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Working Paper 417

The Coinages and Monetary Policies of Henry VIII (r.  
1509-1547): Contrasts between Defensive and Aggressive  
Debasements

By John H. Munro

November 26, 2010

**Department of Economics  
University of Toronto  
150 St. George Street  
Toronto, Ontario M5S 3G7  
Canada**

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**Working Paper no. 417 (MUNRO: no. 40)**

Repec Handle: tecipa-461

by John Munro

Tuesday, 23 November 2010

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Department of Economics  
University of Toronto

Author's e-mail: [munro5@chass.utoronto.ca](mailto:munro5@chass.utoronto.ca)

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**Keywords:** coinage debasements, gold, silver, bullion, bullionist policies, mints, mint outputs, seigniorage, brassage, inflation, deflation, fiscal policies, warfare, taxation

**JEL Classifications:** E 31; E41; E42; E51; E52; E62; F33; H11; H27; N13; N23; N43

## **The Coinages and Monetary Policies of Henry VIII (r. 1509-1547): Contrasts between Defensive and Aggressive Debasements**

The renown or infamy of Henry VIII's Great Debasement (1542 - 1553), which the government of his successor, Edward VI, continued for another six years after his death, has unfairly obscured his earlier and far more modest coinage changes and public-spirited monetary policies. Furthermore, despite the renown of and the ample literature devoted to the Great Debasement this unusual episode in early-modern monetary history still lacks a fully accurate exposition and explanation. For example, did it begin in 1542 or 1544? How did it work, and why and how did it prove to be successful or 'profitable'. This study seeks to provide such an accurate exposition and explanation, and thus to provide a proper contrast with Henry VIII's earlier coinage changes and monetary policies – while also providing a brief comparison with those of Edward IV, whose debasements of 1464-65 were the last undertaken before those of Henry VIII.

The subject of coinage debasements remains an arcane subject, ill understood not only by students of European history but also by many of the historians and economists who have published on topics in monetary history. A major problem is that historians have not clearly asked one fundamental question: were debasements fundamentally aggressive or defensive in nature? The second question to be asked is the nature of the goals sought from debasement: were they fundamentally monetary or fiscal? The fiscal aspect of coinage debasements is derived from the fact that in pre-modern western Europe minting was a princely or government monopoly from which the prince or government derived a fee known as seigniorage. The central thesis of this study is that 'aggressive' coinage debasements were undertaken primarily as fiscal policies to increase mint profits: profits from an increased mint output and from an increased seigniorage rate. In most, if not all cases, the fiscal motive was to finance warfare, even if indirectly. As this study shows, aggressive coinage debasements worked best if the offending mint could lure coinage and bullion from not only domestic but also foreign sources. Since neighbouring lands were thus affected and afflicted by such coinage debasements, their rulers were so often forced to respond with retaliatory if purely defensive coinage debasements, to protect their own mints and also their domestic money supplies from the effects of Gresham's Law. Indeed, some variant of Gresham's Law can be found as an excuse for coinage debasements in western Europe, especially from the fourteenth to sixteenth centuries – so that it is often difficult to tell from an ordinance whether a debasement is aggressive or defensive. The other defensive aspect of such coinage debasement was the consequence of long-term 'wear and tear', 'clipping', 'sweating', counterfeiting, and other factors that over time diminished the mean precious metal contents of the circulating coinage. The result was that legal-tender coins lost their agio over bullion – an agio justified by circulating coins at 'tale', rather than measuring them, thus saving on transaction costs. The loss of that agio prevented bullion from being delivered to the mints; and the consequences were another variant of Gresham's Law (as examined in this paper).

In sum this paper explains why Henry VIII's two related coinage debasements of August and November 1526 were purely defensive, and as such monetary policies, while the Great Debasement was an aggressive fiscal policy, and one highly effective in financing Henry VIII's wars with France and Scotland. The Great Debasement was not, however, medieval England's only aggressive debasement, for the same can be shown of Edward IV's debasements of 1464-65. The proof for these assertions lies in the mint accounts and the evidence for the mintage fees: low with purely defensive debasements; high with aggressive debasements (a factor that would not have been true if aggressive debasements were monetary in their motivations). Finally, this study also presents proof that the extent of inflation during the Great Debasement (1542-1553) was less than that anticipated by monetary formulae, so that inflation did not nullify the merchants' gains from spending debased coins (a reason some have cited to challenge the logic and utility of medieval coinage debasements).

**Keywords:** coinage debasements, gold, silver, bullion, bullionist policies, mints, mint outputs, seigniorage, brassage, inflation, deflation, fiscal policies, warfare, taxation, Henry VIII.

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## **The Coinages and Monetary Policies of Henry VIII (r. 1509-1547): Contrasts between Defensive and Aggressive Debasements**

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The infamy of Henry VIII's Great Debasement, which began in 1542 and was continued by his successors for another six years after his death, until 1553, has obscured the previous monetary changes of his reign, especially the two linked debasements of 1526. Certainly the ensuing Great Debasement was by far the most severe ever experienced in English monetary history, and was one of the worst experienced in late medieval and early-modern Europe, while the 1526 debasements were relatively minor changes, in comparison with most other such monetary changes, whether in England or continental Europe.<sup>1</sup> An analysis of the reasons for the very sharp contrast between the two sets of Henry VIII's coinage debasements provides us with a far better understanding of the nature and economics of this very widely practised coinage policy that some historians have unkindly labelled 'mint manipulation'. In essence, we must view late-medieval and early-modern debasements as either aggressive fiscal policies or defensive monetary policies, and understand their fundamental differences.

### **COINAGE DEBASEMENTS**

Coinage debasement is a complex, arcane, and confusing topic for most readers, and indeed for most historians. Put simply, however, we may say that it meant a reduction of the fine precious metal contents, silver or gold, represented in the unit of money-of-account. That generally also meant (though not always) a physical diminution of the precious metal contents in the affected coins. Thus the nature and consequences

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<sup>1</sup> The four classic accounts of Henry VIII's debasements, are, in chronological order: Frederick C. Dietz, *English Government Finance, 1485-1558*, University of Illinois Studies in the Social Sciences, vol. IX (Urbana: University of Illinois Press, 1920), pp. 137-59, 175-91; Sir Albert Feavearyear, *The Pound Sterling: a History of English Money*, 2<sup>nd</sup> edn. revised by E. Victor Morgan (Oxford: Clarendon Press, 1963), pp. 46-86; Christopher E. Challis, 'The Debasement of the Coinage, 1542 - 1551', *Economic History Review*, 2<sup>nd</sup> ser., 20:3 (Dec. 1967), 441-66; and J. D. Gould, *The Great Debasement: Currency and the Economy in Mid-Tudor England* (Oxford: Clarendon Press, 1970). See also C. E. Challis and C. H. Harrison, 'A Contemporary Estimate of the Production of Gold and Silver Coinage in England, 1542 - 1556', *English Historical Review*, 88: no. 349 (Oct. 1973), 821-35; C. E. Challis, *The Tudor Coinage* (Manchester and New York: Manchester University Press, 1978); C. E. Challis, 'Lord Hastings to the Great Silver Recoinage, 1464 - 1699', in C. E. Challis, ed., *A New History of the Royal Mint* (Cambridge and New York: Cambridge University Press, 1992), pp. 179-397; and C. E. Challis, *Currency and the Economy in Tudor and Early Stuart England*, Historical Association pamphlets no. 4 (London: Chameleon Press, 1989).

of coinage debasements depended on the relationship between coins and moneys-of-account: that is, the accounting system used to reckon prices, values, wages, other payments, receipts of income, and so forth.

### **The relationship between coins and moneys-of-account**

The English money-of-account, closely based on the monetary system that Charlemagne's government had established between 794 and 802, was the pound sterling.<sup>2</sup> This particular money-of-account, with 12 pence (d) to the shilling (s) and 20 shillings to the pound (and thus 240 pence to the pound), remained the most prevalent in western Europe until the French Revolution. The Carolingian pound, as a money-of-account, was worth one pound of silver in corresponding new Carolingian weight (displacing the old Roman pound), which contained 12 ounces (489.506 grams).<sup>3</sup>

The only coins struck were, however, the silver penny and its subdivisions (half and quarter pennies, and even smaller coins). Larger denomination, full-bodied silver coins, those that Carlo Cipolla called *moneta grossa* – known as *grossi* in Italy and *gros* in France – were not struck until the later twelfth century, accompanying a major inflationary expansion in European silver mining.<sup>4</sup> Many of these *grossi* and the

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<sup>2</sup> John Munro, 'Money and Coinage of the Age of Erasmus: An historical and analytical glossary with particular reference to France, the Low Countries, England, the Rhineland and Italy', in Sir Roger Mynors, Douglas Thomson, and Wallace Ferguson, eds., *The Collected Works of Erasmus: The Correspondence of Erasmus*, Vol. 1: *Letters 1 to 151, A.D. 1484 - 1500* (Toronto: University of Toronto Press, 1974) [Hereafter: CWE], pp. 328-29, 330-31; Appendix E, p. 347.

<sup>3</sup> See Etienne Fournial, *Histoire monétaire de l'Occident médiéval* (Fernand Nathan: Paris, 1970), pp. 24-27 whose arguments are quite complex. The new Carolingian pound weight of 489.5058 grams was designed to be 1.5 times the weight of the old Roman pound of 12 ounces (or 18 Roman ounces), which, according to Fournial, had once weighed 327.453 grams, but had diminished slightly to 326.337 grams by the ninth century. These weights have been challenged by other numismatists (by even more complex arguments), who variously offer alternative weights for the Carolingian pound: 408.0 g., 411.36 g., 459.36 g., and 483.33 g. For a summary, see Willem Blockmans, 'Le poids des deniers carolingiens', *Revue belge de numismatique et de sigillographie*, 119 (1973), 179-81. In support of Fournial's views is the indisputable fact that the later *livre de Paris* (composed of 16 *onces*) also weighed exactly 489.506 grams; and the *marc de Troyes*, the mint weight used in France and most of the Low Countries, with half its weight (8 *onces*), weighed 244.753 grams. For these weights, and documentary analyses, see John Munro, 'A Maze of Medieval Monetary Metrology: Determining Mint Weights in Flanders, France and England from the Economics of Counterfeiting, 1388 - 1469', *The Journal of European Economic History*, 29:1 (Spring 2000), 173-99.

<sup>4</sup> The First *grossi* were issued in Genoa in or about 1172 (worth 4d); then in Venice in 1192 (worth 26 *denari*); in Florence, in 1237 (*fiorino*); in Milan, about 1250; in France, with Louis IX's great monetary

French *gros tournois* (of 1266) represented the shilling: that is, they were worth 12 pence in the local money of account. In England, the first coin larger than the penny did not appear until Edward I's recoinage of 1279: the groat, worth only 4d sterling.<sup>5</sup> The shilling coin (worth 12d) did not appear, at least as a regular issue, until the reign of Henry VIII: the *testoon* of May 1542 (issued with the commencement of the Great Debasement).<sup>6</sup>

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reform of 1266 (silver *gros tournois* = 12d *tournois*); in Flanders, from 1275 (the *groot*, imitating the *gros tournois*); and in England, from 1279 (the *groat* = 4d sterling.) See Carlo Cipolla, *Money, Prices, and Civilization in the Mediterranean World: Fifth to Seventeenth Century* (New York: Gordian Press, 1967), pp. 14-15 (quotation), 42-51; Peter Spufford, *Money and its Use in Medieval Europe* (Cambridge and New York: Cambridge University Press, 1988), pp. 109-62; and Appendix 1, pp. 404-06; Fournial, *Histoire monétaire*, pp. 78-80.

<sup>5</sup> Nicholas J. Mayhew, 'From Regional to Central Minting, 1158 - 1464', in C. E. Challis ed., *A New History of the Royal Mint* (Cambridge and New York: Cambridge University Press, 1992), pp. 120-28.

<sup>6</sup> Also known as 'teston', 'tester', and the 'sovereign groat'. When the testoon was first issued is still the subject of much vexatious dispute. Several monetary historians have contended that the initial issues took place in or about 1504, under Henry VII (r. 1485-1509): see Feavearyear, *Pound Sterling*, Appendix III.ii, p. 439; W.J.W. Potter and E.J. Winstanley, 'The Coinage of Henry VII', *British Numismatic Journal*, 30 (1961), 262-301; 31 (1962), 109-24 – esp. pp. 109-112 ('shillings'); 32 (1963), 140-60; and E. J. Winstanley, 'The Sovereign Groat of Henry VII', in R. A. G. Carson, *Mints, Dies, and Currency: Essays Dedicated to the Memory of Albert Baldwin* (London: Methuen and Co, 1971), pp. 161-64 (very inconclusive: the coin in question may be a fraud). See also Challis, *Tudor Coinage*, pp. 48-49, 60-61. While admitting that there is no documentary evidence for its issue under Henry VII, Challis states that 'it does seem reasonable to suppose that the three 'sovereign type' denominations – the penny, groat, and sovereign [shilling] – stemmed from the decision to introduce new designs in 1489', when indeed the gold sovereign, worth 20s or £1, was first struck (Tower Mint indenture of 28 October 1489, which mentions no silver coins at all). Arguing in favour of this thesis on numismatic grounds, while also citing dubious evidence from some chroniclers (Fabian, Vergil, Holinshed), Challis presents a photograph of a silver testoon, purportedly issued under Henry VII, dating from 'c. 1504' (p. 48, fig. 13). The first problem for such a dating is that two royal proclamations on coinage, issued on 5 July 1504 and 27 April 1505, do not mention any such coins worth 12d, but only groats (4d), half-groats (2d), and pennies (1d); and the same is true of four later monetary ordinances, issued on 25 May 1522, 24 November 1522, 6 and 8 July 1525. They are all published in Paul L. Hughes and James F. Larkin, eds., *Tudor Royal Proclamations*, 2 vols. (New Haven and London: Yale University Press, 1964), Vol. I: *The Early Tudors (1485-1553)*, no. 54, pp. 60-61; no. 57, pp. 70-71; no. 88, p. 136; no.95, p. 141; no. 102, p. 145; no. 103, p. 146. The second problem is that no mint indentures (instructions) of Henry VII, issued from the time of the gold sovereign of 1489, make any mention of silver coins worth 1s. The Tower mint indenture of 22 November 1505 lists only groats (4d), and coins worth 2d (half-groats), 1d, 1/2d, and 1/4d (farthings), as do all the subsequent mint indentures before the Great Debasement. Thus the first extant mint document to list specific issues of the 'testoon' or shilling coin is the Tower Mint indenture of 16 May 1542. Since this coin was issued at the commencement of the Great Debasement, the testoon was struck not of sterling silver but of 9 oz 5 dwt fineness. See Christopher E. Challis, 'Appendix 2: Mint Contracts, 1279 - 1817', in C. E. Challis, ed., *A New History of the Royal Mint* (Cambridge and New York: Cambridge University Press, 1992), pp. 717-21. (Challis gives

The relationship between the silver coinage and the Carolingian-style moneys of account that so commonly appear in the commercial documents, correspondence, and literature of this era – for example, the English pound sterling, the French *livre tournois*, the Flemish *pond groot (livre gros)* --is a simple one. The silver penny coin always equalled in value one penny (d) in the local money-of-account, so that the value of one pound in the local money-of-account always equalled the value of 240 currently circulating silver pennies (*deniers*), irrespective of the changes in their silver contents that had resulted from centuries of debasements.<sup>7</sup>

### **Methods of coinage debasements in medieval and early-modern Europe**

A coinage debasement, whether for silver or for gold, was implemented by one or more of three techniques: (1) a reduction in its fineness, so that less silver or gold and consequently more base metal (usually copper) composed the coin's alloy; (2) a reduction in weight; and (3) an increase in the nominal or money-of-account value of the coin. An increase in the nominal value of a gold coin – the English gold noble, for example, from 6s 8d (80d) to 7s 4d (88d) – constituted a debasement in that a lesser quantity of precious metal (in this case, fewer grams of gold) was represented in the unit of money-of-account.

