thoroughly in the second-term topic on **Mercantilism**.

iii) **Debasement of the coinage**: to increase the supply of coined money

(1) in essence, producing more coinage from the same amount of precious metals (a ‘bigger bang for a buck,’ as some used to say, and perhaps still say, in American military circles).

(2) That is a topic in itself, and vital for understanding both late-medieval and early-modern monetary history, to which we now turn.

d) **Coinage Debasement**: and its relationship with changes in the money-of-account

i) **That relationship fixed relationship between the pound weight of silver and the pound value in money-of-account**: that established by Charlemagne, in the 790s, and in England, re-established under William the Conqueror (from 1066), soon broke down with ensuing physical alterations in the silver and gold coinages that we call debasement: those that reduced their silver contents.

iv) **coinage debasement**: nature and mechanism

(1) **debasement** is the term used to describe those coinage alterations that resulted in a reduction:

- in the quantity of silver in the penny (or other coin, as multiple or fraction of penny),
- and thus in the unit of money of account: penny, shilling, pound
- it by far the most common kind of coinage alteration.
- The French term *affaiblissement* is really more accurate, as we shall see

(2) **reinforcement or revaluation**: Adding more silver to the penny is called revaluation or, in French, *renforcement* (strengthening).

v) **There were three possible ways of achieving such debasement, i.e., of reducing the silver content of the coinage**:

(1) **reducing the weight of the coin**:

- i.e., by striking more coins from a pound of silver:
- e.g., instead of 240 pennies, striking 480 pennies.

(2) **reducing the fineness of the silver in the coin's alloy**:

- or in other words creating an alloy that contained more copper and less silver.
- since copper is a ‘base’ metal (silver and gold are ‘noble’ metals), this method explains the origin of the English term ‘debasement’
- when you understand that all coinages, even the very finest in both gold and silver, contained some copper as a hardening agent, in order to ensure a greater durability in circulation, then you can readily understand the princes’ strong temptation to add just a bit more copper, and thus a bit less silver or gold in their coins, in re-issuing their coins.
- such changes were very, very difficult to detect, even with a so-called touchstone.<sup>8</sup>

(3) **raising the official or money-of-account value of the coin**:

- only infrequently done with silver, and only with high-value, high denomination coins that remain

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<sup>8</sup> Answers.com: ‘A hard black stone, such as jasper or basalt, formerly used to test the quality of gold or silver by comparing the streak left on the stone by one of these metals with that of a standard alloy.’



unaltered, when the lower-value coins were debased.

- but quite commonly with gold coins: since it was necessary to raise their value when the silver coinage was debased, lest the mint and the principality lose its gold coins to other mints, where, in relative terms, it would be more highly valued.

vi) **debasement** meant the following two features:

(1) it necessarily meant – to repeat – a reduction in the quantity of precious metal (silver or gold) in the unit of money-of-account, and not just, or not necessarily the coin itself: i.e., in terms of the penny, shilling, and pound.

(2) Debasement thus also meant that the value of pure silver, of a fixed weight of pure silver – say, a pound of silver -- correspondingly rose in terms of the money-of-account: i.e., its value rose as expressed in pounds, shillings, and pence.

(3) See the handout: the table of English silver coinage, from 1257 to 1526.

vii) **The same was true of gold coins:** debasements by fineness or alloy, weight, and value.

(1) As noted above, if the government's mint wished to continue striking/issuing both gold and silver coins it had to ensure that the official mint values for gold and silver, what are called the mint ratio, corresponded to the market values and thus the market ratio of the two metals.

(2) Consequently, if the mint debased the silver coinage, it would also be required to debase the gold coinage as well, and more or less proportionately.

(3) But, as just noted, the government (or the mint) could achieve that goal most simply by raising its official price or exchange value, expressed in the silver-based money-of-account; e.g., the gold noble from 6s 8d [80d] to 8s 4d [100d], as indeed happened in the English debasement of 1464-65.

viii) **Note that, if the consequence of debasement was a rise in the price or exchange value of these coins,** so another normal or general consequence of debasement was the rise in the money-of-account prices of most goods and services: i.e., inflation.

ix) **N.B. the expected and theoretical change in the price of a pound of silver will be the mathematical reciprocal of the degree of debasement,** or reduction of silver:

$$[ 1 / (1-x) ] - 1,$$

in which  $x$  represents the percentage reduction in the fine silver content of the unit of account, i.e., the penny, so that a 10% reduction in the silver content of the penny will produce an increase of 11.11% in the nominal or coined value of a pound weight of commercially fine silver.

x) **Be very careful of the monetary terminology involved, which is rather tricky:**

(1) A common and perfectly legitimate synonym for debasement is **depreciation**;

(2) and the synonym for *renforcement* or strengthening of the coinage is **appreciation**.

(2) But a debasement or depreciation of the coinage meant a rise in coinage values: less silver or gold per unit of money of account

(3) and thus an appreciation of the coinage meant a fall in coinage values: and thus more silver or gold per unit of money-of-account.

xi) **The relationship between the pound weight and the pound as 'money' or money-of-account after**

**debasement:** obviously that direct relationship was broken forever, and the two -- the weight and the money -- parted company.

(1) Thus, in England, at the beginning of the 16th century, after many medieval debasements, the pound sterling as a money-of-account represented just under a half-pound of pure silver by weight (172.8 g.).

(2) Conversely, a Tower pound of sterling silver (92.5% pure) was being minted not into 240 pence or 20s. (pound), but (from 1464 to 1526) into 450 pence = 37s 6d = £1.8725 -- i.e., in this period the mint was striking almost double the number of pennies as it had in the 13th century (242 to the English pound sterling, up to 1279).

(3) See the above comment about the reciprocal relationship between the degree of debasement and the rise in the coined value of a pound or other unit of silver.

e) **Gresham's Law:**

(i) **an important law or economic principle:** one that must be firmly understood to complete your understanding of both the mechanics of debasement and its economic consequences:

ii) **Gresham's Law:** <sup>9</sup>

(1) is often summarized by the common phrase: 'cheap money drives out dear;' or 'bad coins drive out good coins.'

(2) This famous so-called economic law can be seen in action by observing what happens when a large quantity of debased, counterfeit, or otherwise fraudulent (clipped) coins is added to the monetary circulation.

iii) **Gresham's Law has two chief economic features:** concerning

(1) **the coinage circulation:**

- the circulation of debased, inferior silver coins will drive out higher-silver content silver coins of the same face value.
- Thus: why spend a good penny or sixpence (6d) when a bad one will do just as well, with the same official exchange rate and purchasing power?
- The good silver coins were generally sent to the domestic mint for recoinage into more coins
- or they were sent to foreign mints offering higher prices, for that metal
- or else melted down for bullion contents, to be used in foreign trade, or just hoarded.

(2) **the bimetallic ratios:** debasement of silver coinage will necessarily alter the ratios comparing gold and silver, making silver overvalued and gold undervalued, officially, in comparison with free market or foreign ratios.

- Thus, while a silver debasement would attract silver from abroad, it would also encourage the export abroad of now undervalued gold.
- Consequently, gold and silver each tended to flow to those regions where the purchasing power for

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<sup>9</sup> Thomas Gresham (1519-1579) was a financial advisor to Queen Elizabeth I; and he was credited with formulating this law, which, however, was well known to French and Flemish mint officials in the 14<sup>th</sup> century, and also to the Polish scientist (astronomer), Nicolas Copernicus (1473-1543). See John Munro, 'Gresham's Law', in Joel Mokyr, et al, eds., *The Oxford Encyclopedia of Economic History*, 5 vols. (Oxford and New York: Oxford University Press, 2003), vol. II, pp. 480-81.

each was highest [see graph on the screen for 15<sup>th</sup>-century England and the Low Countries].<sup>10</sup>

- If ratio was 10:1 in country A, but 12:1 in country B, then gold would go to B, and silver to A, where each was valued relatively more highly.<sup>11</sup>
- Note that in country A silver was worth 1/10th an ounce of gold, but only 1/12th an ounce in country B: obviously 1/10th is larger than 1/12th.

f) **The economic motivations for debasement:** especially in the light of Gresham's Law

(i) **Debasements as Fiscal Policies, for War-Financing:**

(1) Debasements, in my opinion, were undertaken principally for profit, profit for the prince;  
 (2) and certainly mint profits offered the prince one of the very few elastic and direct sources of revenue at his command.

(3) In my opinion, also, most princes desired mint profits chiefly to meet the burden of financing warfare.

(4) **Profits:** A special tax or fee on minting, known as *seigniorage*, provided the source of this profit from debasement:

(5) from the table on the screen (and in the appendix), we can see how seigniorage operated, with the silver-coinage debasement undertaken in the county of Flanders (a fief of the king of France), in November 1428.<sup>12</sup>

(6) the greater the volume of minting, the greater would be the mint profits (or gross mint profits).

(7) **A well-designed debasement would achieve this goal by encouraging:**

- people to surrender all their old coins for recoinage at the mint [Gresham's Law]
- both the populace and foreigners to deliver new bullion to the mint.

(8) The merchant who brought in such coins or bullion would receive more coins for his bullion than before the debasement, and often a far greater sum of new coinage, in nominal terms.

(9) Merchants, however, would not freely surrender old coins to the mint for their bullion contents, unless they received back an amount of new coinage whose nominal or face value (in money-of-account) exceeded the nominal value of the coinage surrendered.

(10) Merchants receiving the new, debased coinage would realize or achieve a net gain,

- provided that they spent these new coins quickly, before the almost inevitable inflation ensued:
- i.e., inflation from an increased quantity of money in circulation,
- and also from an increased velocity on the part of those holders of new money who correctly anticipated that inflation.
- but one can also observe that, once people became aware of the coinage debasement – that coins with

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<sup>10</sup> The graph may found in: John Munro, *Wool, Cloth and Gold: The Struggle for Bullion in Anglo-Burgundian Trade, ca. 1340-1478* (Brussels, 1973), graph IV, p. 97.

<sup>11</sup> Today (21 September 2013), the bimetallic ratio, as noted above, is radically different: since silver is worth \$22.42 CAD per Troy ounce and gold is worth \$1,363.60 CAD per Troy ounce, the G:S ratio is therefore 60.84:1 (with rounding errors).

<sup>12</sup> Flanders, once a feudal fief of the King of France, is today part of the kingdom of Belgium, created in 1830.

the same face value (exchange value) now had less silver – they would seek compensation by raising prices

(11) How did the prince gain?

- First, from all the extra volume of seigniorage earned on the greater volume of minting,
- and often also from imposing a higher rate of seigniorage.

(12) Who lost? The public, of course,

- through the ensuing inflation (loss of purchasing power).
- debasement thus was a form of an *inflation tax* on the populace.