The third method was applied only rarely to silver coinages in continental Europe, and never in England. Because most silver coinages were rigidly tied to their respective moneys-of-account, so that, as just indicated, the penny coin always represented one penny (d) in the money-of-account, increases in nominal coin values were necessarily applied only to those high-value silver coins whose silver contents

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a fineness of 9 oz 2 dwt; but see below, nn. 65-72). The first mention of 'testons' in Hughes and Larkin, *Tudor Royal Proclamations*, I, is doc. no. 302, p. 420: for 10 April 1548: 'calling in testons because of counterfeiting'.

<sup>7</sup> Peter Spufford, 'Coinage and Currency', in M. M. Postan et al., eds., *Cambridge Economic History of Europe*, Vol. III: *Economic Organization and Policies in the Middle Ages* (Cambridge: University Press, 1963), pp. 576-602; Spufford, *Money and Its Use*, Appendix II, 'Money of Account', pp. 411-14; Hans Van Werveke, 'Monnaie de compte et monnaie réelle', *Revue belge de philologie et d'histoire*, 13 (1943), 123-52; reprinted in Hans Van Werveke, *Miscellanea mediaevalia: Verspreide opstellen over economische en sociale geschiedenis van de middeleeuwen* (Ghent: E. Storia-Scientia, 1968), pp. 133-58; Herman Van der Wee, *The Growth of the Antwerp Market and the European Economy, 14th to 16th Centuries*, 3 vols. (The Hague, 1963), I: *Statistics*, Part I, chapter 3: 'Money and the History of Prices', pp. 107-36.

remained unchanged when the penny coin and its subdivisions were subjected to debasements that reduced their fine silver contents.<sup>8</sup> The same was true for gold coins, when their precious metal contents remained unchanged, especially following a debasement of the silver coinage. When silver coins were debased, the relative or exchange values of the gold coins almost always increased, as market forces drove up their values, which were expressed in the silver-based money of account. Princes then had no alternative but to raise the money-of-account values, or exchange rates, on their gold coins, in order to maintain the same equilibrium between the mint's value and the market values for precious metals, so that merchants would not export gold coins and bullion to foreign markets.

For English silver coins, therefore, we may focus on the first two methods – reductions in fineness and in weight – both of which necessarily increased the number of coins of a given denomination struck from a pound weight of pure silver. The English term debasement indicates an adulteration of the coin's fineness, a change in the ratio of its two components in its alloy, silver and copper. All coins contained at least some copper to serve as a hardening agent: in order to provide greater durability and thus to reduce wear and tear on the silver or gold, both very soft metals. Most medieval and early modern princes could not resist the temptation to add more copper to their coins, thus reducing their silver or gold contents. Before and after the Great Debasement of Henry VIII and Edward VI, the English monarchy provided a rare exception to the continental practices. Indeed, the purity or fineness of England's silver coins remained amongst the best in Europe: as 'sterling silver', with 11 ounces 2 dwt (pennyweight) of silver and 18 dwt of copper, for a total of 12 Troy ounces, so that the silver fineness or purity was 92.50 percent.<sup>9</sup> Historically, that was or became

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<sup>8</sup> An early and prime example was the fate of Louis IX's *gros tournois*, struck from 1266 with commercially fine silver (*argent-le-roy* = 23/24 or 95.833% pure silver), worth 12 d. *tournois*, during Philip IV's debasements of the petty silver *deniers*, from 1295. The *gros* itself was then left untouched so that its relative value (relatively higher silver contents), as did its value: from 12d to 20d by 1301. Fournial, *Histoire monétaire*, pp.87-89.

<sup>9</sup> According to Mayhew, 'Central Minting', pp. 109-10, and nn. 79-81, English mint documents provide proof that pennies and groats were struck from sterling silver, with 18 dwt copper, as early as 1279-80. But these documents, published in Charles Johnson, ed., *The De Moneta of Nicholas Oresme and English Mint Documents: Translated from the Latin* (London: Thomas Nelson and Sons, 1956) do not precisely confirm that statement. Thus the *Tractatus Nove Moneta* (ca. 1280), p. 66, states that English



the official ‘standard’ of silver fineness. The only prior and temporary exception had taken place in 1335, when Edward III’s government reduced the fineness to 10 ounces of silver (83.333 percent fine), and then only for half-pennies (no full pennies were struck). The Great Debasement thus marked the second and final exception, when the silver fineness was reduced, ultimately, to just 3 ounces of silver (25.00 percent fine): in April and October 1551, and again, finally, in June 1553 (Table 1, part 1).<sup>10</sup>

For gold coins, the English standard was the almost universal one of 24 carats, with subdivisions in grains. From the introduction of the gold florin in December 1343, and then of its replacement, the gold noble in July 1344, English gold coins were as fine as any others: as fine indeed as the Florentine florins and Venetian ducats, at 23 carats 3.5 grains = 23.875 carats (99.479 percent pure).<sup>11</sup> Only with Henry VIII’s monetary changes of 1526 was that standard reduced for gold coins: initially, to 22 carats (91.667 percent fine). Debasements of both coinages by such reductions in fineness were far more common in medieval and early- modern Italy, the Low Countries, France, and Spain – where the more appropriate term was

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Sterlings contain 18.5 dwt of copper (‘de cupro pondus xviii sterlingorum et oboli’); and the ‘De cuneo et monetario’ (The St. Edmundsbury Trial Plate), of ca. 1280 states (p. 86) that ‘the pound must contain 11 oz 2 ¼ dwt of fine silver (de fin argent xi unces, ii esterlings, et j ferling), and the rest alloy (i.e., 17.75 dwt copper). See also Johnson’s introduction, p. xxvii and n. 2. For the silver mint standard in France and the Low Countries (*argent-le-roy*), see nn. 3, 8 above and Munro, ‘Money and Coinage’, *CWE*, Vol.I, pp. 312, 330.

<sup>10</sup> Challis, ‘Mint Contracts’, pp. 700 (July 1335) and 728 (June 1553).

<sup>11</sup> See Munro, ‘Money and Coinage,’ *CWE*, Vol. I, pp. 313, 314, 316, 325-26. There was no European uniformity in using grains to indicate gold fineness, not even in England, where grains were reckoned either out of 4 or out of 12. Thus the fineness for gold nobles at 23 carats 3.5 grains (out of 4) was often also given as 23 carats 10.5 grains, both meaning 23.875 carats. J. D. Gould, in his *Great Debasement*, Table 11, p. 12 (on the gold coinages of 1526-1560), failed to recognize this anomaly, incorrectly believing that all gold grains were reckoned in terms of a total of 12, and thus providing an incorrect lower fineness for coins described as 23 carats 3.5 grains. Italian florins and ducats were never struck with a full 24 carats, but were comparable to English nobles in fineness; for, as noted in the text, all coins required at least some copper as the requisite hardening agent. See Mario Bernocchi, *Le monete della Repubblica fiorentina*, 5 vols. (Florence: Leo S. Olschki, 1974), vol. III: *documentazione*, pp. 55-75, 110-20 (tables of fineness, 1252-1531, when the *fiorino d’oro* was last struck). See also Frederic C. Lane and Reinhold C. Mueller, *Money and Banking in Medieval and Renaissance Venice*, vol. I: *Coins and Moneys of Account* (Baltimore and London: The Johns Hopkins University Press), pp. 229-30: usually ‘better than 23 ¾ carats’, and thus often better in fineness than many Florentine florins.

*affaiblissement* (French) or *indebolimento* (Italian): meaning enfeebling or weakening the coinage, and were more commonly undertaken concurrently with reductions in the coin's weight.

In England, the standard mint-weight, from the era of William the Conqueror to the monetary changes of Henry VIII in 1526, was the Tower Pound, which weighed 11.25 Troy ounces (349.914 grams), and contained 5400 Troy grains (480 grains to the ounce).<sup>12</sup> The earliest reliable documents for English silver coinage come from the reign of Henry III (r. 1216-1273), with more or less continuous mint accounts from 1235.<sup>13</sup> These and other documents indicate that 242 silver pennies were then struck from the Tower Pound – close to the Carolingian standard of 240 to the pound – so that each penny weighed 22.314 Troy grains (1.446 grams). With a fineness of sterling silver, it contained 1.337 grams of pure silver. In England, as in most European countries, the historic monetary pattern was a periodic but continuous loss of the penny's silver contents, so that the final English silver coin issued (issued in February 1817), with the standard sterling silver fineness, had a weight of 7.273 Troy grains (0.471 grams), and thus it contained only 0.436 grams of fine silver.<sup>14</sup> Hence, over almost six centuries the English silver penny had lost almost two-thirds – 64.95 percent – of its fine silver contents.

That six-century reduction in silver contents was in fact considerably less than that incurred during the Henrician Great Debasement of 1542-1553, which finally removed 83.10 percent of the penny's silver contents.<sup>15</sup> Seven years after the Great Debasement had ceased (June 1553: see Table 1, part 1), Elizabeth

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<sup>12</sup> Munro, 'Money and Coinage', *CWE*, Vol. I, p. 332.

<sup>13</sup> Christopher E. Blunt and John D. Brand, 'Mint Output of Henry III', *The British Numismatic Journal*, 3<sup>rd</sup> series., 39 (1970), 61-65, for London and Canterbury, including some partial accounts from July 1220. See also Mayhew, 'Central Minting', pp. 99-107.

<sup>14</sup> Feavearyear, *Pound Sterling*, Appendix III.ii, p. 439; Blunt and Brand, 'Henry III', pp. 61-65; Challis, 'Mint Contracts', Appendix II.

<sup>15</sup> Between May 1542 and April 1551, the silver content of the English penny was reduced from 0.639 gram fine silver (as established by the recoinage of November 1526) to just 0.108 gram. In October 1551, the silver contents were restored to 0.477 gram, then reduced to 0.216 gram in December 1551. In June 1553, they were temporarily increased to 0.259 gram. In August 1553, the silver contents were restored to 0.475 gram; and then slightly increased again to 0.480 gram with the Elizabethan recoinage of November 1560. The silver coinage then remained untouched for four decades, when, in July 1601, its fine silver

I imposed a *renforcement* or ‘strengthening’ and partial restoration in the renowned Recoinage of November 1560. The traditional monetary standard of sterling silver standard (11 oz 2dwt) was indeed fully restored (from the 3 oz of silver in June 1553, and then from 11 oz of silver in August 1553), but the silver penny’s weight was restored to just 8.000 Troy grains (0.518 gram), much less than the 10.667 grains (0.691 grams), as prescribed for Henry VIII’s silver coinages from 1526 to 1542. Thus, combining changes in both weight and fineness, we find that Elizabeth’s reformed coinage of 1560 contained only 75.12 percent as much silver as did Henry VIII’s coins from 1526 to the onset of the Great Debasement: 0.480 grams vs. 0.639 grams pure silver. From the 1560 Elizabethan Recoinage to the final silver coinage issued in 1817, the penny lost only 9.167 percent of its pure silver contents.<sup>16</sup>

That loss may usefully be compared with the 11.11 percent reduction in the penny’s fine silver contents that took place with Henry VIII’s debasement of the silver coinage (but not his first debasement), in November 1526. As large as that may appear to be, it was much less the 20.00 percent reduction in silver contents that Edward IV had imposed in the previous debasement, of August 1464, and obviously far less than the 83.10 reduction experienced during the Great Debasement of 1542-53.<sup>17</sup>

### **The motivations for coinage debasements:**

The first major difference between the 1526 debasements and the Great Debasement was the former’s very modest reduction in the penny’s fine silver contents (11.11 percent) and the drastic, indeed unprecedented reductions (83.10 percent), though the differences in the debasements of gold were more

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content was reduced to 0.464 gram. Thereafter, the silver penny remained unchanged until the final debasement, of 6 February 1817, by which the penny’s pure silver content was diminished to 0.436 gram. See Challis, ‘Mint Contracts’, pp. 721-58, and Table 1; Feavearyear, *Pound Sterling*, Appendix I, p. 435; Appendix III.ii, p. 439. See below Table 1, part 2.

<sup>16</sup> Challis, ‘Mint Contracts’, Appendix 2; Feavearyear, *Pound Sterling*, Appendix III.ii, p. 439.

<sup>17</sup> See Table 1, part 1. For Edward IV’s debasement, and associated monetary changes of 1464-65, see John H. Munro, *Wool, Cloth and Gold: The Struggle for Bullion in Anglo-Burgundian Trade, 1340-1478*, Centre d’Histoire Économique et Sociale (Brussels: Editions de l’Université de Bruxelles; and Toronto: University of Toronto Press, 1973), pp. 157-63; Christopher E. Blunt and C. A. Whitton, ‘The Coinages of Edward IV’, *British Numismatic Journal*, 5 (1948), 53-56; Nicholas Mayhew, ‘The Monetary Background to the Yorkist Recoinage of 1464-1471’, *British Numismatic Journal*, 44 (1974), 62-73.

modest (see Tables 1 and 2). The second major difference was in what motivated them. The 1526 debasements were undertaken as a purely defensive monetary policy, designed to protect the English money supply and the economic viability of the royal mints. In sharp contrast, the Great Debasement was implemented and maintained for eleven years as an aggressive fiscal policy, designed to increase the king's mint profits.

### **1/ Aggressive fiscal policies and inflation**

One of the greatest incentives for medieval and early modern coinage debasements was the lust for much greater mint revenues, derived from the ruler's princely prerogative to exact a seigniorage tax on minting. In an era when many princes found that their feudal incomes were severely limited (often by custom) and taxes difficult to impose and collect, seigniorage revenues often provided them with very substantial incomes.<sup>18</sup> As the fourteenth-century French philosopher Nicholas Oresme contended in his famous treatise *De Moneta*:<sup>19</sup>

I am of the opinion that the main and final cause why the prince pretends to the power of altering the coinage is the profit or gain from which he can get from it; it would otherwise be vain to make so many and so great changes.... Although all injustice is in a way contrary to nature, yet to make a profit from altering the coinage is specifically an unnatural act of injustice.

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<sup>18</sup> See Hans Van Werveke, 'Currency Manipulation in the Middle Ages: the Case of Louis de Male, Count of Flanders', *Transactions of the Royal Historical Society*, 4<sup>th</sup> ser., 31 (1949), 115-27, reprinted in Hans Van Werveke, *Miscellanea mediaevalia: verspreide opstellen over economische en sociale geschiedenis van de middeleeuwen* (Ghent: E. Storia-Scientia, 1968), pp. 255-67; Arthur J. Rolnick, François R. Velde, and Warren E. Weber, 'The Debasement Puzzle: An Essay on Medieval Monetary History', *Journal of Economic History*, 56:4 (December 1996), 789-808, 795-98; Munro, *Wool, Cloth, and Gold*, pp. 11-41, Appendix I, Tables F - I, pp. 202-08. See also nn. 20-21 below.

<sup>19</sup> Quotations from the editor's translations, in Johnson, *De Moneta*, chapter 15, p. 24 (first quotation): 'Videtur michi quod principalis et finalis causa propter quam princeps sibi vult assumere potestatem mutandi monetas, est emolumentum vel lucrum quod inde potest habere'; chapter 16, p. 25 (second quotation). The official title of Oresme's treatise is *Tractatus de Origine, Natura, Jure, et Mutationibus Monetarum*. On the importance of Oresme (ca. 1320-1382), see Johnson, pp. ix - xviii; Spufford, *Money and Its Use*, pp. 295-305.

Oresme, it should be noted, never admitted the possibility that some debasements were defensive in nature (for reasons to be explained later); nor did he observe that the necessity underlying most debasements now regarded as ‘aggressive’ was financing warfare (including defence).<sup>20</sup>

The medieval opposition to such aggressive coinage debasements stemmed from the all too visible consequences: rising prices –that is, inflation -- and the consequent loss of purchasing power, especially for those living on fixed-incomes. While wage earners almost always suffered from inflation, the most vocal opponents of debasements were the landed nobility, whose rents and feudal dues were chiefly defined, by the later Middle Ages, in money-of-account, rather than in kind (harvest shares) and labour services. Some historians argue that inflation resulted from the combined responses of those producers, tradesmen and merchants who sought to compensate for the loss of precious metals received in the debased coin by raising prices. But most economists, rightly noting that debasements increased the quantity of coins (of a given denomination), contend that the inflation resulted instead from the increase in the money supply.

My own recent research indicates, however, that inflation, if almost always the inevitable result of coinage debasements, was never proportional to the extent of the debasement, nor indeed never as much as the traditional Quantity Theory of Money would indicate, for several reasons. First, the common notion that, say, a ten-percent debasement would lead to a ten-percent increase in the coinage supply is fallacious, because it ignores the reciprocal nature of the two changes involved: that is, the reduction of the quantity of precious metal, silver or gold, in the money-of-account units (the penny, shilling, and pound) and the increase in the money-of-account value of the coinage struck from a pound of fine silver or gold.

The mathematical formula to express this reciprocal relationship is:  $\Delta T = [1/(1 - x)] - 1$ . In this formula, the letter T is the *traite*: the total money-of-account value of the coins struck from a pound of pure

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<sup>20</sup> Johnson, *De Moneta*, p. xi, makes this same point: that a common motive for debasement was ‘the wear of current coin’, but one not mentioned by Oresme. See below, pp. 000 for the explanation. For the almost inevitable link between warfare and coinage debasements – beginning with Philip IV of France (r 1285-1314) – see Spufford, *Money and Its Use*, pp. 289-318; and John Munro, ‘Coinage Debasements in Burgundian Flanders, 1384 - 1482: Monetary or Fiscal Policies?’ in David Nicholas, James Murray, and Bernard Bacharach, eds., *Comparative Perspectives on History and Historians: Essays in Memory of Bryce Lyon (1920-2007)* (Kalamazoo, MI: Medieval Institute Publications), in press.

gold or silver, as the case may be.<sup>21</sup> The Greek letter  $\Delta$  means the percentage rate of change in that *traite* value; and the letter  $x$  represents the percentage reduction in the gold or silver content of the pound sterling (or, for silver, in the penny coin linked to the penny and pound in money of account). If we take the example of Henry VIII's silver debasement of November 1526, which reduced the fine silver content of the penny by 11.111 percent (one ninth), and use that number in this equation, we find that:  $[1/(1 - 0.111)] - 1 = 0.1250$ , or 12.50 percent. That means that the *traite* or total coined value of a Troy pound of silver increased by 12.50 percent, a calculation that is verified in Tables 1 and 2.

This silver debasement probably did not, however, produce a corresponding 12.50 percent increase in the aggregate English money supply for several reasons. If the bimetallic mint ratio was not correspondingly adjusted – and it was not, in November 1526 – such a debasement would have led to some outflow of the gold coinage. At the same time, the debasement may not have succeeded in reminting all the former issues of silver coins, some of which may have been hoarded or exported. Furthermore, the effects of these coinage changes, and related economic changes (see below) on the supply of credit, an important component of the money supply, cannot possibly be calculated.

Nor may we assume, even if the aggregate money supply had increased by 12.50 percent, that such an increase would have led to a proportional increase in the price level, as the traditional Quantity Theory of Money would indicate. Any inflationary increase in the money supply may have been offset, to some degree, by both a reduction in the velocity or 'turnover' of the circulating units of money (coins and credit instruments) and by any subsequent increase in the volume of production and trade, especially in response to rising prices. Those changing relationships can be seen in the formula for the revised Quantity Theory of Money:  $M.V = P.y$ , in which the four components are calculated in annual aggregate 'national' terms. M

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<sup>21</sup> The alternative term 'mint equivalent' was first introduced in Gould, *Great Debasement*, p. 13: and has been used by many other Anglophone monetary historians since then. I prefer the term used in all of the mint accounts of late-medieval and early-modern Low Countries: *traite*. The formula for computing its value is:  $traite = N.V/F$  = number (N) of coins struck per pound times the coin's official face value (V) divided by the percentage fineness (F) of the coins. The comparable French term was *piéd de la monnaie*. See Fournial, *Histoire monétaire*, pp. 30-31 (with a much more complex formula).

is the aggregate value of the money supply,  $V$  is the income velocity of money circulation (the rate of turnover for a unit of money), 'y' is the net value of total national output (and thus total national income), and  $P$  is the price level, usually measured by the Consumer Price Index (CPI), as the best measure of inflation.<sup>22</sup>

The CPI used here for England is the well-known Phelps Brown and Hopkins 'Basket of Consumables' Index, with the base 100 calculated as the average of all prices in the basket for the period 1451-75.<sup>23</sup> In the case of the Great Debasement – if we allow three years for the monetary changes to have taken their full effect – the rise in the CPI that followed the overall reduction of 83.10 percent of the penny's fine silver content was 123.04 percent: from the CPI index number of 163.21 in 1541 to the CPI of 364.03 in 1556. But the mathematical formula for the reciprocal relationship between a debasement and the rise in prices (discussed above, pp. 000) produces a far higher expected inflation of 491.72 percent. If we measure the inflation by five-year averages (quinquennial means), beginning with the quinquennium preceding the Great Debasement, we find that the CPI rose from a mean of 153.69 in 1536-50 to one of just 272.12 in 1551-55, an increase of only 77.06 percent. This historical observation, contradicting a common

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<sup>22</sup> The letter  $Y$  is the Keynesian symbol for the value of the Net National Product or Net National Income, in the formula  $Y = C + I + G + (X - M)$ : as the sum of total consumption ( $C$ ), government expenditures ( $G$ ), investment ( $I$ ) and the difference between the values of exports and imports ( $X - M$ ). Lower-case 'y' is  $Y$  deflated by the CPI. For a further analysis of debasement and inflation, see See also Munro, *Wool, Cloth, and Gold*, pp. 11-41; Munro, 'Coinage Debasements'; Spufford, *Money and Its Use*, pp. 289-318 ('The Scourge of Debasement').

<sup>23</sup> E. H. Phelps Brown, E.H., and S.V. Hopkins, 'Seven Centuries of the Prices of Consumables Compared with Builders' Wage-Rates', *Economica*, *Economica*, 23:92 (November 1956), 296-314, reprinted in E.H. Phelps Brown and Sheila V. Hopkins, *A Perspective of Wages and Prices* (London, 1981), pp. 13-59. I have recently, however, recalculated all of their index numbers from their working papers (in part by basing them on the money-of-account values of the annual baskets), now located in the British Library of Economic and Political Science (LSE Archives), Phelps Brown Papers, Box 1a.324. The index numbers used here are from the following Excel file, which is online, at: <http://www.economics.utoronto.ca/munro5/ResearchData.html>.

view that any potential mercantile gains from debasement were eliminated by inflation,<sup>24</sup> helps to explain why so many debasement were successful in achieving their fiscal motives.

The mint master or ‘moneyer’ may also have had an incentive to promote debasements in that he could have augmented his revenues from the ‘brassage’ levy, the fee or tax that allowed the ‘moneyer’ to realize a profit, as the residual amount after recovering his costs: for wages, copper and other materials, the mint dyes and other tools, and his own profit.<sup>25</sup> But much evidence from not just English but a wide range of continental records strongly indicates that, in an ‘aggressive’ debasement, the ruler’s fiscal motives prevailed over those of the mint-masters.

How debasements achieved these fiscal goals is rather complex. In essence, a properly designed debasement attracted more bullion to the mints by offering merchants a greater quantity of coins having the same nominal value than that received before the debasement. That ‘offer’ is known as the mint price, that is, the price that the mint pays to merchants who deliver bullion for coinage. In accounting terms, it is the total money-of-account value of the coins struck from a pound weight of pure silver (or gold), that is, the *traite* value (see above, pp. 000), minus the total money-of-account value of the mint charges (the combined fees for seigniorage and brassage).

No debasement could have succeeded without such an increase in the mint price (in nominal or money-of-account values). Implicit in that condition is the requirement that the merchant had to receive coins with initially a greater purchasing power than that previously offered by the domestic mints and

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<sup>24</sup> Rolnick, Velde, Weber, ‘The Debasement Puzzle’, pp. 789-808, esp. pp. 803-04. They rely principally on assertions in Harry Miskimin, *Money, Prices, and Foreign Exchange in Fourteenth-Century France*, Yale Studies in Economics: 15 (New Haven: Yale University Press, 1963), pp. 53-82 (esp. pp. 81-82), based on wheat prices: an analysis that fails to provide adequate proof for the view that inflation was normally proportional to the extent of coinage debasements, and that such inflation ensued quickly after such debasements.

<sup>25</sup> The capital costs of constructing and maintaining the mint were, however, normally borne by the ruler. Sometimes the ruler ‘farmed’ or sold the right to operate the mint to such ‘moneyers’, but evidently not in the case of medieval England. See Philip Grierson, *Numismatics* (Oxford: Oxford University Press, 1975); Nicholas J. Mayhew and Peter Spufford, eds., *Later Medieval Mints: Organisation, Administration, and Techniques*, Eighth Oxford Symposium on Coinage and Monetary History, British Archeological Reports International Series no. 389 (Oxford: 1988); Munro, *Wool, Cloth, and Gold*, pp. 1-41.



currently offered by competing foreign mints, as well. The value of the debased coins that the merchant received from the mint also had to compensate him for the mintage fees on the older coins delivered to the mint. So long as the merchants spent all those newly debased coins before the almost inevitable, if never proportionate, inflation ensued they would reap substantial profits. To the extent that inflation did ensue the public paid the price – in what economists rightly call the seigniorage tax -- for the gains reaped by the merchants and the prince. Since the prices of necessities – food, clothing, shelter – generally rose the most during such inflations, the poorer strata of society suffered the most.<sup>26</sup>

Most successful ‘aggressive’ debasements did result in dramatically increased mint outputs: first by requiring merchants to surrender their old (and better) coins for recoinage, indeed by demonetizing them;<sup>27</sup> and second, by offering them such substantial gains from spending debased coins that they brought other, new, and often foreign sources, of bullion to the ruler’s mints. Obviously, the increased flow of bullion into the mint and thus in its coinage outputs provided the prince with his chief source of gain, in augmenting his seigniorage revenues, even if the rates remained unchanged. Most princes also sought a further gain by increasing their seigniorage rate; but higher rates necessarily lowered the mint price, thus reducing the incentive to bring bullion to the mint. A fundamental test to determine whether or not a debasement was aggressive (fiscal motive) or defensive (monetary motive) was whether or not the seigniorage or combined mint fees increased as a percentage of the bullion’s value when coined (see Tables 1 and 2).

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<sup>26</sup> See the Flemish evidence in Munro, ‘Coinage Debasements’, and also in John Munro, ‘The Usury Doctrine and Urban Public Finances in Late-Medieval Flanders (1220 - 1550): Rentes (Annuities), Excise Taxes, and Income Transfers from the Poor to the Rich’, in Simonetta Cavaciocchi, ed., *La fiscalità nell’economia Europea, secoli. XIII - XVIII/ Fiscal Systems in the European Economy from the 13<sup>th</sup> to the 18<sup>th</sup> Centuries*, Atti della ‘Trentanovesima Settimana di Studi’, 22 - 26 aprile 2007, Fondazione Istituto Internazionale di Storia Economica “F. Datini”, Prato, Serie II: Atti delle “Settimane de Studi” e altri Convegni, no. 39 (Florence: Firenze University Press, 2008), pp. 973-1026.

<sup>27</sup> Most medieval and early-modern monetary ordinances implementing a debasement required, under penalty of law, the surrender of old coins, which were thus *demonetized*, to be reminted. But the fact that an old, pre-debasement penny would continue to circulate only as a penny, i.e., with the same value of 1d, meant that anyone spending old good pennies instead of spending new debased pennies would lose value: i.e., the potential loss in not receiving more ‘bad’ pennies for the old ‘good’ pennies. The merchant’s alternative was to melt down the old coins as bullion, and hoard them, or to export them to foreign mints or markets as bullion, in either case driving them out of circulation. See nn. 29-30 on Gresham’s Law.

## 2/ Defensive Monetary Policies and Gresham's Law

The most obvious 'defensive' motive that many princes cited for debasement was protection against a neighbour's aggressive debasements, and in particular against what is known as Gresham's Law. As just noted, most successful aggressive debasements depended on luring not just domestic but foreign bullion and coins to the aggressor's mint. Such tactics proved all the more successful if the aggressor minted debased imitations of its neighbour's coins; and England had long been beset by influxes of debased counterfeit sterling coins, and even debased gold nobles.<sup>28</sup> If merchants succeeded in spending counterfeit coins at the same face value as the 'good' coins, they would then cull the good coins from circulation and export them, often melted down as bullion, to the offending mints abroad. Hence the essence of Gresham's Law: 'Bad money drives out good'.<sup>29</sup> That 'law', a commonplace observation attributed to the Tudor financial agent and diplomat Thomas Gresham (c. 1519-1579), was well known to fourteenth-century mint officials, and was cited in most French and Flemish debasement ordinances, which, of course, were always presented as purely 'defensive' measures.<sup>30</sup> In the long-run, the domestic consequences of Gresham's Law was a continuous deterioration of the circulating standard: that is, the mean (average) precious metal contents of the domestic coinage stock.

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<sup>28</sup> Nicholas J. Mayhew, 'The Circulation and Imitation of Sterlings in the Low Countries,' in Nicholas J. Mayhew, ed., *Coinage in the Low Countries (800 - 1500): The Third Oxford Symposium on Coinage and Monetary History*, British Archeological Reports, BAR International Series 54 (Oxford, 1979), pp. 54 - 68; Feavearyear, *Pound Sterling*, pp. 12-20; John Munro, 'An Aspect of Medieval Public Finance: The Profits of Counterfeiting in the Fifteenth-Century Low Countries', *Revue belge de numismatique et de sigillographie*, 118 (1972), 127-48; 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; and Brookfield, Vermont: Ashgate Publishing Ltd., 1992); Munro, 'A Maze of Medieval Monetary Metrology', pp. 173-99.

<sup>29</sup> 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. 2, pp. 480-81.

<sup>30</sup> Munro, *Wool, Cloth, and Gold*, pp. 28, 33, 35, 40, 44, 58, 60, 74, 87, 101, 150, 161, 169, 179; Munro, 'Burgundian Coinage Debasements'. The principles of Gresham's Law can also be found in treatises of the Polish scientist Nicholas Copernicus (1473-1543), but not in the original texts of Oresme's *De Moneta*. As noted in Johnson, *De Moneta*, p. xii, the text in question has been added later, possibly by Flemish mint officials.

Such coinage deterioration was further exacerbated by both normal ‘wear and tear’ in circulation over many years and by the nefarious but all too common practices of ‘clipping’ and ‘sweating’ the coins. ‘Clipping’ was undertaken by using sheers to cut off small pieces from the coin’s normally imperfect edges; ‘sweating’ was undertaken by rapidly shaking a group of coins together inside a leather bag. Friction would remove some surface metal and cause it to adhere to the leather, which metal could then be scraped and removed from the bag.

The success of these techniques was based on the crudity of medieval minting using the techniques of ‘hammered coinages’. First, the moneyer placed the coin ‘blank, a disk cut from a thin sheet of alloyed metal, on the reverse dye (bottom), and then he used the obverse dye (top) as a hammer to imprint the required design or inscriptions on each side of the blank. The hammered coin was then trimmed with sheers to give it the approximate shape of a circle. The result was that no two ‘good’ coins were identical, nor observably different from bad ‘clipped’ or ‘sweated’ coins.<sup>31</sup>

Several historians have estimated that England’s medieval and early-modern silver coinages lost about one percent of their fine metal contents a year from a combination of counterfeiting, ‘clipping’, ‘sweating’, and normal ‘wear and tear’ in circulation (not including unretrieved hoards, shipwrecks, etc). Nicholas Mayhew, with a more conservative estimate (0.2 per cent per annum), contended that during every decade (in the fourteenth century) ‘seven tons of silver vanished into thin air’.<sup>32</sup> For the viability of the

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<sup>31</sup> In 1662, the Royal Mint adopted the water-powered screw press, which created more perfectly circular coins with milled edges that could not be so readily clipped or sweated, or counterfeited; but these problems were not finally resolved until the adoption of Boulton’s steam-powered coin press, developed between 1787 and 1810. See Thomas J. Sargent and François R. Velde, *The Big Problem of Small Change* (Princeton and Oxford: Princeton University Press, 2002), pp. 53-64, 273-90. Continental experiments with mechanized screw presses and cylinder coin presses began in sixteenth-century France. Far higher costs of production explain why they did not readily supplant hammered coinage. In England, screw-press milled coins and hammered coins co-existed after 1662, and up to the Great Recoinage of 1696. See also Angela Redish, ‘The Evolution of the Gold Standard in England’, *Journal of Economic History*, 50: 4 (Dec. 1990), 789-805; George Selgin, ‘The Institutional Roots of Great Britain’s “Big Problem of Small Change”’, *European Review of Economic History*, 14:2 (August 2010), 205-34.