(13) **The Asymmetric Information Problem:** note that this coinage debasement system, as a fiscal policy, can work only with asymmetric information, shared between the prince, the mintmaster, and merchants and financiers (i.e., especially merchant bankers), but denied to the public at large.<sup>13</sup>

- that is: only merchants and financiers, not the general public, have to be privy to this special information to be assured that they and the prince will gain at the expense of the public
- If the public as a whole received this information at the same time as did the financial-merchants who furnished older, fuller-weight coins and bullion to the mints (or to bankers, who then re-sold such metals to the mint), there would be no gain for the merchants:
- for the public would collectively respond immediately by raising prices, as mechanism for discounting the new coinage
- to repeat: those merchants who sold bullion, etc. to the mints and received more but now inferior coins would gain only by spending the new coins before general inflation set in, as the public gradually became aware of the coinage changes
- at the same time, of course, as an economist would more readily argue, inflation ensues because of the increased supply of money (and also because of the increased income velocity of the new coinage, for reasons mentioned above).

(14) Why would the public initially accept newly issued debased coins at face value, without detecting the changes -- i.e., apart from the asymmetric information problem?

(15) The simple answer is that such changes to the coinage were very difficult to detect:

- a change in weight was very hard to detect, because the mechanical means of producing coins was so crude:
- minting by the technique known as ‘hammered coinage’ was so crude that no one coin, honestly struck, weighed exactly the same as another;
- a money-changer would have to weigh a large number of these coins to detect any change from

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<sup>13</sup> When I first composed the first version of this lecture that dealt with this topic of ‘asymmetric information in money markets’, little did I realize that in 2001 three economists – Joseph Stiglitz, George Akerlof, and Michael Spence (raised in Toronto) – would win the Nobel Prize in Economics for developing this concept of asymmetric information.

reducing the weight (i.e., striking more coins to the pound or marc).<sup>14</sup>

- a change in alloy was even more difficult to detect: even with a ‘touchstone’, which allowed a money changer to compare the colour of a gold coin (i.e., its alloy) with striped marks, a slight reduction in fineness would be difficult to detect – beyond an eighth of a carat of gold
- touchstones could not be used effectively for silver coins: instead only the certain way of determining its fineness was to melt it down by the so-called ‘cupellation’ process, and do a chemical analysis of its components (silver and copper)..
- in any event, only money changers normally had touchstones;
- and even they did not have access to the cupellation process for silver.

(16) Hence the continual problem of dealing with foreign counterfeits: i.e., foreign coins struck in very close imitation of the domestic coins, but with less gold (or silver) in them.

ii) **Defensive debasements:** undertaken to protect the country against the effects of Gresham’s Law:

(1) i.e., to protect the domestic mints against an influx of foreign counterfeit or otherwise debased coins struck by competing mints abroad.

(2) thus the domestic mint would be forced to reduce the silver (or gold) contents of its coinages to the level in the competing foreign coins.

(3) the objective would be to discourage export of coin and bullion to these competing foreign mints.

(4) But similarly, even without any influx of inferior foreign coins, the domestic mint would be forced to debase its coinage, to reduce the silver contents, in response to normal ‘wear and tear’

- when the average level of silver in circulating domestic coins had been reduced by wear, tear, and ‘sweating and clipping’ over many years;<sup>15</sup>
- and that was similarly therefore a defensive debasement.

iii) **Debasements as Monetary Policies?** Were debasements undertaken to remedy at least perceived shortages of much during periods of bullion scarcities?

<sup>14</sup> In medieval and early modern Europe, the mint-master and his moneyers first prepared thin sheets of the alloyed metal (silver or gold), and then used shears to cut circular blanks. The ‘blank’ was placed on top of the lower die (which was engraved); and the upper die served as the hammer, which in hitting the disk created impressions, in the form of specified designs and insignia, on the top (obverse) and bottom (reverse) of the coin. Since the hammering flattened the disk and caused irregular edges, the mint-master (or his moneyers) then had to use their shears to clip off the rough edges. But the result was never completely circular or even. This problem was not resolved until Isaac Newton, who was also Master of the Mint, introduced (from the advice of a French refugee) the technique of mechanically ‘milled’ coins in the 1690s (with water-powered machinery), i.e., perfectly round coins with a milled edge. Any disruption to the round shape and especially to the milled pattern on the coin’s edge would thus now be readily observed.

<sup>15</sup> (1) ‘Sweating’ was the illegal practice of placing a group of coins in a leather bag, shaking that bag vigorously, so that the coins would rub against each other, and deposit silver (or gold) on the inside lining of the bag. The culprit would then scrub and remove the accumulated silver (or gold), and sell the contents to a merchant as bullion; (2) ‘Clipping’ was the illegal practice of taking sharp shears to clip off parts of the exterior rim – and similarly selling the clippings as bullion. The fact that coins were imperfectly shaped, and never round, from the mint procedures in ‘hammered coinage’ made both practices difficult to detect. That problem was resolved in the 1690s with water-powered mechanical ‘milling’ of coins, to produce perfectly round coins with etched, milled edges (as in modern coins).

(1) Well, perhaps, but relatively rarely in my opinion;

- I do not believe that many medieval princes or kings had any real conception of monetary policies nor of the commercial needs of their subjects.
- Greed was the more common motivation;
- or, as I suggested earlier, the prince's perceived public necessity in terms of financing warfare

(2) On the other hand, if the prince experienced a lack of bullion -- little or no bullion flowing into his domestic mints for the reasons given above in no. 2 -- then he would likely undertake a defensive debasement for the reasons already elaborated.

(3) But a lack of bullion at the mint is very different from a general monetary scarcity.

iv) **Debasements to defraud the prince's creditors?**

(1) Thus a debasement to allow prince to pay back debts fixed or defined in money of account terms with bad coin.

(2) But if so, such a policy would have to be used very sparingly, or else the prince would find, in the future, no one willing to serve as his creditors.

v) **Debasements in English economic history: Debasements during the 16th-century Price Revolution.**<sup>16</sup>

(1) In English economic history, by far the worst period of debasement was at end of reign of King Henry VIII (1542-49), when he was in desperate need of money to fight his continental wars, having long before exhausted the rich treasury bequeathed to him by his father, the first Tudor, Henry VII.

(2) So badly was the silver coinage debased, so much copper was added, that people mockingly referred to the new shilling coin, the teston, which contained just one-third silver, by saying: 'These testons look red, how like you the same? Tis a token of grace; they blush for shame.'

(3) These debasements finally ended under his successor (Edward VI: 5.1547-1553), in 1552, after quite horrendous inflation.

- In 1560-61, Henry VIII's daughter, now Queen Elizabeth I, reformed the coinage, by recoinage all the money into sterling silver fineness (though still coins of lighter weight than the pre-debasement coinage);
- and that coinage remained thereafter basically unaltered (with only minor weight reductions in 1601 and 1816) to modern times.

(4) We will be discussing this further in the second term, in January, dealing again with money and macro-economic changes in the 16th and 17th centuries.

g) **The Question of Paper Credit:**

(i) **Credit or Debt:** to repeat, is deferred payment, a written promise to pay in the future for goods or services received in the present; thus an acknowledgement of debt on the part of the person receiving credit.

ii) **I stressed earlier that written credit instruments are not modern in origin**, but can be found in ancient

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<sup>16</sup> See John Munro, 'The Coinages and Monetary Policies of Henry VIII (r. 1509-47)', in Charles Fantazzi (translator) and James Estes, ed., *The Collected Works of Erasmus: The Correspondence of Erasmus*, Vol. 14: *Letters 1926 to 2081, A.D. 1528* (Toronto: University of Toronto Press, 2011), pp. 423-76.

as well as in medieval times; and in the medieval era credit provided the very lifeblood for international trade and much regional trade.

iii) **But beware the opposite danger of exaggerating the role of credit in the medieval or even the early modern economy.**

- (1) Obviously it pertained only to the market economy, which was still far less than the entire economy.
- (2) And even within the western European market economies, credit played a limited and restricted role, especially in local trade.

iv) **restrictions on credit:**

- (1) Most people had little if any real access to paper credit in domestic trade, relying instead almost entirely on metallic coinage.
- (2) Even in Venice and Bruges, two most advanced commercial centres in late medieval Europe, less than 10% of adult males had bank accounts.
- (3) When credit was used, its use was often tied directly to the use of coined money or precious metals: most credit transactions required down payments in precious metals; and final payment was made in metal.
- (4) As various recent studies have shown, lenders were much more willing to extend credit when coined money and bullion were plentiful so that they could reasonably expect to be repaid, and in good coin;
- (5) but when money was scarce or 'tight', merchants and other lenders were far more reluctant to extend credit, make loans, for fear they might not be repaid properly in coin.
- (6) There were very few financial centres with few banks or international financial houses that permitted payment by use of cheques and bills of exchange: chiefly the big commercial-financial cities in Italy and the Low Countries, the two dominant financial centres of West European economy; and some in London, Paris, Barcelona -- controlled by Italians.
- (7) Church prohibition against lending at interest, or what was called usury.<sup>17</sup>
  - Because any form of credit, explicitly or implicitly means lending money (the principal) at interest,
  - and because this usury ban came to be so strictly enforced, by both ecclesiastical and secular authorities,
  - From the 13th century, when the usury ban came to be far more rigorously enforced by ecclesiastical and then secular authorities, this was certainly an impediment to the use of credit, which we shall consider as a separate topic at the end of this first term.

iv) **Finally, for late-medieval and early-modern Europe, there were no paper banknotes, not until the 17th century.**

- (1) Even when banknotes came into use during the later 17th century, as we shall see in the second term, they began simply as the issuing bank's promise to pay the stipulated sum on demand in gold or silver, and thus they were still also tied to precious metals.
- (2) Complete separation of paper credit and precious metals came only in the 20th century (except for one brief, abortive experiment in Britain, 1797-1815).

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<sup>17</sup> See the subsequent lecture topic no. 10.

#### h) **Conclusions:**

(i) **Thus, in so far as we are talking about the European market economies**, again much less than the full economy, the most important form of money effecting transactions was precious metals in coined money, and for local or domestic trade, especially silver coins.

ii) **So let us now look at what changes occurred in the supply, distribution, and circulation of coinage**, of both silver and gold, from 1350 to about 1500.

(1) Our object will be not just to observe these monetary changes;

- but also to relate them closely to real economic changes, including the demographic changes just observed:
- more generally, to relate these changes to the re-orientation, restructuring, and development of the European economy from late-medieval through early modern times, to the eve of the Industrial Revolution in the mid 18th century.

(2) Now back to the late 13th century, for a study that will take us far beyond the confines of Europe.

### 3. **The Late-Medieval European Economy: Did it Experience a ‘Bullion Famine’ and/or a Monetary Contraction?**

a) **The possible monetary problems of later-medieval Europe: bullion famines?**

i) **A major monetary question about the later Middle Ages, especially in the context of the debate about the so-called ‘Great Depression’ is this:**

(1) Did western Europe experience so-called ‘bullion famines’: i.e., a growing scarcity of precious metals, relative to the demand for precious metals?