<sup>32</sup> For the higher estimate, see C. C. Patterson, ‘Silver Stocks and Losses in Ancient and Medieval Times’, *Economic History Review*, 2<sup>nd</sup> ser., 25:2 (May 1972), 205-35; for the lower estimates, see Sir John Craig, *The Mint: A History of the London Mint from A.D. 287 to 1948* (Cambridge and New York: Cambridge

prince's mint, the true economic significance of continuous physical deterioration of the coinage standard from all such causes has to be understood in terms of the difference between the value of precious metals as bullion and as coins.<sup>33</sup>

Official, legal-tender coins can circulate only so long as they commanded an *agio* or premium in value over their bullion contents; and only so long as current coin issues commanded that *agio* would merchants continue to deliver bullion to the mint. This premium normally equals the combined values of the mint charges, in brassage and seigniorage. That premium in the value was economically justified by the greater exchange value of coins over bullion: in obviating the significant transaction costs involved in weighing and assaying bullion, including non-legal tender coins, to ascertain their true intrinsic precious metals contents. That cost-saving benefit in turn allowed coins, with the prince's official stamp or insignia, to circulate by tale, that is, at face value, and not their bullion value.

When the currently circulating silver coinage had suffered a continuous diminution in their average silver contents, merchants would have responded to that loss by discounting the entire coinage: not by refusing to accept coins by tale, but by bidding up prices, including the market price of silver bullion, in money-of-account terms, thereby reducing and finally eliminating the necessary premium on coinage.<sup>34</sup> In

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University Press, 1953), pp. xvi, 60; and Nicholas J. Mayhew, 'Numismatic Evidence and Falling Prices in the Fourteenth Century', *Economic History Review*, 2<sup>nd</sup> ser., 27:1 (Feb. 1974), 1-15. See also Philip Grierson, 'Coin Wear and the Frequency Table', *Numismatic Chronicle*, 7<sup>th</sup> ser, 4(1964), pp. iii - xii, republished in Philip Grierson, *Later Medieval Numismatics (11<sup>th</sup> - 16<sup>th</sup> centuries): Selected Studies* (London: Variorum Reprints. 1080), no. XIX. He adds the factor of chemical erosion to precious-metal losses in circulation.

<sup>33</sup> For the following arguments, see Feavearyear, *Pound Sterling*, pp. 10-20; John Munro, 'Bullionism and the Bill of Exchange in England, 1272-1663: A Study in Monetary Management and Popular Prejudice', in Center for Medieval and Renaissance Studies, University of California (Fred Chiappelli, director), ed., *The Dawn of Modern Banking* (New Haven and London: Yale University Press, 1979), pp. 169-239, reprinted in Munro, *Bullion Flows and Monetary Policies*, IV, 169-239.

<sup>34</sup> Accepting coins by 'tale' (face value), rather than by weight and fineness, with high measurement costs, was to recognize the commercial advantage of coins over bullion, especially the savings on transaction costs. The arguments in Rolnick, Velde, and Weber, 'Debasement Puzzle', pp. 800-01, to the effect that coins were accepted only by weight (and presumably by fineness), and not by tale, are, in my view, completely untenable, and not supported by any known monetary historian, other than Miskimin (see n. 24 above). For a more modified view, by one of this article's co-authors, see Sargent and Velde, *Big Problem*

similar fashion, the bullion contents in any newly minted coins of the official standard would have enjoyed a relatively higher value, similarly eliminating the *agio*, so that, in accordance with Gresham's Law, those newly minted coins would have been culled from circulation and exported (or hoarded) as bullion.

Under these adverse circumstances, princes had no alternative but to reduce the fine silver (or gold) contents of newly minted coins to the currently prevailing inferior standard of the circulating coins. They had to engage in a purely defensive coinage debasement, with low mintage fees as well, lest precious metals be lost to foreign mints and their own mints become idle. That chronic phenomenon better explains why virtually all European coinages experienced long-term, continuous debasements, until the era of precious-metal commodity moneys came to an end in modern times.

### THE COINAGE CHANGES OF HENRY VIII

The two debasements of 1526 were defensive in nature. They must be understood first, in the light of an unusual monetary ordinance that Henry had issued on 25 May 1522, one that abrogated a long-standing ban on foreign gold coins.<sup>35</sup> It permitted the free, legal-tender circulation of the most internationally prominent gold coins: 'ducats' (presumably both Venetian ducats and Florentine florins) and French 'crowns' (*écus à la couronne* and *écus à la couronne au soleil*).<sup>36</sup> A similar ordinance of 24 November 1522 authorized the legal-tender circulation of certain imperial gold coins: the *carolus* florin and some other unnamed 'base florins' (presumably both the Burgundian-Habsburg Philippus florins and imperial Rhenish

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*of Small Change*, pp. 161-9, 22, 322. For royal statutes requiring acceptance of coins by tale, except those very badly impaired, see nn. 53-54, below.

<sup>35</sup> For English prohibitions, dating from 1275, against the importation of foreign coins, see Munro, 'Bullionism and the Bill of Exchange in England', Appendix A, pp. 216-20. That ban may not have been complete, for a statute of January 1504 (19 Hen. VII, c. 5), had granted or recognized the legal-tender status of 'coyne of other landys nowe currant in this Realme for grotes or for foure pence [4d]', that were not clipped or impaired. Great Britain, Record Commission (T.E. Tomlins, J. Raithby, et. al, eds.), *Statutes of the Realm*, 6 vols. (London, 1810-22), vol. II, p. 650.

<sup>36</sup> Hughes and Larkin, *Tudor Royal Proclamations*, vol. I, no. 88, p. 136. The Italian ducats and florins were given an exchange rate of 4s 6d sterling: they contained 3.536 to 3.559 grams of fine gold; the *écus au soleil* were given a rate of 4s 4d sterling: they contained 3.296 grams of fine gold; the *écus à la couronne*, a rate of 4s 0d sterling: they contained 3.275 grams of fine gold. See Munro, 'Money and Coinage', *CWE*, vol. I, Appendix A, p. 336; and also Challis, *Tudor Coinage*, p. 68; and Table 3, below.

florins).<sup>37</sup> Possibly these ordinances on foreign gold coins were a requirement of Henry VIII's current if temporary anti-French alliance with the Habsburg Emperor Charles V.<sup>38</sup> Those official rates for these foreign gold coins were reconfirmed in royal ordinances of 6 and 8 July 1525.<sup>39</sup> But that legal-tender status of foreign gold coins did not survive the second debasement of 1526.

### **Henry VIII's debasement of August 1526: gold and the gold coinages**

An unusual, and indeed unprecedented feature of Henry VIII's first debasement, imposed on 22 August 1526, was that it involved only the gold coinage, and was not, as had always been the case in the past, one combined a debasement of silver. This debasement did not prescribe any physical change in the coins, but a revaluation that was (for reasons explained earlier) nevertheless a genuine debasement (see p. 000

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<sup>37</sup> Hughes and Larkin, *Tudor Royal Proclamations*, vol. I, no. 95, p. 141. The exchange rates for Italian ducats and florins and French *écus* were confirmed at the rates given in the previous ordinance (in n. 36). The Habsburg coin of 'fine gold', called the *carolus*, was given a rate of 6s 10d sterling, which seems very high for the Carolus florin, which, furthermore, had a fineness of only 14 carats gold (at this time worth just 42d *groot* Flemish). Perhaps the ordinance meant the *real d'or*, of 23 carats 9.5 grains = 23.792 carats gold, containing 5.275 grams fine gold, and worth three times as much: 127d or 10s 7d *groot* Flemish. Thus the unnamed 'base florins' may refer to the actual *Carolus* florin, first struck in February 1521, at 14 carats, containing 1.700 grams fine gold, and the imperial Rhenish florins (of the Four Electors) of 18 carats 6 grains = 18.50 carats, containing 2.527 grams fine gold. These 'florins' were granted exchange rates of 2s 1d sterling and 3s 3, respectively. The rate for the Rhenish florin, at 39 sterling, is confirmed in Erasmus's correspondence with his banker, Erasmus Schets, in Epistle 1681, dated 17 March 1526 and Epistle 1758, dated 2 October 1526: in Alexander Dalzell and Charles G. Nauert, Jr., eds., *The Collected Works of Erasmus: The Correspondence of Erasmus*, Vol. XII: *Letters 1658 - 1801, A.D. 1526-27* (Toronto: University of Toronto Press, 2003), pp. 100-05 and pp. 376-77). For a confirmation of the rate for the Carolus florin, at 25d sterling, see John Munro, 'Money, Wages, and Real Incomes in the Age of Erasmus: The Purchasing Power of Coins and of Building Craftsmen's Wages in England and the Southern Low Countries, 1500 - 1540', in *CWE*, vol. XII, Table 3, pp. 646-51 (esp. p. 650), and Table 17, pp. 697-99. See also John Munro, 'Money and Coinage of the Age of Erasmus': Appendix A, on 'The Coinage of the Burgundian-Hapsburg Netherlands, Before and After 1521'; Appendix B: 'Official Coinage Rates: February and August 1521', in Sir Roger Mynors, Douglas Thomson, and Peter Bietenholz, eds., *The Collected Works of Erasmus: The Correspondence of Erasmus*, Vol. VIII: *Letters 1122 to 1251, A.D. 1520 to 1521* (Toronto: University of Toronto Press, 1988), pp. 349- 50; and Munro, *CWE*, Vol. I, Appendix A, pp. 314-19 and 338-39.

<sup>38</sup> J. D. Mackie, *The Earlier Tudors, 1485 - 1558*, The Oxford History of England (Oxford: Clarendon Press, 1957), pp. 308-12 (treaties of 25 August and 24 November 1522). By 1523, England was at war with France; but the Anglo-Habsburg alliance effectively ended with England's Truce with France, 15 August 1525: in Hughes and Larkin, *Tudor Royal Proclamations*, vol. I, no. 104, p. 147.

<sup>39</sup> Hughes and Larkin, *Tudor Royal Proclamations*, vol. I, no. 102, p. 145; no. 103, p. 146.

above). That revaluation was the result of recommendations from a royal commission, established on 24 July 1526, under the leadership of Henry's chief minister, Thomas Cardinal Wolsey (1475-1530), with instructions 'for increasing the sterling value of the coinage to an equality with the rates of foreign currency.'<sup>40</sup>

The August 1526 ordinance required three steps to achieve this objective.<sup>41</sup> The first was an increase in the value of all existing English gold denominations by ten percent: the gold sovereign (1489), issued as the 'pound' coin, rose in value from 20s 0d (240d) to 22s 0d (264d) sterling; the ryal or rose noble, from 10s 0d (120d) to 11s 0d (132d); the angel noble, from the traditional 6s 8d (80d) to 7s 4d (88d). The second was, not surprisingly, a less than commensurate increase in the value of legal-tender foreign gold coins: Italian ducats and florins, from 4s 6d (54d) to 4s 8d (56d) – an increase of 3.70 percent; and the French *écus au soleil*, from 4s 4d (52d) to 4s 6d (54d) – an increase of 3.85 percent. No mention was made of the other recently current gold coins. The third and most striking feature was the introduction of a new English gold coin, the 'crown of the rose', to have the 'like fineness, poise, and goodness' of the current French 'crown of the sun', the *écu à la couronne au soleil*, with the same value of 4s 6d.

Neither the fineness nor the weight of the new crown was otherwise specified. Its fineness was presumably, however, not that of the *écu*, 23 carats (95.833 percent pure), but the same as that of all subsequent issues of English crowns, 22 carats (91.667 percent pure).<sup>42</sup> The weight is more problematic, in the absence of any documentary evidence. Albert Feavearyear (1963) offered the first of two estimates:

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<sup>40</sup> J. S. Brewer, J. Gairdner, and R.H., Brodie, , ed., *Letters and Papers, Foreign and Domestic, of the Reign of Henry VIII Preserved in the Public Record Office, the British Museum, and Elsewhere in England*, 36 vols. (London: Longmans and Mackie and Co, for His Majesty's Stationery Office: London, 1862-1931), vol. IV, part 1 (1870), no. 2338, p. 1046.

<sup>41</sup> Hughes and Larkin, *Tudor Proclamations*, vol. I, no. 111, pp. 156-58; and Challis, 'Mint Contracts', p. 720; Challis, *Tudor Coinage*, pp. 67-69.

<sup>42</sup> Hughes and Larkin, *Tudor Royal Proclamations*, vol. I, no. 111, p. 157. See also the text in J. S. Brewer, ed., *Letters and Papers, Foreign and Domestic, of the Reign of Henry VIII*, vol IV, part 2 (London: Longman and Co, 1872), no. 2423, p. 1085, for the royal proclamation of 22 August 1526: that 'a new coin is about to be made in England, called the crown of the rose, of the same weight and value', 4s. 6d., as that of the French 'crown of the sun'. See the text above and nn. 43-44 below.

54 grains (3.499 grams).<sup>43</sup> Ignoring that estimate, Christopher Challis (1967, 1978, 1992) offered a lower one of just 51 Troy grains (3.305 grams).<sup>44</sup> Feavearyear's estimate is to be preferred, on the grounds of logic: exactly 100 coins of 54 Troy grains could have been struck from the Tower Pound of 5400 Troy grains, whereas 51 Troy grains would have yielded the awkward number of 105.882 coins. Since the new crown was intended to supplant the French *écu au soleil*, Feavearyear's estimated weight is again more convincing, because it is closer to that of the current *écu* (as struck from July 1519), 3.439 grams. While the new English crown would have been slightly heavier than the *écu*, its inferior fineness meant that it contained less fine gold: 3.208 grams (according to Feavearyear's weight estimate) vs. 3.296 grams in the *écu* (Table 2, part 2; Table 3).<sup>45</sup> The Challis estimate produces a fine gold content of only 3.029 grams, far too low to allow the English crown to serve as an acceptable substitute for the *écu*.

In speculating on the origins of the August gold debasement, and the introduction of the English crown, Feavearyear contended that financing England's the two-year war with France (1523-25) had required excessive precious-metal exports and very substantial loans from Flemish and Italian bankers, both of which had led to a fall in exchange rates and thus to a sharp rise in the market value of ducats and other foreign gold coins. According to this author, English merchants were then accepting ducats for as much as 5s 2d, well above the 4s 8d rate set in the August ordinance.<sup>46</sup>

The recent and current rise in the value of gold was a far more widespread and far more profound phenomenon than Feavearyear had indicated. Evidence for free-market gold prices at Antwerp during this period show that the value of gold had risen from a very stable £91.979 *groot* Flemish per kilogram in the

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<sup>43</sup> Feavearyear, *Pound Sterling*, Appendix III, p. 438.

<sup>44</sup> Challis, *Tudor Coinage*, Appendix III, p. 311; Challis, 'Mint Contracts', p. 720; Feavearyear, *Pound Sterling*, Appendix III, p. 438.

<sup>45</sup> For the 1519 *écu au soleil*, see Adrian Blanchet and Adolphe Dieudonné, *Manuel de numismatique française*, 2 vols. (Paris: 1916, reissued 1988), vol. II: *Monnaies royales françaises depuis Hugues Capet jusqu'à la Révolution*, chapter 20, p. 314. Note that the weight and gold contents of the *écu au soleil* given in Munro, *CWE*, Vol. I, Appendix A, p. 336 are for the earlier version of 1475 (3.369 grams).