(2) What relationships did the supply of precious metals – coin in particular – have with the changing levels of population:

- So later we will have to compare changes in the supplies of bullion and coined money with changes in the levels of population, both before and after the Black Death
- In particular we need to inquire whether monetary contractions – the so-called ‘bullion famines’ were related to the post-Plague demographic decline.

(3) In a subsequent topic later this term, we will have to expand our definition of the effective money supply by bringing in credit: in the topic on Banking and Finance in the Later Middle Age.

ii) **For the problem of a possible worsening scarcity of money**, let us begin with late-medieval Europe's sources of precious metals -- from its own mines, and from earnings in foreign trade.

b) **Europe’s sources of precious metals, and their changing supplies in the later Middle Ages:**

i) **for silver:**

(1) mining provided most of this metal, principally from mines in Germany and Central Europe (Bavaria, Austria, Tyrol, Bohemia, Hungary, Serbia);

(2) very little silver was derived from trade with other regions.

ii) **for gold:** the opposite was roughly true.

(1) Some gold came from European mines, principally in Hungary and Bohemia;



(2) but more was derived from international trade, especially with North Africa (which received the gold much further south: see below).

iii) **International trade and the European gold supply:** the role of Africa

(1) For centuries, western Europe had enjoyed a more or less positive balance of payments with North Africa:

- selling more in goods and services (shipping, etc.) than was bought from the Africans,
- thus requiring Africans to make up the difference in gold shipments
- which they considered just another commodity to export.

(2) That African gold came principally from rivers of West Africa, especially Niger and its tributaries, in modern day Ghana, Guinea, Mali, Nigeria: in particular from

- Bambuk on the Upper Senegal river;
- Mali on the Upper Niger river;
- and Lobi on the Upper Volta;

(3) This topic of African gold will be examined in much greater detail in the following topic (and then again, with Portugal's African trade, at the end of this term).

c) **Monetary Expansion during the Commercial Revolution era: ca. 1160 - 1320**

i) **England: in 12<sup>th</sup> and 13<sup>th</sup> centuries**

(1) **northern England (Cumberland-Northumberland region) and Scottish border region:** from the 1130s: a very large mining boom poured out significant quantities of silver

(2) but this English boom had ceased by the end of the 12<sup>th</sup> century, or early 13<sup>th</sup> century

ii) **Germany:**

(1) in the central regions, particularly in the Harz Mountains - Freiberg region of Saxony, an even more momentous mining boom pour out vast amounts of silver from the 1160s

(2) but this German mining boom continued far longer – into the early 14<sup>th</sup> century.

iii) **Italian trade with North Africa:** large increases in supplies of west African gold (but up to the 1370s)

iv) **this momentous monetary expansion, it must be noted,** preceded the demographic and economic upswing that began in the 1180s:

- known as the 'long thirteenth century' (to ca. 1315):
- and undoubtedly it contributed to that economic expansion, in turn fuelling the demographic expansion.

v) **The monetary situation ca. 1300, according to Michael Postan:**

By 1300 or 1320, the dates at which supplies of silver from continental mines began markedly to fall off, the total stock of silver in Europe, in relation to annual output, must have been truly enormous, for it had been amassed in at least two centuries, probably three, of large and steadily mounting output. And when the total stock was thus two hundred to five hundred times that of its annual accretions, the international price of silver was influenced more by the manner in which it was employed than by the current flow from the

mines.<sup>18</sup>

vi) **Nevertheless, by the 14th century, according to some other economic historians,** western Europe was beginning to suffer from a chronic shortage of precious metals:

(1) For England, at least, there is evidence of a growing scarcity of coined money from the 1320s, right up to the eve of the Black Death.<sup>19</sup>

(2) The evidence for such a growing scarcity is three-fold, from the 1320s to the 1340s

- drastically falling English mint outputs
- quite severe deflation
- domestic complaints about the scarcity of coinage

(3) **The fundamental causes:**

- beginnings of decline in European silver mining (see below)
- European warfare (mentioned earlier): disrupting international bullion flows
- but also England's large exports of gold and silver to finance military expenditures abroad and aid to continental allies
- however, this did not become a major problem until the onset of the Hundred Years War in the late 1330s

e) **Population and the money supply:**

i) **While many of these monetary problems had become evident by the 14th century,** they were, in a sense, postponed by the demographic catastrophes with population losses up to 40%.

(1) But with the Black Death and drastic depopulation there was clearly a surplus supply of precious metals

(2) For as David Herlihy commented: 'men were dying but coins were not'.

(3) Thus, despite dwindling money stocks, there was more than an adequate money supply for a much smaller economy:

(4) Indeed, the rampant inflation that followed the Black Death in most of western Europe provides strong evidence of a 'surplus' or excess supply of money (in per capita terms).

(5) There is no convincing evidence of a subsequent *relative* scarcity of precious metals until the later 14<sup>th</sup> century, for reasons to be discussed later.

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<sup>18</sup> Michael Postan, 'The Trade of Medieval Europe: the North', in M.M. Postan and E. Rich, eds., *Cambridge Economic History of Europe*, Vol. II: *Trade and Industry in the Middle Ages* (Cambridge, 1952), pp. 191-216 (quotation on p. 2112); subsequently reprinted in his collection *Medieval Trade and Finance* (Cambridge, 1973), pp. 160-85.

<sup>19</sup> See in particular Nicholas Mayhew, 'Numismatic Evidence and Falling Prices in the Fourteenth Century', *Economic History Review*, 2nd ser. 27 (1974), 1-15; and also W.C. Robinson, 'Money, Population, and Economic Change in Late Medieval Europe', *Economic History Review*, 2nd ser. 12 (1959), 63-76; read also the 'Note', by Michael Postan, following Robinson's article, as a rejoinder, on pp. 77-82.

d) **Was there a Late-Medieval ‘Bullion Famine’, during the 14<sup>th</sup> and 15<sup>th</sup> centuries?** <sup>20</sup>

i) **Subsequently, from the 1370s: we find evidence for relative monetary scarcities – for the first major late-medieval ‘bullion famine’**

(1) from rapidly declining mint outputs in England, the Low Countries, France – and, so far as may be estimated from very imperfect evidence – Italy (or rather: Florence)

(2) from the evidence of stark deflation in both England and the Low Countries – and evidently also for Spain and Italy, but with far less complete evidence on prices

(3) as the economic and social forces of depopulation, insecurity, and periodic economic depressions became paramount;

(4) such conditions evidently promoted a rise in hoarding and thus a deflationary fall in the income velocity of money, of coinage circulation.

(5) But other forces for monetary contraction may also have been at work: to be explored in a moment

ii) **The early 15<sup>th</sup>-century wartime interval between the first and second bullion famines:**

(1) The ‘bullion famine’ that had evidently begun in 1370s or 1380s seems to have come to an end with the revival of warfare (the Hundred Years’) after the Battle of Agincourt in 1415:

(2) That intensification of warfare led to a temporary monetary expansion accompanied by inflation:

- from coinage debasements, especially in France and the Low Countries
- from vast increases in military expenditures
- from dishoarding: from the impact of taxation and war in converting buried coin hoards, plate and jewellery, etc. into coin
- from increased velocities of coinage circulation (next topic)

(3) **Then, with relative peace (formal end of Hundred Years war in 1453), came another Bullion Famine:** from the early 1440s to the early 1470s

- again the prime evidence: from dramatic reductions in mint outputs
- from very severe deflations
- and of course, the absence of coinage debasements
- and possible reductions in coinage circulations.

ii) **Any relative scarcity of precious metals and coined money came from adverse developments in both**

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<sup>20</sup> For an elaboration of my views on this subject, see my collected studies in: *Bullion Flows and Monetary Policies in England and the Low Countries, 1350 - 1500*, Variorum Collected Studies series CS 355 (Aldershot), in particular (reprinted in this volume): John Munro ‘Bullion Flows and Monetary Contraction in Late-Medieval England and the Low Countries,’ in John F. Richards, ed., *Precious Metals in the Later Medieval and Early Modern Worlds* (Durham, North Carolina: Carolina Academic Press, 1983), pp. 97-158; and also (not in this volume) John Munro, ‘Patterns of Trade, Money, and Credit,’ in James Tracy, Thomas Brady Jr., and Heiko Oberman, eds., *Handbook of European History in the Later Middle Ages, Renaissance and Reformation, 1400 - 1600*, Vol. I: *Structures and Assertions* (Leiden: E.J. Brill, 1994), pp. 147-95; and most recently, John Munro, ‘Wage Stickiness, Monetary Changes, and Real Incomes in Late-Medieval England and the Low Countries, 1300 - 1500: Did Money Matter?’, *Research in Economic History*, 21 (2003), 185-297. Also available, in an earlier Working Paper version on my Home Page (no. 11): <http://www.economics.utoronto.ca/ecipa/archive/UT-ECIPA-MUNRO-00-03.html>

**stocks and flows of precious metals, involving the following:**

- (1) gold and silver mining within western Europe;
- (2) international commerce and the international distribution of precious metals
- (3) decreased monetary flows involving both hoarding and government interference with the free flow of metals in trade,
- (4) restrictions on the use of credit (to be discussed later).

**iii) We must always relate changes in monetary stocks and flows to the aggregate size of the population and of the market, from the later 14<sup>th</sup> century:**

- Thus, even though population had become far smaller,
- the quantity of circulating gold and silver coins may have becoming scarcer relative to the transactions and other demands for these precious metals.

**d) Possible Causes of Relative Monetary Scarcity in the late-medieval European economy:** from the 1370s, and again especially in the mid-15th century

**i) losses from coinage wear and tear, shipwrecks, unrecovered hoards, etc:**

- (1) gold and silver coins are very soft, and are subject to considerable physical and chemical erosion through just normal circulation;
- (2) as various monetary historians have now demonstrated, a nation's coinage stock can diminish at a rate of about 1% per decade, unless it is replenished with constantly renewed minting; and thus we have to consider the following factors that tended to reduce the flow of precious metals coming into a nation's mints.
- (3) Thus, Michael Postan was mistaken (see previous quotation) in indicating that western Europe's stock of precious metals, accumulated during two or more centuries of mining, was permanent, imperishable, and immutable.
- (4) Furthermore, Postan did not take account of the likelihood that more and more those precious metal stocks were being exported abroad (to purchase imports from or via Asia in particular).

**ii) increasing and more severe balance of payments deficits with the East:** both the Baltic-Russian and especially the Byzantine - Islamic East (i.e., in the eastern Mediterranean, and thus, by commercial contacts, with Asia itself).

- (1) From Roman times, Europe had traditionally bought more in spices, silks, and luxury goods from the East than Europeans had sold, resulting in some drainage of precious metals.
- (2) The hypothesis that western Europe chronically suffered from a balance of payments deficit with the Mediterranean and Baltic East is a favourite one with very many economic historians.
- (3) Thus various historians have argued, for complex reasons, that in late-Middle Ages, that deficit and metal outflow to East worsened (buying relatively more; selling relatively less to East).