<sup>46</sup> Feavearyear, *Pound Sterling*, pp. 48-49.



period 1500 to 1511 to £95.785 *groot* Flemish per kilogram by 1520, by which time it had exceeded the official Habsburg mint price (rising from 96.84 percent to 100.85 percent). Then it rose far more rapidly: to £112.461 *groot* Flemish per kilogram by 1525 (109.23 percent of the official mint price), an increase of 17.23 percent in just five years.<sup>47</sup> Such circumstances had already forced King Francis I of France to debase (revalue) his gold coinage in May and again in July 1519; and Emperor Charles V, to do the same for the Low Countries' coinages in February 1521 (when he introduced the *Carolus* florin), and to raise the gold rates again in August 1521.<sup>48</sup> It is thus significant to observe, in Henry VIII's August 1526 ordinance, that:<sup>49</sup>

in Flanders as in France, the price of money and gold ... is so much enhanced in the valuation thereof that not only strange [foreign] golds, as crowns and ducats, but also the gold of this realm, as nobles, half nobles, and royals, by merchants as well strangers resorting hither... for the great gain and lucre that they find thereby daily, be transported and carried out of this realm to no little impoverishing thereof, and finally to the total exhausting and drawing out of all the coins out of the same, unless speedy remedy be provided in that behalf...

This is a traditional, pre-Gresham exposition of Gresham's Law.<sup>50</sup>

What was responsible for this rise in the relative value of gold (an increase in the bimetallic ratio)? There are only two possible reasons: either the gold supply had contracted or the silver supply had expanded. In either case, gold would have become relatively more expensive, as demonstrated when its value was given in any silver-based money-of-account. The answer is clearly the latter, in the light of the South German-Central European silver mining boom that had commenced in the 1460s and reached its peak in the late 1530s. As contended in earlier publications, that mining boom was produced by radical technological innovations in both mechanical and chemical engineering, which were devised in response to the deflationary

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<sup>47</sup> See Munro, 'Money and Coinage, *CWE*, Vol. XII, Appendix, Table 2, pp. 644-45; and Van der Wee, *Antwerp Market*, vol. 1, Table 16, pp. 133-34.

<sup>48</sup> For France, see n. 45 above; for the Habsburg Low Countries, see Munro, 'Money and Coinage of the Age of Erasmus', in *CWE*, Vol. VIII, Tables A and B, pp. 348-50.

<sup>49</sup> Hughes and Larkin, *Tudor Royal Proclamations*, vol. I, no. 111, p. 156.

<sup>50</sup> Virtually the same rendition of Gresham's Law was used to justify Henry VIII's aggressive, profit-seeking debasement of 16 May 1544. See Hughes and Larkin, *Tudor Royal Proclamations*, vol. I, no. 228, p. 327.

‘silver famines’ of the mid-fifteenth century . This region’s mined output of pure silver more than quadrupled: from an annual mean of 12,973.44 kg in 1471-75 (when data first become available) to an annual mean peak of 55,703.84 kg in 1536-40 – minimum estimates based on available if incomplete data. The major event of this era was the opening of the vast Joachimsthal mines in Bohemia in 1516, which, in 1521-25, produced an annual mean output of 9,703.24 kg of fine silver.<sup>51</sup>

As a reflection of this rise in the market’s bimetallic ratio, that is, with the fall in the relative value of silver, the August 1526 ordinance raised the official Tower mint ratio in favour of gold: from 11.158:1, which Edward IV had previously established in March 1465, to 12.274:1<sup>52</sup>

### **Henry VIII’s gold and silver debasements of November 1526**

Henry VIII’s government evidently soon decided that these monetary measures were insufficient. On 5 November 1526, Henry VIII issued a new monetary ordinance (repeating the version of Gresham’s Law in the August 1526 ordinance), with four components to achieve the previously announced objective to ‘provide an equality with the rates of foreign currency’, and hence to obviate ‘Gresham’s Law: another increase in the value of current English gold coins; the issue of new, higher-valued English gold coins; the

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<sup>51</sup> John 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, especially Table 1.3, pp. 8-9. See also John Munro, ‘The Central European Mining Boom, Mint Outputs, and Prices in the Low Countries and England, 1450 - 1550’, in Eddy H.G. Van Cauwenberghe, 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 (Leuven: Leuven University Press, 1991), pp. 119 - 83; John Nef, ‘Silver Production in Central Europe, 1450-1618’, *Journal of Political Economy*, 49 (1941): 575-91; John Nef, ‘Mining and Metallurgy in Medieval Civilisation,’ in *The Cambridge Economic History of Europe, 2: Trade and Industry in the Middle Ages*, 2nd rev. edn., ed. M. M. Postan and E. E. Rich (Cambridge, 1987), 691-761 (1st edn. published in 1952). From Joachimsthal is derived the German monetary term *thaler*, the Dutch *daalder*, and the American *dollar*.

<sup>52</sup> Computed from data in Tables 1 and 2. The bimetallic ratio expressed here is the ratio of the *traite* or coined value of a pound (or kilogram) of silver to the *traite* coined value of a pound of gold. Since gold coins were valued in the silver-based sterling money-of-account, the only way to express a falling value of silver was by an increase in the money-of-account of the gold coins: by, a rise in the value of the sovereign, for example, from 20s to 22s sterling.

denial of legal-tender status to foreign gold coins; and the previously mentioned debasement of the silver coinage (see above, pp. 000).<sup>53</sup>

The value of current English gold coins was raised by another 2.27 percent, for an over all increase of 12.50 percent (one eighth). Thus the value of the gold sovereign was raised to 22s 6d; that of the ryal or rose noble, to 11s 3d; and that of the angel-noble, to 7s 6d. (see Table 2, part 3; Table 3).

The first new gold coin was the crown of the double rose, struck at 22 carats fineness, with a weight of 57.313 Troy grains ( heavier than the former rose crown), and a pure gold content of 3.404 grams; it was given a value of 5s 0d sterling or 60d (compared to 4s 6d for the former single-rose crown). Half crowns were also struck, with proportional weights and values (2s 6d). The other new gold coin was the St. George noble, which received the old noble's traditional value of 6s 8d sterling (three to the pound sterling) and with its traditional fineness of 23.875 carats, but with a weight of only 71.111 Troy grains, thus containing 4.584 grams fine gold. Half nobles, with proportional weights and values, were also struck.<sup>54</sup>

The denial of legal-tender status to foreign gold coins, so that they no longer enjoyed fixed legal exchange rates, was based on the valid observation that so many 'ducats' were being struck, in various continental principalities, 'of divers fineness and weights' – that is, with inferior quality – that many people, 'not being expert in knowledge of the fineness... might take great loss and be deceived therein'. No mention was made, however, of the French gold coins; but clearly Henry VIII's government under Cardinal Wolsey would not have allowed them to compete with the new English double-rose crowns. Henceforth, all 'ducats as other coins of gold of outward parts not named' were to be treated as bullion, to be sold or traded 'at such value as the payer and receiver of them can agree' or delivered to 'unto to the King's mint' for recoinage. This provision was both novel and significant, since in the past royal ordinances had forbidden any free-

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<sup>53</sup> Hughes and Larkin, *Tudor Royal Proclamations*, vol. I, no. 112, pp. 158-63. For the wide variety of such ducats and florins, see Munro, 'Money and Coinage', *CWE*, Vol. I, p. 314; and Appendix A, Table D, p. 339; and John Munro, 'Money and Coinage: Western Europe', in Jonathan Dewald, et al, eds., *Europe 1450 to 1789: Encyclopedia of the Early Modern World* (New York: Charles Scribner's Sons/The Gale Group, 2004), Vol. IV, pp. 174-184.

<sup>54</sup> See also Challis, 'Mint Contracts', p. 720; Challis, *Tudor Coinage*, pp. 68-71.

market exchanges in foreign coins and stipulated that all such coins be delivered to the mint as bullion.<sup>55</sup> Equally remarkable was another provision permitting the Burgundian-Habsburg silver ‘carolus’ or ‘double placks’ – (struck from 1521) to ‘be current in receipts and payments for 4d sterling the piece, as they now be’.<sup>56</sup>

The defensive nature of this first debasement, of the gold coinage, is revealed by the very modest increase in the official values of the gold coinages, which, according to the available evidence (given above) was still less than the current rise in the market prices for gold, at home and abroad. Further proof that the 1526 debasement of the gold coinages was purely defensive can be found in the exceptionally modest rate of mintage fees (Table 2, part 3): just 0.51 percent, on all gold coins. The fees had declined from a rate of 12.00 percent, in Edward IV’s initial gold debasement of August 1464, to a more modest fee of 4.63 percent in Edward’s second debasement of March 1465, and to a rate of 0.56 percent, set in November 1492, when the Tower mintage fees were last changed. The principle adopted here was again simple: low mintage fees permitted a higher mint price, which should have attracted more gold bullion to the royal mints.

As Table 2, part 2, also indicates, the two gold debasements, as measured by the diminution of grams of fine gold in the pound sterling, amounted to 9.094 percent in August 1526 and a further 2.218 percent in November 1526, for an overall reduction of 11.111 percent. The seeming paradox that such a debasement led to a 12.50 percent increase in the value of gold coins can now be readily resolved by the previously

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<sup>55</sup> Hughes and Larkin, *Tudor Royal Proclamations*, vol. I, no. 112, p. 161. On 27 March 1538, however, Henry VIII again permitted the legal-tender circulation of ducats, at 5s 0d sterling, and *écus au soleil*, at 4s 8d, and other French *écus* (crowns) at 4s 0d. sterling. *Ibid.*, no. 178, pp. 261-62. See also Munro, ‘Bullionism and the Bill of Exchange’, pp. 187-96, Appendix A, pp. 216-20; John Munro, ‘Billon - Billoen - Billio: From Bullion to Base Coinage’, *Revue belge de philologie et d’histoire/Belgisch tijdschrift voor filologie en geschiedenis*, 52 (1974), 293-305; 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; and Brookfield, Vermont: Ashgate Publishing Ltd., 1992), III, pp. 293-305.

<sup>56</sup> Hughes and Larkin, *Tudor Royal Proclamations*, vol. I, no. 112, p. 160. See Munro, ‘Money and Coinage’, *CWE*, Vol. VIII, Tables A and B, pp. 349-50. Presumably the coin meant was the *réal* or ‘double carolus’ struck at almost *argen-le-roy* fineness (93.40 percent pure), containing 2.875 grams pure silver, compared to the 2.556 grams of pure silver in the new English 4d groat. That privilege was not granted to the other Burgundian-Habsburg silver coins, all of inferior fineness. The ordinance recommended, however, that these Burgundian-Habsburg coins be surrendered to the King’s mint.

discussed formula relating debasements to reciprocal changes in money of account values (see above, pp. 000-00).  $\Delta T = [1/(1 - x)] - 1$ , so that  $[1/(1 - 0.111)] - 1 = 0.1250$ , or 12.50 percent.

As indicated earlier, this second debasement, of November 1526, involved not just gold, but also the silver coinages. It reduced their pure silver content, by weight alone – retaining the traditional sterling silver fineness – by one-ninth: 11.111 percent (Table 1, part 1). We can even more readily understand its purely defensive nature when we realize that more than sixty years had passed since the last silver debasement and recoinage of August 1464, under Edward IV, during which time all the previously discussed circumstances – ‘clipping’, ‘sweating’, counterfeit coin imports, and the operations of Gresham’s Law – had combined to diminish the average silver contents of currently circulating coins, undoubtedly by well more than ten percent. Indeed, as early as 1504, Henry VII’s Parliament had contended, in enacting a statute on the coinage, that:

his Coyne, and specially of Sylver, is sore ympeyred as well by clipping therof as counterfettyng of the same and by bryngyng into this Realme of the Coyne of Ireland, by occasion wherof gret rumour and variance daly incresith amongis his subjettis for takyng & refusyng of the same...

The statute declared that all legal-tender coins, ‘beyng Sylver and not clypped, mynesshed, or otherwyse empeyred, except for reasonable weryng, albeit they be crakked’, were to be ‘curraunt through all the seid Realme for the somme as they were coyned for’ [i.e., by tale].<sup>57</sup> Such complaints and corresponding measures can be found in subsequent royal proclamations, up to the 1526 debasements.<sup>58</sup>

A further test revealing the purely defensive nature the silver debasement of November 1526 is once more the mintage fees: at the exceptionally low rate of 2.22 percent (Table 1, part 3).<sup>59</sup> In contrast, when Edward IV debased the silver coinage in 1464, he had exacted a high mintage fee of 12.00 percent, one that indicates that even though his debasement had also been the first in over fifty years (since 1411-12), it was

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<sup>57</sup> *Statutes of the Realm*, vol. II, p. 650: statute 19 Henry VII, c. 5.

<sup>58</sup> Hughes and Larkin, *Tudor Royal Proclamations*, vol. I, no. 54, pp. 60-61, no. 88, p. 136; no. 95, p. 141; nos. 102-03, pp. 145-47.

<sup>59</sup> Only the total mintage fees are supplied in this table, because most of the English Tower mint accounts and mint indentures provide only that total, and not separate rates for brassage and seigniorage.

primarily an aggressive, profit-seeking measure. Over the next three decades, however, Edward IV and then Henry VII were forced to lower the mintage fees, by stages – to 2.67 per cent by 1492 – in order to raise the mint price and thus to attract more bullion.

### **Bimetallic mint ratios and the new Troy Pound**

Remarkably, when we compare the gold and silver coinages that Henry VIII in his debasements of August and November 1526 with the previous coinage issue, those that Edward IV had struck in his debasements of 1464-65, we find that the overall percentage debasement of Henry's gold coinages (that is, the total reduction in the gold content of the pound sterling in money-of-account) was precisely identical to the percentage debasement of the silver coinage (that is, the reduction in the penny's silver content): 11.111 percent for each of the two coinages. Consequently, the November 1526 mint ordinances nullified the previous change in the bimetallic ratio (to 12.274, in August 1526), thereby restoring the ratio that Edward IV had established in March 1465: that is, 11.158:1 (see p. 000 above). While the bimetallic ratios were slightly altered during the rapid and often drastic changes of the Great Debasement (1542-1553), that same ratio of 11.158:1 was re-established with Elizabeth I's recoinage of November 1560, and it remained unchanged until the new coinages of 1601.<sup>60</sup>

This is one of the most puzzling features of the 1526 debasements, for the first one had been undertaken, in August, with the intention of altering the mint ratio more in favour of gold, in order to retain gold in England. The bimetallic ratio is, in fact, an aspect of Gresham's Law. For if the official mint ratio undervalues one metal and thus overvalues the other metal in relation to market and foreign mint ratios, the relatively cheaper metal (here, silver) will drive out the other (gold). Or more simply, merchants will choose to have each metal coined in those mints offering the relatively higher values. Along with the undisputed importance of the Central European silver-copper mining boom, and then, from the 1550s, of the even greater silver inflows from Spanish America, England's unaltered bimetallic mint ratio helps to explain why England,

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<sup>60</sup> Calculations of the official bimetallic mint ratios, based on mint data supplied in Challis, 'Mint Contracts', pp. 720-757, indicate a rise from 12.109 in 1601 to 13.363 in 1612 to 13.348 in 1623 to 14.485 in 1660 to 15.210 in 1718 (remaining at this level until 1815).

which had minted predominantly gold before 1526 came to mint predominantly silver thereafter, especially as the market ratio continued to rise in favour of gold.<sup>61</sup> In 1521-25, silver constituted only 38.96 percent of the total value of English mint outputs; in 1531-35, 68.41 percent; and in the second half of the century, silver accounted, on average, for 82.84 percent of the total value of steadily mounting mint outputs (even well after the end of the Great Debasement).<sup>62</sup>

Another significant feature of the mint and monetary ordinances of November 1526 was the change from the traditional, historic Tower Pound, containing 11.25 Troy ounces (5400 Troy grains = 349.914 grams), to the Troy pound itself, with 12.00 Troy ounces (5760 Troy grains = 373.242 grams).<sup>63</sup> Possibly such a change, relatively minor though it may have been, helped to obscure the extent of the coinage debasements. In the tables for this study, all of the pre-1526 monetary and mint data have been converted from the Tower pound to the Troy pound, to permit direct comparisons of the monetary changes from 1464.

### **The Great Debasement of 1542-53: some new observations**

From November 1526, England's gold and silver coinages, mintage fees, and mint prices remained unchanged until the onset of Henry VIII's Great Debasement in May 1542. Despite the renown and so much published literature on the Great Debasement, there is considerable confusion about when it began as profit-seeking enterprise: in 1542 or in 1544. That debate needs to be resolved. Furthermore, the significance of the 1526 monetary changes as a purely defensive debasement can be better understood by demonstrating that

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<sup>61</sup> See 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., *Relazioni economiche tra Europa e mondo islamico, secoli XIII - XVIII*, Fondazione Istituto Internazionale di Storia Economica 'Francesco Datini', Atti delle 'Settimana di Studi' e altri convegni no. 38 (Florence: Le Monnier, 2007), pp. 907-62; Kirti N. Chaudhuri, 'Treasure and Trade Balances: the East India Company's Export Trade, 1660-1720', *Economic History Review*, 2nd ser. 21 (Dec. 1968), 480-502.

<sup>62</sup> See Munro, 'Monetary Origins', Table 1.6, pp. 22-23. For the Central European silver mining outputs, see Table 1.3, p. 8; for the outputs of the Spanish American silver mines and for imports of silver into Seville, see Table 1.2, pp. 4-5.

<sup>63</sup> Munro, 'Money and Coinage', *CWE*, Vol. I, p. 332. The Troy pound was first mentioned in a parliamentary statute of 1414: 2 Hen IV Stat. 2, cap. 4, concerning the Goldsmiths, in *Statutes of the Realm*, Vol. II, p. 188.

the aggressive, profit-seeking aspects of the Great Debasement were present from the very onset of the coinage changes, in 1542.

The best known authorities on the Great Debasement are Frederick Dietz, Albert Feavearyear, Christopher Challis and J. D. Gould.<sup>64</sup> Gould evidently followed Dietz in contending that the initial change in the silver coinage, undertaken from 16 May 1542, was relatively minor. In their incorrect view, it reduced the silver fineness from the traditional sterling silver standard of 11 oz 2 dwt to 10 oz (with 2 oz of copper).<sup>65</sup> Dietz indeed explicitly stated that ‘this debasement was not a financial expedient; it was defensible on purely economic grounds, as a necessary measure to prevent the export of gold and silver from England’.<sup>66</sup> Gould states that this ‘first debasement ... offered no incentive to remint silver coins of the 1526-42 issue, except on Government account’.<sup>67</sup>

Gould’s statement, published in 1970, surprisingly ignored earlier criticisms of Dietz’s views published in Feavearyear’s *Pound Sterling* (1963), and in Challis’s ‘Debasement of the Coinage’ (1967).<sup>68</sup> Gould evidently also ignored the relevant mint documents. To be sure, the mint ordinance does seem to indicate a new silver fineness of 10 oz. As Feavearyear notes, however, the mint instructions (indenture) for this date explicitly state that the new silver coinage was to be ‘of the standard of 10 oz sterling silver and 2

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<sup>64</sup> See the sources cited in note 1 above.

<sup>65</sup> Gould, *Great Debasement*, Table 1, p. 11; and the text on p. 43; Dietz, *English Government Finance*, p. 175.

<sup>66</sup> Dietz, *English Government Finance*, pp. 175-76. That incorrect view was endorsed in Mackie, *The Early Tudors*, p. 412. The only partial justification for Dietz’s statement is that (according to Feavearyear, *Pound Sterling*, p. 51) the current market price for silver was 3s. 8½d per ounce, compared to a mint price of 3s. 8d, by the 1526 indenture. Nevertheless, all the evidence presented here indicates that this debasement was aggressive, and the true beginning of the Great Debasement.

<sup>67</sup> Gould, *Great Debasement*, p. 43.

<sup>68</sup> Feavearyear, *Pound Sterling*, pp. 50-52; Challis, ‘Debasement’, pp. 441-466, esp. p. 442. There is no justification, however, for Feavearyear’s assertion that ‘the silver money was not coined according to the [mint] indenture’.



oz of allayē – that is, not 10 oz of pure silver, but only silver of 92.50 percent purity.<sup>69</sup> For some inexplicable reason, however, Feavearyear then concluded that pure silver fineness was ‘only 8.3 oz in the pound’ (69.167 percent fine), an impossibly low estimate, whose calculation is not explained.<sup>70</sup> Since sterling silver already contained 18 dwt (of 20) copper (7.5 percent of 12 oz), this mixture, by one calculation – simply by adding 2 oz of copper, displacing 2 oz of silver, for a total of 2 oz 18 dwt copper) – would have produced an alloy of 24.167 percent copper and thus only 75.833 percent pure silver: that is, with a silver fineness of 9 oz 2 dwt copper.<sup>71</sup> Alternatively, 10 oz of sterling silver plus 2 oz copper could be seen as 77.0833 percent pure silver: that is,  $11.10/12.0 * 10/12 = 0.925 * 0.8333 = 0.770833$ , which converts to a measure of 9 oz 5 dwt fine silver.

Challis, who treated the mint documents with far more care than either Dietz or Feavearyear, stated that both interpretations are possible, suggesting that the mint instructions may have been deliberately ambiguous to disguise the extent of the debasement. He chose the first estimate, of 9 oz 2 dwt silver, one that he retained in all his subsequent coinage publications.<sup>72</sup> But this lower estimate is far too close to that established in the next step of the Great Debasement, implemented on 28 May 1544, which reduced the

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<sup>69</sup> See Feavearyear, *Pound Sterling*, p. 52. The quotation, however, is from James Gairdner and R. H. Brodie, eds., *Letters and Papers, Foreign and Domestic, of the Reign of Henry VIII*, vol. 19: Part I (London: Mackie and Co, for His Majesty’s Stationery Office, 1903), ‘Note on the Debasement of the Currency’ (Preface), p. li: declaration of the account of Sir Martin Bowes and Thomas Skipwith. Feavearyear’s citation of this source is inaccurate.

<sup>70</sup> Feavearyear, *Pound Sterling*, p. 52. He notes, from the mint document in Gairdner and Brodie, eds., *Letters and Papers*, vol. 19: part I, p. lii (34 Hen. VIII), that 5,513 Troy lb of copper alloy were used to strike 22,053 Troy lb of the debased coinage, an amount equal to 25 percent of the total, thus indicating a fineness of at least 9 oz fine silver.

<sup>71</sup> Challis, ‘Debasement of the Coinage’, p. 442, citing another mint document (National Archives [Public Record Office], Exchequer, E101/303/8): ‘every pound weight of these moneys of silver aforesaide shall holde tenne ounces of sterling silver and two ounces of alloye in every pownde weight of troy aforesaide. That is to say to hold two ounces of alloye more in the pound weight of troy thanne doothe the sterling money ... before the date of this indenture’. See also Challis, *Tudor Coinage*, pp. 83-85, and Appendix III, p. 312; Challis, ‘Mint Contracts’, p. 721. As Challis notes, the Great Debasement was preceded by debasements of the Irish silver coinages in March 1536 and July 1540.

<sup>72</sup> Challis, ‘Debasement’, pp. 442-43; Challis, *Tudor Coinage*, pp. 83-86, p. 312 (mint indenture); Challis, ‘Lord Hastings to the Great Silver Recoinage’, p. 288; Challis, ‘Mint Contracts’, p. 721.

fineness to 9 oz pure silver (75.00 percent pure) – a fineness, it must be noted, substantially higher than Feavearyear’s inexplicable estimate for the 1542 debasement.

The major problem with Challis’s lower estimate for the 1542 coinage, as may be seen in Table 1, part 3 (penultimate column), is the adverse mint price calculated for that fineness: for it is *higher* than that offered in the next debasement, of May 1544. In other words, the 1544 mint price would have been uncompetitively *lower* than the 1542 mint price: £2.619 sterling for a Troy pound of pure silver, in 1544, vs. £2.637 per pound Troy, in 1542. But the mint price calculated for the second estimate, a 1542 coinage of 9 oz 5 dwt, would have been suitably lower than that offered in 1544 : £2.619 lb sterling for a Troy pound of pure silver in 1544, vs. £2.595 lb sterling in 1542. The ‘golden rule’, so to speak, for the success of any coinage debasement is that the mint price for bullion offered to merchants, with any newly debased coinage, had to be higher than that offered by the previous mint indenture, and also higher than the current market price for bullion.<sup>73</sup> If we accept the higher of the two estimates for the fine silver content of the 1542 coinage, we can see, from Table 1, part 1, that the Great Debasement had begun, in May 1542, with a reduction of 21.88 percent in the silver content of the penny (coin) and pound sterling (money of account), almost double the reduction imposed on the 1526 coinage (and also greater than that in Edward IV’s 1464 debasement). The 1542 debasement of the gold coinage, as indicated in Table 2, part 1, was a more modest 9.69 percent: that is, a reduction from 13.752 grams to 12.420 grams of fine gold in the pound money of account based on the gold sovereign, the rose and angel nobles.

Further evidence that the Great Debasement had commenced as early as May 1542 as a profit-seeking, aggressive fiscal enterprise, and not as a merely defensive measure, can be found in the mintage fees. For silver, as Table 1, part 3 demonstrates, the total mintage fees prescribed in 1542 were 16.67 percent of the metal coined (per Troy pound of silver), compared to just 2.22 percent in the defensive

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<sup>73</sup> See above, pp. 000 . That dictum does not hold with the reverse coinage change, a *renforcement*. As Table 1 also indicates, the mint price offered merchants with Elizabeth I’s recoinage of November 1560, at the equivalent of £3.162 for a Troy pound of pure silver, was lower than that previously offered (with debased coinage) of £3.191. That explains why a *renforcement* was so much more difficult to achieve than a debasement, requiring an effective ban and demonetization of all previous coin issues.

debasement of 1526. By the fourth debasement, of April 1545, the mintage fees on silver had risen to 61.11 percent; and thereafter, until 15 April 1551, they remained above 50 percent with only one exception (45.83 percent in the July 1550 debasement). After the Great Debasement for silver effectively ceased in 1553, the mintage fees suddenly and precipitously dropped to just 2.50 percent, and did not change with the Elizabethan Recoinage of November 1560.

For the several debasements of the gold coinages (for which the worst degree of fineness, in 1546-47, was 20 carats = 83.33 percent fine), the mintage fees were more modest than those for silver, though still high enough to justify labelling them as aggressive. As Table 2, part 3 indicates, for the first debasement, of May 1542, the mintage fees exacted were 4.17 percent of the gold metal coined, compared to just 0.51 percent charged in the 1526 gold coinages (that is, 8.2 times higher). Those mintage fees peaked at exactly 15.00 percent of the gold metal coined in 1546, then fell to just 3.33 percent in 1547-48, temporarily rising to 5.73 percent in 1550, but then falling to 0.38 percent in 1551. From the end of the Great Debasement in June 1553 up to, and including, the Elizabethan Recoinage of December 1560, the mintage fees were a commendably modest 0.56 percent for coins of traditional purity, 23.875 carats, and 0.61 percent for those of what became the permanent alternative standard of 22 carats (91.167 percent fine), including crowns and later, guineas.<sup>74</sup>

There is no mystery about the causes of the Great Debasement: the fiscal necessity of financing Henry VIII's many wars, especially those with France and Scotland in the 1540s, when other royal revenues, including those gained from land sales following the Dissolution of the Monasteries (1536-40), had been virtually exhausted.<sup>75</sup> In much of later-medieval continental western Europe wars were financed by public

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<sup>74</sup> From October 1551, gold sovereigns, angel-nobles, and rose-nobles ('ryals') were struck in two finenesses: 23.875 and 22.00 carats, but crowns were struck at only 22 carats. The last gold coins to be struck at 23.875 carats were issued in July 1660; and thereafter only coins of 22 carats were issued. Challis, 'Mint Contracts', pp. 720-758.

<sup>75</sup> See Joyce Youngs, *The Dissolution of the Monasteries* (Historical Problems series No. 14, London: 1971); Mackie, *Earlier Tudors*, pp. 370-401. For the costs of war with France and Scotland, see Dietz, *English Government Finance*, pp. 137-59, 178-84; Mackie, *Earlier Tudors*, pp. 405-11.

borrowing, so that the direct utility of mint profits was in paying the interest or annuity payments on permanent funded public debt (or *rentes*), payments that often continued as major public financial burdens long after the wars had ceased.<sup>76</sup> In England, however, which did not yet use this form of public finance, the mint profits were evidently used more directly in financing warfare (and defence). According to Challis, whose conclusions are now widely accepted, the net profits from the Great Debasement (from the mints of Canterbury, Southwark, York, and London Tower I and Tower II, but excluding the Irish mints) amounted to at least £1,157,407 sterling, as recorded in the accounts of the Under-Treasurers. He also recorded a further profit £94,418.913 (again excluding the Irish mints), from the accounts of the accounts of the High Treasurer. If the Irish mints are included, the total mint profits from July 1542 to Michaelmas 1551 amount to about £1,285,000.<sup>77</sup>

The singular importance of these mint profits can be better appreciated by comparing them with Challis' estimates of total revenues from taxation for the period 1544 - 1551 (excluding clerical 'first fruits

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<sup>76</sup> See John Munro, 'The Medieval Origins of the Financial Revolution: Usury, *Rentes*, and Negotiability', *The International History Review*, 25:3 (September 2003), 505-62.

<sup>77</sup> Challis, 'Debasement of the Coinage', Tables 3, 5, pp. 452-53; and Appendix, Table 6, pp. 457-66 (detailed accounts for each mint, and each minting period). These figures are vastly greater than Feavearyear's total estimate of the profits: just £227,378.5875, in *Pound Sterling*, 62. But these statistics cover only the years 1542-47, and (according to Challis) are based on only a small sample of the accounts. Dietz, *English Government Finance*, pp. 177, 180, 191, had offered a far higher total estimate of the debasement profits than did Feavearyear, but nevertheless a lower estimate than that supplied by Challis. According to Dietz, the sum of £363,000 was acquired under Henry VIII (1544-47), another £537,000 under Edward VI (1547-January 1551), 'more than the revenues from the court of Augmentation for the same period'; and finally, another £114,500 in mint profits, from 1 Jan to 31 July 1551, for a total net profit of £1,014,500 sterling. For Dietz's estimates of total revenues and expenditures in this period, see the Appendix, Tables I - VII, pp. 215-28. See Challis, 'Debasement', p. 454 for a critique of Dietz's statistics on the debasement profits. Gould, *The Great Debasement*, p. 187, states that his book 'has eschewed comment on the fiscal aspect of the debasement of the coinage', since he accepts Challis's statistics, differing only on those concerning the conversion of testoons in 1548 (see Appendix E, pp. 187-98). For Challis's convincing reply and defence of his calculations, see Christopher Challis, 'The Conversion of Testoons: a Restatement', *British Numismatic Journal*, 50 (1980), 67-80; and Challis, *Tudor Coinage*, pp. 96-100. For another perspective on total mint outputs and profits, but surprisingly only for the period of 1544-1551, see Challis, 'Lord Hastings to the Great Silver Recoinage', pp. 232-44. For this period, Challis estimates that the Great Debasement produced a silver coinage output of 1,091,666.375 lb Troy, with a face value of £3,015,895.125, and a gold coinage output of 44,015.656 lb Troy, with a face value of £1,323,281. See also Challis and Harrison, 'A Contemporary Estimate of the Production of Gold and Silver', pp. 821-35 (in note 1 above).

and tenths’): £976,000, to which may be added another £1,048,255 from rents and sales of crown lands (1544-54). But even that total, of all revenues, did not match estimated military expenditures for this period: about £3.5 million sterling, so that Henry VIII was forced to engage in extensive foreign borrowing, principally in the Low Countries.<sup>78</sup>

In conclusion, we may now assert that a correct understanding of the Great Debasement provides us with the proper perspective on the earlier, preceding monetary changes: those of Henry VIII, in 1526, and those of Edward IV in 1464-65. By comparing both sets of Henry VIII’s monetary changes with those of Edward IV (see above, pp. 000-00), we can see that the Great Debasement was not the only ‘aggressive’ debasement in English monetary history, as is so often contended. Furthermore, we can gain a far better understanding of the Henry VIII’s two earlier debasements of 1526, so neglected by historians: as purely defensive monetary changes, to be properly compared with the English debasements of 1351 and 1411, but not those of 1464-65.<sup>79</sup> No debasements of the medieval and early-modern eras can be understood unless the historian begins with this fundamental question: were they aggressive or defensive; and thus were they primarily fiscal or monetary policies. No historians have yet successfully argued the case that aggressive debasements were ever primarily monetary in nature, though certainly almost all defensive debasements were indeed primarily monetary in nature.