**iii) reduction or disruption of gold supplies from North Africa:**

- (1) As just noted, Europe had long been able to finance all of this chronic deficit in balance of payments with the East by a combination of its own supplies of gold and silver and gold that it acquired from trade with North Africa.
- (2) From the later 14th century, according to some economic historians, western Europe was unable to

balance its commerce the Levant and Asia, because of the loss of or severe reduction in its supplies of African gold.

(3) The African problem: it has been argued that the following sequence of events led to a severe reduction in supplies of African gold:

- the collapse of the once powerful Mali empire, from the 1360, which was followed by anarchy
- and its successor, the Songhai empire, failed to maintain either adequate security along the trans-Saharan trade routes to the North African ports;
- thus disruptions in trans-Saharan trade led, according to some historians, to a severe reduction in gold flows from the great trading emporium of Timbuktu (at the top of the Niger River bend) to the North African ports on the Mediterranean
- and especially via the inland Algerian trading centre of Sijilmassa and the Tunisian trading centre of Kairouan ( which still boasts an immense and majestic mosque built around c.790);
- that the Italians consequently were acquiring very little gold from North African trade with these ports -- trade that was also being disrupted by Mediterranean naval warfare and chronic piracy during the 14th century.

(4) More recent researches indicate, however, that at least some African gold was always accessible to the Italians in Mediterranean trade.<sup>21</sup>

(5) Also it seems doubtful that western Europe could have long sustained a continuous outflow of precious metals to the East: for such a situation would have been forced to curb its purchases from the Levant.

(6) Nevertheless scattered data for the 1370s (Genoa) and 1420s and 1490s (Venice) do indicate that Western Europe did have a large and chronic balance of payments deficit with the Levant:

- in the 1490s: for every 100 ducats worth of goods purchased from the East, the West was able to sell only about 30-35 ducats worth of manufactured goods (textiles, chiefly, along with paper and glasswares) and raw materials,
- and thus had to make up the difference in precious metals.

#### iv) **Hoarding and a reduction in the Income Velocity of Money: i.e., of Coinage Circulation:**

(1) i.e., along with these adverse developments, and partly because of them, an increased hoarding of precious metals within Europe.

(2) Let us look again at the longer term consequences of the Black Death and subsequent depopulation, combined with ever worsening protracted warfare in late-medieval Europe.

(3) The chief economic consequence of both recurrent plagues and chronic, debilitating warfare was dislocation and contraction leading to periodic depressions:

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<sup>21</sup> See Angus MacKay, *Money, Prices and Politics in Fifteenth-Century Castile*, Royal Historical Society (London, 1981); E.W. Bovill, *The Golden Trade of the Moors*, 2nd edn. (London, 1968), pp. 13-44, 79-131; John Day, 'The Great Bullion Famine of the Fifteenth Century', *Past and Present*, no. 79 (May 1978), 1-54; reprinted in John Day, *The Medieval Market Economy* (Oxford: Basil Blackwell, 1987), pp. 1-54; Marian Malowist, 'Quelques observations sur le commerce de l'or dans le Soudan occidentale au moyen âge', *Annales: E.S.C.*, 25 (1970), 1630-36.

- the monetary consequence was an increase in hoarding and thus a reduction in coinage velocity that reflected a new climate of both fear and pessimism.
- The plague itself had changed from being a sudden and horrifying catastrophe to ‘the steady drizzle of rain through a leaking roof,’ as the later-14th century poet William Langland described it (in *Piers Ploughman*).

(5) People hoarded money to keep it from tax collectors, to have some security when food supplies might be disrupted or when trade was cut off.

(6) Hoarding further increased as a rational hedge against insecurity and anticipation of future problems.

(7) Insofar as hoarding and falling velocity of circulation led to falling prices, those falling prices would in turn increase the incentive to hoard: i.e., in anticipation of the rising value of money.

(8) But the fall in population would itself also inevitably reduce velocity reflecting a fall in the aggregate demand for money: when there were fewer goods and services requiring money for transactions.

(9) So a monetary contraction can be seen as a consequence of economic contraction, but one that threatened to aggravate or worsen the economic slumps.

(10) Monetary circulation was further reduced or impeded by various state policies related to warfare and military financing, especially coinage debasements.

- Those policies led most princes to ban the export of precious metals.
- We use the term ‘bullionism’ to describe those policies, designed to augment national metal stocks.
- They seriously inhibited the international flow of precious metals and thereby also hindered international trade.
- I can also note here that those late-medieval bullionist policies also provide the foundations for early-modern Mercantilism.

(10) One physical sign of increased hoarding in late-medieval western Europe was the increased display of artwork and ornamentation, especially church ornamentation, using precious metals: after all, what better way of using hoarded gold and silver?

(11) No historian has more eloquently explained the causes and economic consequences of such hoarding than has Peter Spufford; and I thus quote the following passage:<sup>22</sup>

The other exacerbating factor was fear. Fear of disorder made men conceal their coin. Fear of not being able to replace coin made men the keener to keep their assets liquid. With scarcity of coin went a reluctance to spend or invest what one had in hand, so that there was a sluggish circulation, which in itself was equivalent to a further reduction in the available quantity of coin. Fear of debasements, and the instability of money, made men happier to keep their silver in the form of plate, in addition to the desire for ostentation. All of these methods of hoarding, from the few petty coins put aside by poorer men in earthen vessels

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<sup>22</sup> Peter Spufford, *Money and Its Use in Medieval Europe* (Cambridge, 1988), pp. 345-47. As Spooner, writing of the sixteenth century, said: ‘credit doubles money – when money is freely available, credit is also; when money is scarce, so is credit’. See Frank Spooner, *The International Economy and Monetary Movements in France, 1493-1725* (Paris, 1956; Harvard, 1972, for the English edn)

to the vast sums locked up in chests by the greatest of the land, removed a great deal of coin from circulation.... To the contemporaries it seemed that ‘thesaurisation’ [hoarding] was the main cause of the bullion famines. In retrospect it appears that it was itself in part a response to the famine. Nevertheless it made that shortage worse, although the export of precious metals from Europe now seems more important, combined with the failure of the mines to make good the losses.... Finally fear of the failure to repay cut back on credit. This too was partially a consequence of the shortage of money and was also a cause of yet further shortage.

(12) High Liquidity Preference: is the term that modern economists would apply – and they would also view this situation as one with a ‘liquidity crisis’: see the next lecture.

v) **Problems in European gold and silver mining:** suffering from depletion and diminishing returns, again a separate topic in itself.

e) **Technical Problems in European Mining:**

i) **First, medieval Europe had made absolutely no advances over the Romans in mining technology:** possibly the applied technology was even inferior to that practised by the Romans.

ii) **Drainage provided the major problem in medieval mining:**

(1) i.e., how to drain off both noxious gases but especially water from mine shafts, particularly in mountainous areas where most precious metals found.

(2) The drainage problem, in particular, had really restricted most medieval mining to surface diggings and shallow pits; anything deeper quickly flooded.

iii) **Mining Depletion:** By the early 14th century, the traditional silver mines, some worked since the 12th century, had become depleted, or were experiencing sharply diminishing returns and rising costs that made them uneconomic.

iv) **Some new silver mines, however, were developed in the 14th century:**

(1) Bohemia, Serbia, and Sardinia were the chief locations for new silver mines that briefly alleviated silver coinage shortages;

(2) but their outputs were not enough to compensate fully for the decline of older mines;

(3) and many of the new mines also experienced rising marginal costs and depletion after 1400.

(4) In the early 15<sup>th</sup> century, however, new silver mines, with respectably large outputs, were opened in both Serbia and neighbouring Bosnia, substantially raising coinage outputs in the 1420s.

(5) But these mines also ran into the same problems of diminishing returns by the 1440s; and worse

(6) at that time, the Ottoman Turks, in expanding their conquests into the Balkans, seized control of the silver mines in southern Serbia and Bosnia – in 1441.

v) **With a growing scarcity of precious metals by the mid- 15th century,** especially with some renewal of population growth (at least in southern Europe), and increased economic activity:

(1) the value of gold and silver rose in terms of other commodities;

(2) That is expressed by their falling prices: deflation, as can be seen on the two price-graphs, for England and the Low Countries, where prices reached their lowest point in the early 1460s.

vi) **The Consequences of Deflation: a stimulus to technological innovations**

(1) That extensive deflation, reaching its nadir in the mid-15th century, thus meant that the purchasing power of silver was rising: i.e., low prices meant that each ounce of silver could buy more of these cheaper-priced goods (i.e., goods with lower prices when priced in terms of silver).

(2) That provided the profit motive to expand silver mining -- or seek the technical solutions that would permit an expansion in silver mining.

**4. The Central European Silver Mining Boom, 1450 - 1540**<sup>23</sup>

a) **The resolution of the bullion problem:**

i) **the role of technology:** came from a series of interrelated technological breakthroughs;

ii) **and they provide yet another example of historical Challenges and Responses:**

(1) one in mechanical engineering

(2) the other in chemical engineering

b) **The region of South Germany:** modern day Saxony, Bavaria, Austria, Bohemia, was the one that had provided these technological breakthroughs.

i) **It had been the principal site of European silver mining for centuries,** and had become the leader of European mining technology.

ii) **This region, which had long been a backwater of the European economy, now came to the forefront of European commerce and finance,** to a large degree because of the silver mining boom that followed from the 1460s.

c) **The drainage problem:** had been resolved by the mid-15th century.

i) **Drainage pumps:**

(1) German mining engineers invented or perfected various horse-powered and water-powered pumping machines, drainage pumps, to pump water from much deeper shafts up to the surface by stages.

(2) The pumps created a vacuum; and air-pressure, acting against this vacuum, thus lifted up the water, from one level of troughs to another level.

ii) **These engineers also developed drainage tunnels called adits:** slits or horizontal shafts in the mountain sides connected with vertical mining shafts, to allow gases and water to drain down the hill sides.

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<sup>23</sup> See John H. Munro, 'The Monetary Origins of the 'Price Revolution': South German Silver Mining, Merchant-Banking, and Venetian Commerce, 1470-1540', in Dennis Flynn, Arturo Giráldez, and Richard von Glahn, eds., *Global Connections and Monetary History, 1470 - 1800* (Aldershot and Brookfield, Vt: Ashgate Publishing, 2003), pp. 1-34; and, in an earlier publication, John Munro, 'The Central European Mining Boom, Mint Outputs, and Prices in the Low Countries and England, 1450 - 1550,' in Eddy H.G. Van Cauwenbergh, ed., *Money, Coins, and Commerce: Essays in the Monetary History of Asia and Europe (From Antiquity to Modern Times)*, Studies in Social and Economic History, Vol. 2 (Leuven: Leuven University Press, 1991), pp. 119 - 83; and John Munro, 'South German Silver, European Textiles, and Venetian Trade with the Levant and Ottoman Empire, c. 1370 to c. 1720: A Non-mercantilist Approach to the Balance of Payments Problem', in Simonetta Cavaciocchi, ed., *Relazione economiche tra Europa e mondo islamico, secoli XIII - XVIII*, Atti delle "Settimana di Studi" e altri convegni, no. 38, Istituto Internazionale di Storia Economica "Francesco Datini" (Florence: Le Monnier, 2007), pp. 907-62. This essay is freely available online (on my Working Papers website) as a pdf file.



iii) **Consequently, miners could now safely construct and operate much deeper mining shafts**, in order to reach hitherto untouched, often rich ore bodies.