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<sup>78</sup> Challis, ‘Debasement’, pp. 454-55 (without explaining why the comparison periods are not identical); Mackie, *Earlier Tudors*, pp. 412-13.

<sup>79</sup> For the earlier English debasements of 1351 and 1411, see John Munro, ‘Mint Policies, Ratios, and Outputs in England and the Low Countries, 1335-1420: Some Reflections on New Data’, *The Numismatic Chronicle*, 141 (1981), 71-116; 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; and Brookfield, Vermont: Ashgate Publishing Ltd., 1992); Munro, *Wool, Cloth, and Gold*, pp. 11-41, 58-63, 160-73; Munro, ‘Maze of Medieval Monetary Metrology’, pp. 173-79.

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Table 1.

**ENGLISH SILVER COINAGES: FROM 1464 (EDWARD IV) TO 1560 (ELIZABETH I)**

**COMPOSITION OF THE SILVER PENNY, WITH MINT CHARGES AND MINT PRICES FOR SILVER COINAGE**

based on the Troy Pound

part 1: fineness and weight

Date	fineness of the penny			number of pence to the Troy Pound	weight of the penny:	
	in ounces out of 12 oz	in penny- weight  out of 20 dwt	percent fine		in Troy grains  (1 grain = 0.648 gram)	in grams
1464 Aug 13	11	2	92.50%	480.00	12.000	0.778
1465 Mar 6	11	2	92.50%	480.00	12.000	0.778
1466 Sep 29	11	2	92.50%	480.00	12.000	0.778
1467 Sep 29	11	2	92.50%	480.00	12.000	0.778
1470 Oct 23	11	2	92.50%	480.00	12.000	0.778
1471 Apr 14	11	2	92.50%	480.00	12.000	0.778
1492 Nov 20	11	2	92.50%	480.00	12.000	0.778
1526 Nov 5	11	2	92.50%	540.00	10.667	0.691

5760 grains =  
373.242 grams

## part 1: fineness and weight

Date	fineness of the penny			weight of the penny:		
	in ounces out of 12 oz	in penny- weight  out of 20 dwt	percent fine	number of pence to the Troy Pound	in Troy grains (1 grain = 0.648 gram)	in grams
1542 May 16 (Gould)*	10	0	83.33%	576.00	10	0.648
1542 May 16 (Challis)*	9	2	75.83%	576.00	10.000	0.648
1542 May 16 (Munro)*	9	5	77.08%	576.00	10.000	0.648
1544 May 28	9	0	75.00%	576.00	10.000	0.648
1545 Mar 27	6	0	50.00%	576.00	10	0.648
1546 Apr 1	4	0	33.33%	576.00	10	0.648
1547 Apr 5	4	0	33.33%	576.00	10.000	0.648
1547 Apr 5	4	0	33.33%	576.00	10	0.648
1548 Feb 16	4	0	33.33%	576.00	10.000	0.648
1549 Jan 24	8	0	66.67%	1152.00	5.000	0.324
1549 Apr 12	6	0	50.00%	864.00	6.667	0.432
1549 Apr 12	6	0	50.00%	864.00	6.667	0.432
1550 Feb 1	4	0	33.33%	576.00	10.000	0.648

5760 grains =  
373.242 grams

## part 1: fineness and weight

Date	fineness of the penny			number of pence to the Troy Pound	weight of the penny:	
	in ounces out of 12 oz	in penny- weight  out of 20 dwt	percent fine		in Troy grains (1 grain = 0.648 gram)	in grams
1550 July	6	0	50.00%	864.00	6.667	0.432
1550 July	6	0	50.00%	864.00	6.667	0.432
1551 Apr 14	3	0	25.00%	864.00	6.667	0.432
1551 Oct 5	11	1	92.08%	720.00	8.000	0.518
1551 Dec 17	4	0	33.33%	576.00	10.000	0.648
1553 June 11	4	0	33.33%	480.00	12.000	0.778
1553 June 11	3	0	25.00%	480.00	12.000	0.778
1553 Aug 20	11	0	91.67%	720.00	8.000	0.518
1557 June 28	11	0	91.67%	720.00	8.000	0.518
1558 Dec 31	11	0	91.67%	720.00	8.000	0.518
1560 Nov 8	11	2	92.50%	720.00	8.000	0.518

\* the fineness of the silver penny, as debased and struck in May 1542, is given according to the estimates of Gould and Challis (see sources and text) and the one that I myself have calculated as the best estimate (Munro).

**ENGLISH SILVER COINAGES: FROM 1464 (EDWARD IV) TO 1560 (ELIZABETH I)**

**COMPOSITION OF THE SILVER PENNY, WITH MINT CHARGES AND MINT PRICES FOR SILVER COINAGE**

**based on the Troy Pound**

**part 2: pure silver contents and values**

<b>Date</b>	<b>grams of pure silver in penny</b>	<b>percent change in silver contents</b>	<b>grams of pure silver in the pound sterling</b>	<b>silver index base 1526 100.00</b>	<b>Traite value of a Troy lb of silver of given alloy in decimal £ sterling</b>	<b>Traite value of a Troy lb of silver of given alloy in shillings</b>	<b>Traite value of a Troy lb of silver 0.925 fine in decimal £ sterling</b>
<b>1464 Aug 13</b>	0.719	-20.00%	172.624	112.50	2.0000	40.0000	2.0000
<b>1465 Mar 6</b>	0.719	0.00%	172.624	112.50	2.0000	40.0000	2.0000
<b>1466 Sep 29</b>	0.719	0.00%	172.624	112.50	2.0000	40.0000	2.0000
<b>1467 Sep 29</b>	0.719	0.00%	172.624	112.50	2.0000	40.0000	2.0000
<b>1470 Oct 23</b>	0.719	0.00%	172.624	112.50	2.0000	40.0000	2.0000
<b>1471 Apr 14</b>	0.719	0.00%	172.624	112.50	2.0000	40.0000	2.0000
<b>1492 Nov 20</b>	0.719	0.00%	172.624	112.50	2.0000	40.0000	2.0000
<b>1526 Nov 5</b>	0.639	-11.11%	153.444	100.00	2.2500	45.0000	2.2500

## part 2: pure silver contents and values

Date	grams of pure silver in penny	percent change in silver contents	grams of pure silver in the pound sterling	silver index base 1526 100.00	Traite value of a Troy lb of silver of given alloy in decimal £ sterling	Traite value of a Troy lb of silver of given alloy in shillings	Traite value of a Troy lb of silver 0.925 fine in decimal £ sterling
1542 May 16 (G))	0.540	-15.54%	129.598	84.46	2.4000	48.0000	2.8800
1542 May 16 (C)	0.491	-23.14%	117.934	76.86	2.4000	48.0000	2.8800
1542 May 16 (M)	0.499	-21.87%	119.878	78.13	2.4000	48.0000	2.8800
1544 May 28	0.486	-2.70%	116.638	76.01	2.4000	48.0000	2.9600
1545 Mar 27	0.324	-33.33%	77.759	50.68	2.4000	48.0000	4.4400
1546 Apr 1	0.216	-33.33%	51.839	33.78	2.4000	48.0000	6.6600
1547 Apr 5	0.216	0.00%	51.839	33.78	2.4000	48.0000	6.6600
1547 Apr 5	0.216	0.00%	51.839	33.78	2.4000	48.0000	6.6600
1548 Feb 16	0.216	0.00%	51.839	33.78	2.4000	48.0000	6.6600
1549 Jan 24	0.216	0.00%	51.839	33.78	4.8000	96.0000	6.6600
1549 Apr 12	0.216	0.00%	51.839	33.78	3.6000	72.0000	6.6600
1549 Apr 12	0.216	0.00%	51.839	33.78	3.6000	72.0000	6.6600
1550 Feb 1	0.216	0.00%	51.839	33.78	2.4000	48.0000	6.6600
1550 July	0.216	0.00%	51.839	33.78	3.6000	72.0000	6.6600
1550 July	0.216	0.00%	51.839	33.78	3.6000	72.0000	6.6600

**part 2: pure silver contents and values**

<b>Date</b>	<b>grams of pure silver in penny</b>	<b>percent change in silver contents</b>	<b>grams of pure silver in the pound sterling</b>	<b>silver index base 1526 100.00</b>	<b>Traite value of a Troy lb of silver of given alloy in decimal £ sterling</b>	<b>Traite value of a Troy lb of silver of given alloy in shillings</b>	<b>Traite value of a Troy lb of silver 0.925 fine in decimal £ sterling</b>
<b>1551 Apr 14</b>	0.108	-50.00%	25.920	16.89	3.6000	72.0000	13.3200
<b>1551 Oct 5</b>	0.477	342.00%	114.565	74.66	3.0000	60.0000	3.0136
<b>1551 Dec 17</b>	0.216	-54.75%	51.839	33.78	2.4000	48.0000	6.6600
<b>1553 June 11</b>	0.259	20.00%	62.207	40.54	2.0000	40.0000	5.5500
<b>1553 June 11</b>	0.259	20.00%	62.207	40.54	2.0000	40.0000	5.5500
<b>1553 Aug 20</b>	0.475	83.33%	114.046	74.32	3.0000	60.0000	3.0273
<b>1557 June 28</b>	0.475	0.00%	114.046	74.32	3.0000	60.0000	3.0273
<b>1558 Dec 31</b>	0.475	0.00%	114.046	74.32	3.0000	60.0000	3.0273
<b>1560 Nov 8</b>	0.48	0.91%	115.083	75.00	3.0000	60.0000	3.0000



**ENGLISH SILVER COINAGES: FROM 1464 (EDWARD IV) TO 1560 (ELIZABETH I)**

**COMPOSITION OF THE SILVER PENNY, WITH MINT CHARGES AND MINT PRICES FOR SILVER  
COINAGE: based on the Troy Pound**

**part 3: mint charges (brassage and seigniorage) and mint prices for silver bullion per Troy pound**

Date	values in terms of the specified alloy					values in terms of pure silver				
	Traite value of a Troy lb of coined silver in the given alloy in decimal £ sterling	total mint charges in dec. £ sterling	mint charges as per cent of total struck	mint price for bullion: alloyed silver decimal pound sterling	mint price as per cent of total struck	Traite value of a Troy lb of coined silver: in pure silver in decimal £ sterling	total mint charges in decimal £ sterling	mint charges as per cent of total struck	mint price for bullion in pure silver decimal pound sterling	mint price as per cent of the Traite Value for pure silver
<b>1464 Aug 13</b>	2.0000	0.240	12.00%	1.760	88.00%	2.162	0.259	12.00%	1.903	88.00%
<b>1465 Mar 6</b>	2.0000	0.240	12.00%	1.760	88.00%	2.162	0.259	12.00%	1.903	88.00%
<b>1466 Sep 29</b>	2.0000	0.231	11.56%	1.769	88.44%	2.162	0.250	11.56%	1.912	88.44%
<b>1467 Sep 29</b>	2.0000	0.142	7.11%	1.858	92.89%	2.162	0.154	7.11%	2.008	92.89%
<b>1470 Oct 23</b>	2.0000	0.107	5.33%	1.893	94.67%	2.162	0.115	5.33%	2.047	94.67%
<b>1471 Apr 14</b>	2.0000	0.080	4.00%	1.920	96.00%	2.162	0.086	4.00%	2.076	96.00%

**ENGLISH SILVER COINAGES: FROM 1464 (EDWARD IV) TO 1560 (ELIZABETH I)**

**COMPOSITION OF THE SILVER PENNY, WITH MINT CHARGES AND MINT PRICES FOR SILVER  
COINAGE: based on the Troy Pound**

**part 3: mint charges (brassage and seigniorage) and mint prices for silver bullion per Troy pound**

Date	values in terms of the specified alloy					values in terms of pure silver					
	Traite value of a Troy lb of coined silver in the given alloy in decimal £ sterling	total mint charges in dec. £ sterling	mint charges as per cent of total struck	mint price for bullion: alloyed silver decimal pound sterling	mint price as per cent of total struck	Traite value of a Troy lb of coined silver: in pure silver in decimal £ sterling	total mint charges in decimal £ sterling	mint charges as per cent of total struck	mint price for bullion in pure silver decimal pound sterling	mint price as per cent of the Traite Value for pure silver	
<b>1492 Nov 20</b>	2.0000	0.053	2.67%	1.947	97.33%	2.162	0.058	2.67%	2.105	97.33%	
<b>1526 Nov 5</b>	2.2500	0.050	2.22%	2.200	97.78%	2.432	0.054	2.22%	2.378	97.78%	
<b>1542 May 16 (Gould)</b>	2.4000	0.400	16.67%	2.000	83.33%	2.880	0.480	16.67%	2.400	83.33%	
<b>1542 May 16 (Challis)</b>	2.4000	0.400	16.67%	2.000	83.33%	3.165	0.527	16.67%	2.637	83.33%	
<b>1542 May 16 (Munro)</b>	2.4000	0.400	16.67%	2.000	83.33%	3.114	0.519	16.67%	2.595	83.33%	
<b>1544 May 28</b>	2.4000	0.435	18.14%	1.965	81.86%	3.200	0.581	18.14%	2.619	81.86%	

**ENGLISH SILVER COINAGES: FROM 1464 (EDWARD IV) TO 1560 (ELIZABETH I)**

**COMPOSITION OF THE SILVER PENNY, WITH MINT CHARGES AND MINT PRICES FOR SILVER  
COINAGE: based on the Troy Pound**

**part 3: mint charges (brassage and seigniorage) and mint prices for silver bullion per Troy pound**

Date	values in terms of the specified alloy					values in terms of pure silver				
	Traite value of a Troy lb of coined silver in the given alloy in decimal £ sterling	total mint charges in dec. £ sterling	mint charges as per cent of total struck	mint price for bullion: alloyed silver decimal pound sterling	mint price as per cent of total struck	Traite value of a Troy lb of coined silver: in pure silver in decimal £ sterling	total mint charges in decimal £ sterling	mint charges as per cent of total struck	mint price for bullion in pure silver decimal pound sterling	mint price as per cent of the Traite Value for pure silver
<b>1545 Mar 27</b>	2.4000	1.000	41.67%	1.400	58.33%	4.800	2.000	41.67%	2.800	58.33%
<b>1546 Apr 1</b>	2.4000	1.467	61.11%	0.933	38.89%	7.200	4.400	61.11%	2.800	38.89%
<b>1547 Apr 5</b>	2.4000	1.333	55.56%	1.067	44.44%	7.200	4.000	55.56%	3.200	44.44%
<b>1547 Apr 5</b>	2.4000	1.267	52.78%	1.133	47.22%	7.200	3.800	52.78%	3.400	47.22%
<b>1548 Feb 16</b>	2.4000	n.a.		n.a.		7.200	n.a.		n.a.	
<b>1549 Jan 24</b>	4.8000	n.a.		n.a.		7.200	n.a.		n.a.	
<b>1549 Apr 12</b>	3.6000	1.900	52.78%	1.700	47.22%	7.200	3.800	52.78%	3.400	47.22%
<b>1549 Apr 12</b>	3.6000	1.800	50.00%	1.800	50.00%	7.200	3.600	50.00%	3.600	50.00%

**ENGLISH SILVER COINAGES: FROM 1464 (EDWARD IV) TO 1560 (ELIZABETH I)**

**COMPOSITION OF THE SILVER PENNY, WITH MINT CHARGES AND MINT PRICES FOR SILVER  
COINAGE: based on the Troy Pound**

**part 3: mint charges (brassage and seigniorage) and mint prices for silver bullion per Troy pound**

Date	values in terms of the specified alloy					values in terms of pure silver				
	Traite value of a Troy lb of coined silver in the given alloy in decimal £ sterling	total mint charges in dec. £ sterling	mint charges as per cent of total struck	mint price for bullion: alloyed silver decimal pound sterling	mint price as per cent of total struck	Traite value of a Troy lb of coined silver: in pure silver in decimal £ sterling	total mint charges in decimal £ sterling	mint charges as per cent of total struck	mint price for bullion in pure silver decimal pound sterling	mint price as per cent of the Traite Value for pure silver
<b>1550 Feb 1</b>	2.4000	n.a.		n.a.		7.200	n.a.		n.a.	
<b>1550 July</b>	3.6000	1.600	44.44%	2.000	55.56%	7.200	3.200	44.44%	4.000	55.56%
<b>1550 July</b>	3.6000	1.650	45.83%	1.950	54.17%	7.200	3.300	45.83%	3.900	54.17%
<b>1551 Apr 14</b>	3.6000	2.100	58.33%	1.500	41.67%	14.400	8.400	58.33%	6.000	41.67%
<b>1551 Oct 5</b>	3.0000	0.050	1.67%	2.950	98.33%	3.258	0.054	1.67%	3.204	98.33%
<b>1551 Dec 17</b>	2.4000	n.a.		n.a.		7.200	n.a.		n.a.	
<b>1553 June 11</b>	2.0000	n.a.		n.a.		7.200	n.a.		n.a.	