**d) The Saigerhütten [Seigerhütten] Process:**

Innovations in chemical engineering were perhaps the greatest, most important triumphs of German mining engineering:

**i) the problem:**

- (1) miners had long known that Central Europe contained vast ore bodies with silver;
- (2) but that silver could not be extracted from its ores because it was mixed with copper,
- (3) and there was no known way of separating out the silver from such ore bodies.
- (4) From Roman times, however, miners had known how to separate silver out from ore bodies containing lead, which has a very low melting point. [Canada: basically has silver-lead ores]

ii) **In the early 15th century, evidently at Nürnberg [Nuremberg]**, some unnamed German engineers hit upon the solution to this problem, called the *Saigerhütten* Process.

- (1) In smelting the raw ores, to extract the metals, lead was added.
- (2) The lead attached itself to the silver, thus separating it from the copper.
- (3) Then in subsequent resmelting, the known principles of silver-lead separation were applied (i.e., lead liquefying at moderate temperatures).
- (4) The first documented application of this process, with an imperial licence, was around 1450, in Saxony, by a German engineer named Johannes Funcken.

iii) **German mining engineers also developed at this time vastly improved smelters called blast furnaces:**

- (1) these new furnaces also employed water-power: to power the leather bellows, that created the intense combustion required for smelting (reducing) the ores:
- (2) that permitted very large scale reductions of raw ores to the metals, at very low unit costs.
- (3) This subject will be treated in the last section of this course, in March: on early-modern industry.

**e) Copper: was a very important by-product of this mining revolution:**

**i) copper was also an important monetary metal:**

- (1) since most silver and gold coins had to be alloyed with some copper (base metal) to give the coin hardness and resistance to wear.
- (2) As noted earlier, copper was chief ingredient in most common form of coinage debasement: adding more and more copper to reduce the silver (or gold) contents of the coin;
- (3) As noted above (in n. 2), the Habsburg Netherlands (modern day Belgium, Luxembourg, and the Netherlands) was the first principality to issue a pure copper coinage: in 1543.<sup>24</sup>

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<sup>24</sup> See John Munro, 'The Coinages of Renaissance Europe, in 1500,' in James Tracy, Thomas Brady Jr., and Heiko Oberman, eds., *Handbook of European History in the Later Middle Ages, Renaissance and Reformation, 1400 - 1600*, Vol. I: *Structures and Assertions* (Leiden: E.J. Brill, 1994), pp. 671-78; and John Munro, 'Money and Coinage: Western Europe', in Jonathan Dewald, et al, eds., *The Dictionary of Early Modern Europe, 1450 - 1789* (New York: Charles Scribner's Sons/The Gale Group, 2004), Vol. 4, pp. 174-

(4) France followed in 1577; Spain, in 1599; and England in 1672.<sup>25</sup>

(5) During the 17<sup>th</sup> centuries, copper coinages became very common in Europe.

ii) **Copper was also an important industrial metal:** more important, in fact, than iron before the Industrial Revolution, for making various metal goods from pots and pans to machinery parts and weapons.

(1) Copper was usually alloyed with other metals:

- with tin to make bronze,
- and with zinc to make brass.

(2) The art of bronze casting in particular, for industrial purposes, arose principally from ecclesiastical needs: namely, from casting bronze church bells.

(3) Bronze-casting for military purposes, to produce bronze cannons, arose directly out of bell-casting in medieval Europe.

(4) Bronze cannon were, by and large, much preferred to cast-iron cannon, even after iron casting was vastly improved in the 15th century with blast smelters: because bronze cannons were both lighter and safer, less likely to explode.

(5) And if bronze cannons did blow up, the fragmentation was less dangerous than with the very brittle cast iron. More on this when we come to modern industry.

iii) **copper goods, including brass and bronze-wares, and military weapons:** were one of few kinds of European manufactures which were in high demand in Asia and Africa; major trading good, along with silver, in purchasing spices and other luxury goods from East Indies, south Asia, and West Africa.

f) **Central European mining boom ensued:** 1460s - 1530s

i) **Discoveries:** These cost-cutting technological innovations and rising demand for both silver and copper led to search for and discovery of vast new silver-cupric ore bodies in Central Europe.

ii) **A veritable mining boom resulted from the 1460s:** expanding mining output more than five-fold over the next 70 years;

(1) and when that boom peaked in the 1530s (or early 1540s), Central Europe was producing about 60,000 kg. (65 metric tons) of pure silver a year.

(2) The much more famous influx of Spanish American silver would not match that volume of Central European silver output until the 1560s.

g) **Consequences of that Central European Mining Boom:**

i) **It made South Germany the leading commercial and financial force in the early-modern European**

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<sup>25</sup> H. E. Van Gelder and Marcel Hoc, *Les monnaies des Pays-Bas bourguignons et espagnols, 1434-1713: Répertoire générale* (Amsterdam, 1960); Herman Van der Wee, *The Growth of the Antwerp Market and the European Economy (fourteenth-sixteenth centuries)*, 3 vols. (The Hague, 1963), vol. I, pp. 123-35; Frank Spooner, *The International Economy and Monetary Movements in France, 1493-1725* (Paris, 1956; Cambridge, MA: Harvard University Press, 1972, for the English edn), Appendix A, p. 332; Christopher Challis, 'Lord Hastings to the Great Silver Recoinage, 1464 - 1699', in Christopher Challis, ed., *A New History of the Royal Mint* (Cambridge: Cambridge University Press, 1992), pp. 365-78; and Appendix 1. Mint Output, 1220-1985, p. 689.

**economy, from mid-15th to mid-16th century.**

(1) The trade in silver greatly enriched South German merchant banking houses (who obtained mining leases by lending large sums to German Emperors);

(2) and stimulated industrial production in metal goods and cheap textiles.

**ii) Major force in rise of Antwerp in Low Countries:**

(1) because so much of that silver was funnelled down Rhine valley routes to Antwerp, in the Low Countries (modern-day Belgium) for international distribution;

(2) and South German silver merchants became dominant bankers in Antwerp.

(3) Those commercial-financial dynamics made Antwerp commercial-financial capital of northern Europe, as we shall see later in the topic on international trade.

**iv) In late 1490s, Portugal, whose mariners were the first to reach the East Indies, made Antwerp their spice staple,** for international distribution of spices: because at Antwerp the Portuguese could obtain the silver and copper goods necessary for purchasing spices and also obtain the South German banking to finance their trade.

**v) This South-German silver served a major role in financing Europe's growing trade with Asia:** to finance the continuing deficits in Europe's Asian trades.

**vi) Monetary Origins of the European Price Revolution: tremendous increase in the supply of silver at much lower cost:** very large stimulus to aggregate market demand and thus to European economic recovery.

(1) Initially that demand stimulated much increased output at current prices, without much cost increase.

(2) But subsequently, when land and other resources came to be more fully utilized, that increased supply of silver, in coined circulation, was reflected in growing inflation, known as 'Price Revolution' of 16th century, a major topic in the second term.

**g) The End of Central European Mining Boom and the Economic Decline of South Germany:**

By the 1540s, this silver-based commercial boom was coming to an end, for several reasons:

**i) First because those Central European silver mines, without further technological innovation, were encountering the inevitable diminishing returns:** were experiencing sharply rising costs and physical depletion.

**ii) Warfare in South Germany:** religious wars between Protestants and Catholics.

**iii) Most important reason: new and cheaper silver supplies.**

(1) By the 1540s, a new, more abundant, and cheaper alternative supply of silver was becoming available from the New World;

(2) we shall return to this question both at the end of this term (when we deal with the commerce of Portugal and Spain),

(3) and in January, when we also deal with the topic of the 16th-century Price Revolution.

**Table 1. The Coinage (Mint) Outputs of England and the Low Countries, in 25-year totals, 1300-24 to 1575-99: in kilograms of pure silver and gold, and in aggregate money-of-account values (Pounds sterling and livres gros, or ponden groot, Flemish)**

Years (25)	ENGLAND		LOW COUNTRIES *			
	Silver kg.	Gold kg.	Current £ sterling	Silver kg.	Gold kg.	Current £ gros F1.
<b>1300-24</b>	403,029	nil	1,260,746			
<b>1325-49</b>	37,602	3,951	291,054			
<b>1350-74</b>	121,629	43,379	2,335,905	155,772	46,449	1,725,341
<b>1375-99</b>	7,462	9,594	442,228	79,172	11,940	843,621
<b>1400-24</b>	18,932	27,312	1,387,601	96,180	529	451,471
<b>1425-49</b>	87,707	6,926	738,082	103,899	17,675	1,652,668
<b>1450-74</b>	68,352	11,557	1,096,728	54,444	6,964	759,957
<b>1475-99</b>	33,655	6,767	632,349	153,645	4,624	1,750,654
				<b>Bruges and Antwerp**</b>		
<b>1475-99</b>				134,650	4,432	1,542,807
<b>1500-24</b>	59,090	18,979	1,569,081	47,789	13,768	1,728,074
<b>1525-49</b>	247,248	21,993	4,666,444	70,280	8,664	1,401,535
<b>1550-74</b>	305,288	5,356	3,580,657	280,958	12,260	4,078,004
<b>1575-99</b>	287,644	4,348	2,924,852	144,398	1,263	2,222,801

**\* Mint output data for the Low Countries:**

(a) Flanders only, 1350-1419;

(b) Flanders, Brabant, Namur, Hainaut, and Holland-Zeeland, 1420-1499;

© Bruges and Antwerp only, 1500-1599.

No Flemish mint data are available before 1334; and for such 25-year totals, the Flemish data commence therefore in 1350. Brabantine mint data are available from the 1370s, but are not included here until 1420, from which time Brabant becomes fully part of the Flemish monetary orbit, so that values of Brabantine mint outputs can be accurately recorded in terms of Flemish pounds (£) gros. Similarly the mints of Holland-Zeeland, Namur, and Hainaut became part of the Flemish-Burgundian monetary system only from the 1420s (when their mint records first become available).

\*\* For 1475-99, Ghent and Mechelen mint outputs are also included in the totals for Bruges and Antwerp. From 1500, we currently have processed continuous mint data only for Antwerp and Bruges -- which were certainly the two leading mints of the southern Low Countries.

**Table 2. Twenty-five Year Means of the Values of Aggregate Coinage Outputs and of the Composite Price Indices in England and the Low Countries, 1300-24 to 1575-99**  
**Mean of Prices in 1450-74 = 100**

Years	ENGLAND			LOW COUNTRIES <sup>a</sup>			BRABANT	
	Mint Outputs in £ sterling	Price Indices 1450-74=100	s.d.*	Mint Outputs in £ gros Flemish	Price Indices 1450-74=100	s.d.*	Price Indices	s.d.*
<b>1300-24</b>	50,430	121.5	33.85					
<b>1325-49</b>	11,642 <sup>+</sup>	102.0	15.66					
<b>1350-74</b>	93,436	135.6	17.40	69,014	89.8	22.99		
<b>1375-99</b>	17,689	108.0	12.37	33,745	108.3	18.00		
<b>1400-24</b>	55,504 <sup>+</sup>	108.1	11.47	18,059	99.4	12.68	74.3	10.10
<b>1425-49</b>	29,523	106.2	17.05	66,107	122.3	23.49	107.1	15.10
<b>1450-74</b>	43,869 <sup>+</sup>	100.0	7.58	30,398	100.0	11.76	100.0	10.24
<b>1475-99</b>	25,294	103.2	18.27	70,026	143.5	46.05	139.8	34.16
				<b>Antwerp and Bruges**</b>				
<b>1475-99</b>				61,712	143.5	46.05	139.8	34.16
<b>1500-24</b>	62,763	114.0	18.97	69,123			140.0	26.46
<b>1525-49</b>	186,658 <sup>+</sup>	166.5	29.18	56,061			187.8	22.24
<b>1550-74</b>	143,226 <sup>+</sup>	285.8	40.76	163,120			316.7	65.53
<b>1575-99</b>	116,994	391.2	94.90	88,912			655.6	208.10

**Explanations:**

<sup>a</sup> **Low Countries:** Flanders only 1350-1420; Low Countries: Flanders, Brabant, Namur, Hainaut, Holland-Zeeland, 1420-1499;

<sup>b</sup> **Antwerp and Bruges:** with Mechelen and Ghent, 1475-99; Antwerp and Bruges alone, 1500-99.

\* standard deviations from the mean.

+ Periods with extensive debasements and/or recoinages in England.

\*\* Flanders only until 1420; from 1421-25 until 1496-1500: Flanders, Brabant, Holland and Zeeland, within the Burgundian Low Countries

**TABLE 3**

**Aggregate Mint Outputs of England and the Low Countries, 1290 - 1520**  
**Gold and Silver Coinage Outputs in kilograms of fine metal and in current**  
**pounds sterling (England) and groot (Flanders/Low Countries)\***

<b>Years</b>	<b>England Gold in kg.</b>	<b>England Gold in £ ster.</b>	<b>England Silver in kg.</b>	<b>England Silver in £ st</b>	<b>England Total in £ st</b>	<b>England Percent Gold</b>	<b>England Percent Silver</b>
<b>1281-85</b>			21,913.31	68,548.73	68,548.73	0.00%	100.00%
<b>1286-90</b>			17,280.60	54,056.78	54,056.78	0.00%	100.00%
<b>1291-95</b>			1,552.35	4,856.03	4,856.03	0.00%	100.00%
<b>1296-00</b>			12,071.42	37,761.55	37,761.55	0.00%	100.00%
<b>1301-05</b>			16,017.47	50,105.48	50,105.48	0.00%	100.00%
<b>1306-10</b>			40,226.55	125,835.83	125,835.83	0.00%	100.00%
<b>1311-15</b>			10,706.71	33,492.50	33,492.50	0.00%	100.00%
<b>1316-20</b>			7,275.68	22,759.61	22,759.61	0.00%	100.00%
<b>1321-25</b>			1,780.11	5,568.49	5,568.49	0.00%	100.00%
<b>1326-30</b>			121.86	381.19	381.19	0.00%	100.00%
<b>1331-35</b>			209.06	665.13	665.13	0.00%	100.00%
<b>1336-40</b>			429.49	1,551.60	1,551.60	0.00%	100.00%
<b>1341-45</b>	240.01	9,859.48	5,077.46	17,710.47	27,569.96	35.76%	64.24%
<b>1346-50</b>	675.84	27,123.30	1,991.05	7,090.87	34,214.17	79.28%	20.72%
<b>1351-55</b>	1,939.78	83,567.73	17,442.91	67,245.28	150,813.01	55.41%	44.59%
<b>1356-60</b>	1,726.70	74,406.84	4,423.02	17,081.46	91,488.31	81.33%	18.67%
<b>1361-65</b>	2,415.24	104,077.76	1,630.81	6,298.11	110,375.86	94.29%	5.71%
<b>1366-70</b>	1,729.03	74,507.35	293.82	1,134.73	75,642.08	98.50%	1.50%
<b>1371-75</b>	802.61	34,586.02	316.97	1,224.11	35,810.13	96.58%	3.42%
<b>1376-80</b>	235.33	10,140.85	356.90	1,378.32	11,519.17	88.03%	11.97%
<b>1381-85</b>	161.84	6,973.80	317.41	1,225.83	8,199.63	85.05%	14.95%
<b>1386-90</b>	504.81	21,753.33	247.51	955.89	22,709.22	95.79%	4.21%
<b>1391-95</b>	626.55	26,999.15	193.49	747.25	27,746.40	97.31%	2.69%
<b>1396-00</b>	391.14	16,855.14	175.60	678.14	17,533.29	96.13%	3.87%
<b>1401-05</b>	168.67	7,268.39	66.34	256.22	7,524.61	96.59%	3.41%
<b>1406-10</b>	69.01	2,973.57	10.59	40.91	3,014.48	98.64%	1.36%



**Aggregate Mint Outputs of England and the Low Countries, 1290 - 1520**  
**Gold and Silver Coinage Outputs in kilograms of fine metal and in current**  
**pounds sterling (England) and groot (Flanders/Low Countries)\***

<b>Years</b>	<b>England Gold in kg.</b>	<b>England Gold in £ ster.</b>	<b>England Silver in kg.</b>	<b>England Silver in £ st</b>	<b>England Total in £ st</b>	<b>England Percent Gold</b>	<b>England Percent Silver</b>
<b>1411-15</b>	1,870.67	89,519.90	967.48	4,483.34	94,003.24	95.23%	4.77%
<b>1416-20</b>	1,035.15	49,563.08	837.76	3,882.48	53,445.55	92.74%	7.26%
<b>1421-25</b>	2,557.31	122,444.37	3,186.02	14,765.09	137,209.46	89.24%	10.76%
<b>1426-30</b>	599.48	28,703.07	6,858.61	31,785.11	60,488.18	47.45%	52.55%
<b>1431-35</b>	220.79	10,571.18	8,059.55	37,350.66	47,921.84	22.06%	77.94%
<b>1436-40</b>	132.27	6,333.30	977.03	4,527.86	10,861.16	58.31%	41.69%
<b>1441-45</b>	90.78	4,346.47	130.70	605.71	4,952.17	87.77%	12.23%
<b>1446-50</b>	64.34	3,080.42	517.37	2,397.68	5,478.10	56.23%	43.77%
<b>1451-55</b>	63.53	3,041.63	1,460.64	6,769.09	9,810.71	31.00%	69.00%
<b>1456-60</b>	26.72	1,279.29	1,415.09	6,558.02	7,837.31	16.32%	83.68%
<b>1461-65</b>	488.12	29,731.33	3,432.92	18,067.35	47,798.68	62.20%	37.80%
<b>1466-70</b>	1,288.16	83,263.99	5,168.09	29,938.35	113,202.34	73.55%	26.45%
<b>1471-75</b>	538.67	34,818.55	2,422.65	14,034.25	48,852.80	71.27%	28.73%
<b>1476-80</b>	404.48	26,144.62	834.68	4,835.25	30,979.88	84.39%	15.61%
<b>1481-85</b>	219.45	14,184.75	995.23	5,765.30	19,950.05	71.10%	28.90%
<b>1486-90</b>	129.75	8,386.73	926.79	5,368.79	13,755.52	60.97%	39.03%
<b>1491-95</b>	268.98	17,386.53	1,270.84	7,361.88	24,748.40	70.25%	29.75%
<b>1496-00</b>	278.93	18,029.24	2,490.94	14,429.82	32,459.06	55.54%	44.46%

**TABLE 3, continued**

**Aggregate Mint Outputs of England and the Low Countries, 1290 - 1520  
Gold and Silver Coinage Outputs in kilograms of fine metal and in current  
pounds sterling (England) and groot (Flanders/Low Countries)**

<b>Years</b>	<b>Flanders/ Low Countries Gold in kg.</b>	<b>Flanders/ Low Countries Gold in £ groot</b>	<b>Flanders/ Low Countries Silver in kg.</b>	<b>Flanders/ Low Countries Silver in £ groot</b>	<b>Flanders/ Low Countries Total in £ groot</b>	<b>Flanders/ Low Countries Percent Gold</b>	<b>Flanders/ Low Countries Percent Silver</b>
<b>1281-85</b>							
<b>1286-90</b>							
<b>1291-95</b>							
<b>1296-00</b>							
<b>1301-05</b>							
<b>1306-10</b>							
<b>1311-15</b>							
<b>1316-20</b>							
<b>1321-25</b>							
<b>1326-30</b>							
<b>1331-35</b>							
<b>1336-40</b>	266.77	3,975.69	3,641.11	4,873.43	8,849.12	44.93%	55.07%
<b>1341-45</b>	1.32	26.60	176.76	310.86	337.46	7.88%	92.12%
<b>1346-50</b>	315.97	6,596.36	5,553.49	11,138.59	17,734.96	37.19%	62.81%
<b>1351-55</b>	1,096.66	24,811.55	5,178.95	11,397.25	36,208.81	68.52%	31.48%
<b>1356-60</b>	3,191.83	80,870.03	8,820.73	21,251.52	102,121.54	79.19%	20.81%
<b>1361-65</b>	2,629.89	77,350.49	3,992.17	11,141.97	88,492.46	87.41%	12.59%
<b>1366-70</b>	1,586.50	50,200.53	10,030.19	32,269.76	82,470.29	60.87%	39.13%
<b>1371-75</b>	825.21	32,921.28	2,215.76	8,315.15	41,236.42	79.84%	20.16%
<b>1376-80</b>	261.20	10,555.07	915.62	3,648.74	14,203.81	74.31%	25.69%
<b>1381-85</b>	529.81	22,941.63	2,816.88	11,467.50	34,409.13	66.67%	33.33%
<b>1386-90</b>	423.11	20,865.91	1,787.71	7,792.29	28,658.20	72.81%	27.19%
<b>1391-95</b>	368.61	14,458.24	3,676.06	14,958.40	29,416.64	49.15%	50.85%
<b>1396-00</b>	324.59	12,731.42	5,791.31	23,507.52	36,238.94	35.13%	64.87%
<b>1401-05</b>	31.54	1,236.90	691.66	2,826.54	4,063.44	30.44%	69.56%
<b>1406-10</b>	19.03	636.25	1,113.70	3,887.99	4,524.24	14.06%	85.94%
<b>1411-15</b>	5.88	196.76	2,484.27	8,665.85	8,862.61	2.22%	97.78%
<b>1416-20</b>	4.31	181.63	3,124.47	15,052.70	15,234.33	1.19%	98.81%

**TABLE 3, continued**

**Aggregate Mint Outputs of England and the Low Countries, 1290 - 1520  
Gold and Silver Coinage Outputs in kilograms of fine metal and in current  
pounds sterling (England) and groot (Flanders/Low Countries)**

<b>Years</b>	<b>Flanders/ Low Countries Gold in kg.</b>	<b>Flanders/ Low Countries Gold in £ groot</b>	<b>Flanders/ Low Countries Silver in kg.</b>	<b>Flanders/ Low Countries Silver in £ groot</b>	<b>Flanders/ Low Countries Total in £ groot</b>	<b>Flanders/ Low Countries Percent Gold</b>	<b>Flanders/ Low Countries Percent Silver</b>
<b>1421-25</b>	41.06	2,195.70	12,143.55	58,804.34	61,000.04	3.60%	96.40%
<b>1426-30</b>	1,105.07	69,470.41	7,999.91	43,326.04	112,796.44	61.59%	38.41%
<b>1431-35</b>	1,774.87	115,353.24	6,609.82	34,252.10	149,605.34	77.11%	22.89%
<b>1436-40</b>	511.94	28,534.39	5,015.22	25,788.39	54,322.78	52.53%	47.47%
<b>1441-45</b>	111.93	6,466.29	102.68	527.55	6,993.84	92.46%	7.54%
<b>1446-50</b>	2.55	148.08	5.91	40.79	188.87	78.41%	21.59%
<b>1451-55</b>	827.29	50,701.69	164.61	880.32	51,582.01	98.29%	1.71%
<b>1456-60</b>	253.14	15,513.92	64.07	408.31	15,922.23	97.44%	2.56%
<b>1461-65</b>	6.60	404.22	0.00	0.00	404.22	100.00%	0.00%
<b>1466-70</b>	253.59	16,400.73	4,628.96	27,867.69	44,268.42	37.05%	62.95%
<b>1471-75</b>	261.20	18,927.51	7,313.98	45,191.72	64,119.24	29.52%	70.48%
<b>1476-80</b>	380.05	29,208.50	9,341.50	67,636.25	96,844.75	30.16%	69.84%
<b>1481-85</b>	58.54	5,216.39	6,534.30	56,337.18	61,553.58	8.47%	91.53%
<b>1486-90</b>	144.64	24,136.96	6,803.60	78,323.90	102,460.86	23.56%	76.44%
<b>1491-95</b>	20.32	1,336.34	2,780.07	19,521.10	20,857.44	6.41%	93.59%
<b>1496-00</b>	474.63	44,464.28	5,109.49	43,603.01	88,067.29	50.49%	49.51%

**sources:** England: Brooke, G.C., and E. Stokes. 1929; Crump, C. G., and C. Johnson. 1913; Challis 1992; Munro (1973, 1981)

Flanders and the Low Countries  
Munro (1973, 1981, 1983a, 1984a, 1984b, 1988a, 1991b)

\* Flanders only until 1420; from 1421-25 until 1496-1500: Flanders, Brabant, Holland and Zeeland, within the Burgundian Low Countries

**Table 4: Silver Outputs from the Major South German-Central European Mines in kilograms of fine metal, in quinquennial means: 1471-75 to 1546-50**

<b>Years</b>	<b>SAXONY</b>	<b>THURINGIA</b>	<b>BOHEMIA</b>	<b>BOHEMIA</b>	<b>SLOVAKIA</b>	<b>HUNGARY</b>	<b>TYROL:</b>	<b>TOTAL</b>
<b>5 -yr pr.</b>	<b>Est. Total</b>	<b>Est. Total</b>	<b>Joachimsthal</b>	<b>Kutna Hora</b>	<b>Fugger- Thurzo kg</b>	<b>Nagybanya</b>	<b>Schwaz</b>	<b>Estimated</b>
	<b>in kg.</b>	<b>in kg.</b>	<b>in kg.</b>	<b>Kasperska Hora in kg.</b>	<b>in kg.</b>	<b>Körmöcbanya in kg.</b>	<b>in kg.</b>	<b>in kg.</b>
<b>1471-75</b>	4,360.94			4,500.0			4,112.50	<b>12,973.44</b>
<b>1476-80</b>	10,317.46			4,250.0			7,354.00	<b>21,921.46</b>
<b>1481-85</b>	3,743.30			4,000.0		1,800.0	9,745.80	<b>19,289.10</b>
<b>1486-90</b>	2,770.04			3,750.0		3,523.0	12,751.00	<b>22,794.04</b>
<b>1491-95</b>	3,757.33			3,500.0	1,957.12	3,523.0	12,422.75	<b>25,160.21</b>
<b>1496-00</b>	4,641.69			3,250.0	1,957.12	3,795.9	12,094.50	<b>25,739.17</b>
<b>1501-05</b>	8,979.23			3,000.0	2,870.47	4,068.7	11,766.25	<b>30,684.65</b>
<b>1506-10</b>	7,416.41	4,626.19		2,750.0	3,990.76	4,341.6	11,438.00	<b>34,562.92</b>
<b>1511-15</b>	6,925.10	5,713.42		2,500.0	3,632.11	4,614.4	11,109.75	<b>34,494.81</b>
<b>1516-20</b>	5,189.14	6,079.43	3,970.00	2,250.0	1,983.07	4,887.3	10,781.50	<b>35,140.43</b>
<b>1521-25</b>	3,701.18	6,301.73	9,703.24	2,000.0	2,486.46	5,160.1	10,453.25	<b>39,806.00</b>
<b>1526-30</b>	3,425.12	7,889.16	13,795.32	2,000.0	2,269.15	5,433.0	10,125.00	<b>44,936.74</b>
<b>1531-35</b>	6,663.07	6,300.90	16,554.81	2,000.0	2,269.15	5,433.0	10,125.00	<b>49,345.92</b>
<b>1536-40</b>	14,973.18	5,734.07	13,248.01	3,947.0	2,243.58	5,433.0	10,125.00	<b>55,703.84</b>
<b>1541-45</b>	7,739.26	6,144.00	10,936.85	3,997.0	2,141.55	5,433.0	9,963.49	<b>46,355.16</b>
<b>1546-50</b>	4,131.66	6,576.20	10,936.85	700.0	2,141.55	5,433.0	9,963.49	<b>39,882.76</b>

**Table 5. Estimates of Aggregate Silver Production from Central European Mines in the Sixteenth Century: annual estimates in kilograms of fine silver**

<b>Years</b>	<b>Germany</b>	<b>Austria-Hungary</b>	<b>TOTAL</b>
*****			
<b>According to Soetbeer (1879):</b>			
1493 - 1520	11,000 kg.	24,000 kg.	35,000 kg.
1521 - 1544	15,000 kg.	32,000 kg.	47,000 kg.
1545 - 1560	19,400 kg.	30,000 kg.	49,400 kg.
1561 - 1580	15,000 kg.	23,500 kg.	38,500 kg.
<b>According to Nef (1941)</b>			
1526-1535	35,100 kg.	49,100 kg.	84,200 kg. (minimum)
		56,100 kg.	91,200 kg. (maximum)

Soetbeer, Adolf, *Edelmetall-Produktion und Werthverhältniss zwischen Gold und Silber seit der Entdeckung Amerika's bis zur Gegenwart* (Gotha, 1879).

Nef, John U., 'Silver Production in Central Europe, 1450-1618', *Journal of Political Economy*, 49 (1941), 575-91

Nef, John U., 'Mining and Metallurgy in Medieval Civilization', in M.M. Postan, ed., *Cambridge Economic History of Europe*, Vol. II: *Trade and Industry in the Middle Ages* (Cambridge, 1952), pp. 456-69; reissued in M.M. Postan and Edward Miller, eds., *The Cambridge Economic History of Europe*, Vol. II: *Trade and Industry in the Middle Ages*, revised edn. (1987), pp. 696-734.

**Table 6. Flemish Coinage Debasement: The Mint Ordinances of June 1418 and November 1428**

<b>Double Groot (Gros)</b>	<b>June 1418</b>		<b>November 1428</b>	
Value in money-of-account <sup>a</sup>	2d <i>groot</i> [or <i>gros</i> Flemish]		2d <i>groot</i> [or <i>gros</i> Flemish]	
Fineness <sup>b</sup> in <i>argent-le-roy</i> (AR)	6 deniers AR =	50.0% fine	5 deniers 8 grains AR =	44.44% fine
	=	47.92% pure	=	42.59% pure
Weight (Taille) <sup>c</sup> in grams	68 cut to the marc	3.599 grams	68.5 cut to the marc =	3.573 grams.
Fine silver content AR in g.		1.800 g.		1.588 g.
Pure silver content in g.		1.725 g.		1.522 g.
<i>Traite per marc</i> <sup>d</sup> <i>argent-le-roy</i>	$\frac{68.0 \times 2d.}{6/12} = \frac{136d}{0.5} =$	22s 8d	$\frac{68.5 \times 2d.}{5.333/12} = \frac{137d}{0.444} =$	25s 8d 6m

<b>Division of the Traite Value per marc argent-le-roy</b>	<b>Value in groot Flemish</b>	<b>Number of coins</b>	<b>Percentage of the traite</b>	<b>Value in groot Flemish</b>	<b>Number of coins</b>	<b>Percentage of the traite</b>
Brassage	1s 2d	7	5.15%	1s 2d 6m	7 1/8	4.62%
Seigniorage	<u>4d</u>	<u>2</u>	<u>1.47%</u>	<u>6d</u>	<u>3</u>	<u>1.95%</u>
Total Mint Charges (of the above)	1s 6d	9	6.62%	1s 8d 6m	10 1/8	6.57%
Mint Price: for merchants' bullion	<u>21s 2d</u>	<u>127</u>	<u>93.38%</u>	<u>24s 0d</u>	<u>144</u>	<u>93.43%</u>
<b>Traite per Marc argent-le-roy</b>	<b>22s 8d</b>	<b>136</b>	<b>100.00%</b>	<b>25s 8d 6m</b>	<b>154 1/8</b>	<b>100.00%</b>

<sup>a</sup> **Values in money-of-account:**

1 penny or 1d groot = 24 mites = 12d or 1s parisis  
 12d groot = 1s (sou, sol, schelling); 1 livre or pond (£1 pound) = 20 shillings = 240d (pence)

<sup>b</sup> **Fineness:**

reckoned out of 12 **deniers argent-le-roy**, with 24 **grains per denier**: 23/24 or 95.833% pure

<sup>c</sup> **Weight:**

reckoned in terms of the **taille** or number cut from the **marc de Troyes** of 8 **onces**: 244.753 g.

<sup>d</sup> **Traite per marc:**

official value of coinage struck per **marc argent le roy**: T = taille x face value/fineness  
 fineness: (Fineness/12 deniers Argent-le-Roy)

Table 7 :

## Alterations of the English Silver Coinage, 1279 -1526

Date	Fineness: out of 1.000	No. of Pence to the Tower Pound 349.9144 g.	Weight of Penny in grams	Grams of Pure Silver in penny	Nominal Value of a Tower lb of Silver 0.925 fine		Nominal Value of kg. Pure Silver in £ sterling
					shillings	pence	
1257+	0.925	242.0	1.446	1.339	20	2	3.112
1279 Dec	0.925	243.0	1.440	1.332	20	3	3.128
1335 May *	0.833	252.0	1.389	1.157	23	4	3.602
1344 Jan	0.925	270.0	1.296	1.199	22	6	3.476
1344 Aug	0.925	266.0	1.315	1.217	22	2	3.424
1345 Sep	0.925	268.0	1.306	1.208	22	4	3.450
1346 Aug	0.925	270.0	1.296	1.199	22	6	3.476
1351 Jul	0.925	300.0	1.166	1.079	25	0	3.862
1411 Nov	0.925	360.0	0.972	0.899	30	0	4.634
1464 Aug	0.925	450.0	0.778	0.719	37	6	5.793
1526 Nov**	0.925	506.3	0.691	0.639	42	2	6.518

**Notes:**

**1257+**The gold penny of Henry III was abortive, did not circulate, because it was so undervalued

**1335\***No pence were coined from 1335 to 1344, but only half-pence and farthings: 21s 0d to a Tower pound of 10 oz silver and 2 oz copper = 23s 4d to a Tower pound of sterling fineness.

**1526\*\*** In 1526, the royal mints switched from the Tower pound of 349.9144 grams to the Troy pound of 373.242 grams;

**Sterling fineness:** 11 oz 2 dwt of pure silver and 18 dwt of copper = 92.5% pure silver



Table 8:

## Alterations of the English Gold Coinage, 1257 -1526

Date	Name	Fineness out of 1.000	No. Cut to Tower Pound 349.9144 g.	Weight in grams of Fine Gold 0.995	Official Value of Coin in pence	Nominal Value of Tower lb. in £ sterling	Nominal Value of Kilogram Pure Gold	Index of Values 1351-1411= 100.00	Gold: Silver Ratios
1257 Aug	Gold penny	0.995	121.000	2.892	20	10.083	28.967	67.220	9.308
1344 Jan	Double Florin	0.995	50.000	6.998	72	15.000	43.092	100.000	12.398
1344 Aug	Noble	0.995	39.500	8.859	80	13.167	37.825	87.780	11.046
1346 Aug	Noble	0.995	42.000	8.331	80	14.000	40.219	93.330	11.571
1351 Jul	Noble	0.995	45.000	7.776	80	15.000	43.092	100.000	11.158
1411 Nov	Noble	0.995	50.000	6.998	80	16.667	47.880	111.110	10.332
1464 Aug	Angel-Noble	0.995	67.500	5.184	80	22.500	64.638	150.000	11.158
	Ryal, Rose Noble	0.995	45.000	7.776	120	22.500	64.638	150.000	
1526 Nov*	Angel-Noble	0.995	67.500	5.184	90	25.313	72.718	168.750	11.157
	St. George Noble	0.995	75.940	4.608	80	25.313	72.720	168.760	
	Crown (22 carats)	0.917	101.250	3.185	60	25.313	72.718	168.750	

## Notes:

1257+The gold penny of Henry III was abortive, did not circulate, because it was so undervalued

1526\*In 1526, the royal mints switched from the Tower Pound of 349.9144 grams to the Troy Pound of 373.242 grams

Table 9.

**Estimates of Venice's 'Balance of Payments Deficit' with the Levant in the 1490s  
(according to Eliyahu Ashtor)**

<b>Aspects of the Levant Trade</b>	<b>Total Value of Imports from the Levant as valued in Venetian ducats</b>	<b>Total Value of Merchandise Exports to the Levant as Valued in Venetian ducats</b>	<b>Total Value of Precious Metal Exports to the Levant (coin &amp; bullion) in Venetian ducats</b>	<b>Percentage of the trade conducted in precious metals</b>
<b>Galley Trade with Alexandria and Beirut: minimum</b>	<b>450,000</b>	<b>150,000</b>	<b>300,000</b>	<b>66.67%</b>
<b>Galley Trade with Alexandria and Beirut: maximum</b>	<b>550,000</b>	<b>190,000</b>	<b>360,000</b>	<b>65.45%</b>
<b>Cog Trade in Syrian Cotton: minimum</b>	<b>130,000</b>	<b>67,500</b>	<b>62,500</b>	<b>48.08%</b>
<b>Cog Trade in Syrian Cotton: maximum</b>	<b>180,000</b>	<b>83,750</b>	<b>96,250</b>	<b>53.47%</b>
<b>Total Trade with Levant: minimum</b>	<b>580,000</b>	<b>217,500</b>	<b>362,500</b>	<b>62.50%</b>
<b>Total Trade with Levant: maximum</b>	<b>730,000</b>	<b>273,750</b>	<b>456,250</b>	<b>62.50%</b>
<b>Estimated Mean Values of Levant Trade</b>	<b>655,000</b>	<b>245,625</b>	<b>409,375</b>	<b>62.50%</b>

## A Glossary of Medieval Minting Terminology

1. **Coin Value:** the officially prescribed exchange value or face value of the coin, which in this example is the Flemish double groot or double gros, worth 2d in the Flemish gros money-of-account system.

2. **Flemish money-of-account:** 12 gros or pence to the shilling (sol, sou, schelling), and 20 shillings to the livre, pond, or pound. The gros or penny was itself divided into 24 mites (mitten).

24 mites	= 1d or 1 gros (pence)
12d	= 1s (sol, schelling, shilling)
20s	= 1 livre (£1) gros Flemish

### 3. **Marc de Troyes:**

The French and Flemish mint-weight unit, consisting of 8 Paris **onces** (ounces), theoretically weighing 244.753 grams.

### 4. **Fineness in argent-le-roy:**

- the term **argent-le-roy** (the king's silver) meant commercially fine silver, about as fine as could be produced, with a purity of 23/24ths or 95.833%,
- as compared to English sterling fineness of 92.5% purity.
- To measure and record fineness or coin alloy, **argent-le-roy** was divided into 12 **deniers** and each **denier** was subdivided into 24 **grains**.
- Thus 6 **deniers** was a coin that was half silver of commercial fineness and half additional copper alloy (only 47.92% pure silver).

### 5. **Taille per marc:**

- literally the number of prescribed coins cut from the alloyed **marc** of the prescribed fineness; and thus the measure of coin weight (as that fraction of 244.753 grams).
- A coin with a taille of 68 per marc had a theoretical mean weight of 3.599 grams.

### 6. **Traite:**

- The total value, in money-of-account, of a **marc** weight of commercially fine silver (the **Marc de Troyes argent-le-roy**) struck into coins of the prescribed denomination or value, taille (weight), and fineness.

- The formula for this **traite** is:

$$T = \frac{tM.V}{F} \quad \text{Traite} = \frac{\text{Taille per Marc} \times \text{Coin Value}}{\text{Percentage Fineness (Argent-le-Roy)}}$$

- For example, from the accompanying table for Flanders in June 1418, the **traite** value of a silver **marc argent-le-roy** as struck into Flemish double gros, worth 2d groot, a **taille** of 68 per marc, and a fineness of 6 deniers **argent-le-roy** would be:

$$T = \frac{68 \times 2d}{6/12} = \frac{136d}{0.5} = 272d$$

$$= 22s \ 8d \ \text{gros}$$

- A fine silver marc was thus struck into 136 double gros, worth in total 272d or 22s 8d gros Flemish.
- **Debasement:** a reduction in the silver content of a coin increases the corresponding **traite** value of silver by the reciprocal:

$$\Delta T = [1/(1 - x)] - 1$$

$$\Delta T = \% \text{ change in the } \mathbf{traite}:$$

$$x = \% \text{ change (reduction) in the silver content (as a decimal)}$$

- Nov. 1428 debasement of 11.8%:  $[1/(1 - 0.118)] - 1 = (1/0.882) - 1 = 1.133 - 1 = 13.3\%$ . increase in the value of the **traite**.

## 7. **Seigniorage:** or **Seignorage**

- a feudal fee or tax on minting, usually expressed as a specific proportion of the **marc argent-le-roy** delivered to the mint for coinage: as an amount in money-of-account, per **marc** of fine metal, silver or gold, payable directly to the prince.
- This was not pure profit, however, because the prince was expected to pay for both the capital and maintenance costs of the mint buildings and the salaries of his monetary officials and mint-assayers.

## 8. **Brassage:**

- a fee imposed on minting to recompense the mint-master for the costs of materials, labour, and enterprise (i.e., his normal profit) in minting coins.
- Like the **seignorage**, it was also levied as a specific money-of-account sum per fine marc, and thus as a proportion of the fine metal delivered to the mint for coinage.

**Monetary Terms for Coinage Changes: Terms for Debasement  
and Reinforcement in English, French and Italian**

<b>DEBASEMENT</b>	<b>REINFORCEMENT</b>
<p><b>debasement of the coinage</b> devaluation affaiblissement (French) indebolimento (Italian) weak money monnaie faible (French)</p>	<p><b>strengthening of the coinage</b> revaluation renforcement (French) rinforzamento (Italian) strong money monnaie forte, forte monnaie (French)</p>
<p>‘cry up’ the coinage enhancement ‘hausser la monnaie’ (French) augmentation (French) alzamento (Italian)</p>	<p>‘cry down’ the coinage abatement  diminution (French) sbassemento (Italian)</p>

**Debasement** means a reduction of the quantity of fine precious metal represented in the units of money-of-account: the penny, shilling, and pound. As a consequence, a greater money-of-account value, or value by **tale**, of coinage can be struck from the mint-weight unit of fine gold or silver (marc or pound).

**Debasement** can be achieved by one or more of the following techniques, or by some combination of them:

- (1) a relative addition of base metal, almost always copper, and thus a relative diminution in the silver or gold content of the specified coin(s) -- the original meaning of the term;
- (2) a reduction in the weight of the coin (i.e., striking more coins to the alloyed marc or pound);
- (3) an increase in the official-money-of-account or exchange value of the coin -- ‘crying up’ its value (generally with gold coins only).

**Reinforcement** is the opposite of debasement: the restoration or addition of precious metal in the unit of money-of-account, by reversing one or more of these techniques.