**ENGLISH SILVER COINAGES: FROM 1464 (EDWARD IV) TO 1560 (ELIZABETH I)**

**COMPOSITION OF THE SILVER PENNY, WITH MINT CHARGES AND MINT PRICES FOR SILVER  
COINAGE: based on the Troy Pound**

**part 3: mint charges (brassage and seigniorage) and mint prices for silver bullion per Troy pound**

Date	values in terms of the specified alloy					values in terms of pure silver				
	Traite value of a Troy lb of coined silver in the given alloy in decimal £ sterling	total mint charges in dec. £ sterling	mint charges as per cent of total struck	mint price for bullion: alloyed silver decimal pound sterling	mint price as per cent of total struck	Traite value of a Troy lb of coined silver: in pure silver in decimal £ sterling	total mint charges in decimal £ sterling	mint charges as per cent of total struck	mint price for bullion in pure silver decimal pound sterling	mint price as per cent of the Traite Value for pure silver
<b>1553 June 11</b>	2.0000	n.a.		n.a.		7.200	n.a.		n.a.	
<b>1553 Aug 20</b>	3.0000	0.073	2.43%	2.927	97.57%	3.273	0.080	2.43%	3.193	97.57%
<b>1557 June 28</b>	3.0000	0.075	2.50%	2.925	97.50%	3.273	0.082	2.50%	3.191	97.50%
<b>1558 Dec 31</b>	3.0000	n.a.		n.a.						
<b>1560 Nov 8</b>	3.0000	0.075	2.50%	2.925	97.50%	3.243	0.081	2.50%	3.162	97.50%

**Table 2. ENGLISH GOLD COINAGES: FROM 1464 (EDWARD IV) to 1560 (ELIZABETH I)****COMPOSITION OF THE GOLD COINS WITH MINT CHARGES AND MINT PRICES FOR GOLD****based on the Troy Pound**

n.a. = data are not available in the mint ordinances and mint accounts

**Part 1: fineness and weight**

Date	Name of the Gold Coin	fineness of gold coin			weight of gold coin		
		in carats (out of 24)	in grains (out of 4)	Per-cent Fine-ness	No. Cut to Troy Pound 373.242 g. 5760 Troy grains	Weight of Gold Coin in Troy grains	Weight of Gold Coin in grams
<b>1464 Aug 13</b>	Noble	23	3.50	99.48%	53.333	108.000	6.998
<b>1465 Mar 6</b>	Ryal, Rose Noble	23	3.50	99.48%	48.000	120.000	7.776
<b>1465 Mar 6</b>	Angel-Noble	23	3.50	99.48%	72.000	80.000	5.184
<b>1469 Mar 2</b>	Ryal, Rose Noble	23	3.50	99.48%	48.000	120.000	7.776
<b>1469 Mar 2</b>	Angel-Noble	23	3.50	99.48%	72.000	80.000	5.184
<b>1471 Mar 6</b>	Ryal, Rose Noble	23	3.50	99.48%	48.000	120.000	7.776
<b>1471 Mar 6</b>	Angel-Noble	23	3.50	99.48%	72.000	80.000	5.184
<b>1477 Feb 3</b>	Ryal, Rose Noble	23	3.50	99.48%	48.000	120.000	7.776

**Part 1: fineness and weight**

Date	Name of the Gold Coin	fineness of gold coin			weight of gold coin		
		in carats (out of 24)	in grains (out of 4)	Per-cent Fine-ness	No. Cut to Troy Pound 373.242 g. 5760 Troy grains	Weight of Gold Coin in Troy grains	Weight of Gold Coin in grams
1477 Feb 3	Angel-Noble	23	3.50	99.48%	72.000	80.000	5.184
1489 Oct 28	Sovereign	23	3.50	99.48%	24.000	240.000	15.552
1492 Nov 20	Ryal, Rose Noble	23	3.50	99.48%	48.000	120.000	7.776
1492 Nov 20	Angel-Noble	23	3.50	99.48%	72.000	80.000	5.184
1492 Nov 20	Sovereign	23	3.50	99.48%	24.000	240.000	15.552
1526 Aug 22	Sovereign	23	3.50	99.48%	24.000	240.000	15.552
1526 Aug 22	Ryal, Rose Noble	23	3.50	99.48%	48.000	120.000	7.776
1526 Aug 22	Angel-Noble	23	3.50	99.48%	72.000	80.000	5.184
1526 Aug 22	Crown: Rose	22	0.00	91.67%	106.667	54.000	3.499
1526 Nov 5	Sovereign	23	3.50	99.48%	24.000	240.000	15.552
1526 Nov 5	Ryal, Rose Noble	23	3.50	99.48%	48.000	120.000	7.776
1526 Nov 5	Angel-Noble	23	3.50	99.48%	72.000	80.000	5.184
1526 Nov 5	St. George Noble	23	3.50	99.48%	81.000	71.111	4.608
1526 Nov 5	Crown: Double Rose	22	0.00	91.67%	100.500	57.313	3.714
1526 Nov 5	Half-Crown	22	0.00	91.67%	201.000	28.657	1.857
1542 May 16	Sovereign	23	0.00	95.83%	28.800	200.000	12.960
1542 May 16	Ryal, Rose Noble	23	0.00	95.83%	57.600	100.000	6.480

**Part 1: fineness and weight**

Date	Name of the Gold Coin	fineness of gold coin			weight of gold coin		
		in carats (out of 24)	in grains (out of 4)	Per-cent Fine-ness	No. Cut to Troy Pound 373.242 g. 5760 Troy grains	Weight of Gold Coin in Troy grains	Weight of Gold Coin in grams
1542 May 16	Angel-Noble	23	0.00	95.83%	72.000	80.000	5.184
1544 May 28	Sovereign	23	0.00	95.83%	28.800	200.000	12.960
1544 May 28	Ryal, Rose Noble	23	0.00	95.83%	57.600	100.000	6.48
1544 May 28	Angel-Noble	23	0.00	95.83%	72.000	80.000	5.184
1545 Mar 27	Sovereign	22	0.00	91.67%	30.000	192.000	12.441
1545 Mar 27	Ryal, Rose Noble	22	0.00	91.67%	60.000	96.000	6.221
1545 Mar 27	Angel-Noble	22	0.00	91.67%	75.000	76.800	4.977
1545 April	Sovereign	22	0.00	91.67%	30.000	192.000	12.441
1545 April	Ryal, Rose Noble	22	0.00	91.67%	60.000	96.000	6.221
1545 April	Angel-Noble	22	0.00	91.67%	75.000	76.800	4.977
1546 Apr 1	Sovereign	20	0.00	83.33%	30.000	192.000	12.441
1546 Apr 1	Ryal, Rose Noble	20	0.00	83.33%	60.000	96.000	6.221
1546 Apr 1	Angel-Noble	20	0.00	83.33%	75.000	76.800	4.977
1546 Apr 1	Crown	20	0.00	83.33%	120.000	48.000	3.110
1546 Apr 1	Half-Crown	20	0.00	83.33%	240.000	24.000	1.555
1546 Apr 1	Sovereign	20	0.00	83.33%	30.000	192.000	12.441
1546 Apr 1	Ryal, Rose Noble	20	0.00	83.33%	60.000	96.000	6.221
1546 Apr 1	Angel-Noble	20	0.00	83.33%	75.000	76.800	4.977



**Part 1: fineness and weight**

Date	Name of the Gold Coin	fineness of gold coin			weight of gold coin		
		in carats (out of 24)	in grains (out of 4)	Per- cent Fine- ness	No. Cut to Troy Pound 373.242 g. 5760 Troy grains	Weight of Gold Coin in Troy grains	Weight of Gold Coin in grams
1546 Apr 1	Crown	20	0.00	83.33%	120.000	48.000	3.110
1546 Apr 1	Half-Crown	20	0.00	83.33%	240.000	24.000	1.555
1547 April	Sovereign	20	0.00	83.33%	30.000	192.000	12.441
1547 April	Ryal, Rose Noble	20	0.00	83.33%	60.000	96.000	6.221
1547 April	Angel-Noble	20	0.00	83.33%	75.000	76.800	4.977
1547 April	Crown	20	0.00	83.33%	120.000	48.000	3.110
1547 April	Half-Crown	20	0.00	83.33%	240.000	24.000	1.555
1548 Feb 16	Sovereign	20	0.00	83.33%	30.000	192.000	12.441
1549 Jan 24	Sovereign	22	0.00	91.67%	34.000	169.412	10.978
1549 Jan 24	Ryal, Rose Noble	22	0.00	91.67%	68.000	84.706	5.489
1549 Jan 24	Crown	22	0.00	91.67%	136.000	42.353	2.744
1549 Jan 24	Half-Crown	22	0.00	91.67%	272.000	21.176	1.372
1550 Dec 18	Sovereign	23	3.50	99.48%	24.000	240.000	15.552
1550 Dec 18	Ryal, Rose Noble	23	3.50	99.48%	48.000	120.000	7.776
1550 Dec 18	Angel-Noble	23	3.50	99.48%	72.000	80.000	5.184
1551 Oct 5	Sovereign	23	3.50	99.48%	24.000	240.000	15.552
1551 Oct 5	Angel-Noble	23	3.50	99.48%	72.000	80.000	5.184
1551 Oct 5	Sovereign	22	0.00	91.67%	33.000	174.545	11.310

**Part 1: fineness and weight**

Date	Name of the Gold Coin	fineness of gold coin			weight of gold coin		
		in carats (out of 24)	in grains (out of 4)	Per- cent Fine- ness	No. Cut to Troy Pound 373.242 g. 5760 Troy grains	Weight of Gold Coin in Troy grains	Weight of Gold Coin in grams
1551 Oct 5	Ryal, Rose Noble	22	0.00	91.67%	66.000	87.273	5.655
1551 Oct 5	Crown	22	0.00	91.67%	132.000	43.636	2.828
1553 Aug 20	Sovereign	23	3.50	99.48%	24.000	240.000	15.552
1553 Aug 20	Ryal, Rose Noble	23	3.50	99.48%	48.000	120.000	7.776
1553 Aug 20	Angel-Noble	23	3.50	99.48%	72.000	80.000	5.184
1557 Aug 5	Angel-Noble	23	3.50	99.48%	72.000	80.000	5.184
1558 Apr 30	Sovereign	23	3.50	99.48%	24.000	240.000	15.552
1558 Apr 30	Angel-Noble	23	3.50	99.48%	72.000	80.000	5.184
1558 Apr 30	Sovereign	22	0.00	91.67%	33.000	174.545	11.310
1558 Apr 30	Ryal, Rose Noble	22	0.00	91.67%	66.000	87.273	5.655
1558 Apr 30	Crown	22	0.00	91.67%	132.000	43.636	2.828
1559 Jan	Sovereign	23	3.50	99.48%	24.000	240.000	15.552
1559 Jan	Ryal, Rose Noble	23	3.50	99.48%	48.000	120.000	7.776
1559 Jan	Angel-Noble	23	3.50	99.48%	72.000	80.000	5.184
1559 Jan	Sovereign	22	0.00	91.67%	33.000	174.545	11.310
1559 Jan	Angel-Noble	22	0.00	91.67%	66.000	87.273	5.655
1559 Jan	Crown	22	0.00	91.67%	132.000	43.636	2.828
1560 Nov 8	Sovereign	23	3.50	99.48%	24.000	240.000	15.552

**Part 1: fineness and weight**

Date	Name of the Gold Coin	fineness of gold coin			weight of gold coin		
		in carats (out of 24)	in grains (out of 4)	Per- cent Fine- ness	No. Cut to Troy Pound 373.242 g. 5760 Troy grains	Weight of Gold Coin in Troy grains	Weight of Gold Coin in grams
<b>1560 Nov 8</b>	Ryal, Rose Noble	23	3.50	99.48%	48.000	120.000	7.776
<b>1560 Nov 8</b>	Angel-Noble	23	3.50	99.48%	72.000	80.000	5.184
<b>1560 Nov 8</b>	Sovereign	22	0.00	91.67%	33.000	174.545	11.310
<b>1560 Nov 8</b>	Angel-Noble	22	0.00	91.67%	66.000	87.273	5.655
<b>1560 Nov 8</b>	Crown	22	0.00	91.67%	132.000	43.636	2.828

**ENGLISH GOLD COINAGES: FROM 1464 (EDWARD IV) to 1560 (ELIZABETH I)**

**COMPOSITION OF THE GOLD COINS WITH MINT CHARGES AND MINT PRICES FOR GOLD  
based on the Troy Pound**

**Part 2: pure gold contents and values**

Date	Name of the Gold Coin	grams of pure gold				official value of the coin			
		in the coin	in the pound sterling	per cent change in gold contents	index of gold contents 1526 = 100	in shillings	in pence	in decimal pound sterling	traite value of Troy pound in pounds sterling
<b>1464 Aug 13</b>	Noble	6.962	16.708	-20.00%	118.8	8	4	0.417	22.222
<b>1465 Mar 6</b>	Ryal, Rose Noble	7.735	15.471	-7.41%	110.000	10	0	0.500	24.000
<b>1465 Mar 6</b>	Angel-Noble	5.157	15.471	-7.41%	110.000	6	8	0.333	24.000
<b>1469 Mar 2</b>	Ryal, Rose Noble	7.735	15.471	0.00%	110.000	10	0	0.500	24.000
<b>1469 Mar 2</b>	Angel-Noble	5.157	15.471	0.00%	110.000	6	8	0.333	24.000
<b>1471 Mar 6</b>	Ryal, Rose Noble	7.735	15.471	0.00%	110.000	10	0	0.500	24.000
<b>1471 Mar 6</b>	Angel-Noble	5.157	15.471	0.00%	110.000	6	8	0.333	24.000
<b>1477 Feb 3</b>	Ryal, Rose Noble	7.735	15.471	0.00%	110.000	10	0	0.500	24
<b>1477 Feb 3</b>	Angel-Noble	5.157	15.471	0.00%	110.000	6	8	0.333	24

**ENGLISH GOLD COINAGES: FROM 1464 (EDWARD IV) to 1560 (ELIZABETH I)**

**COMPOSITION OF THE GOLD COINS WITH MINT CHARGES AND MINT PRICES FOR GOLD  
based on the Troy Pound**

**Part 2: pure gold contents and values**

Date	Name of the Gold Coin	grams of pure gold				official value of the coin			
		in the coin	in the pound sterling	per cent change in gold contents	index of gold contents 1526 = 100	in shillings	in pence	in decimal pound sterling	traite value of Troy pound in pounds sterling
1489 Oct 28	Sovereign	15.471	15.471	0.00%	110.000	20	0	1.000	24.000
1492 Nov 20	Ryal, Rose Noble	7.735	15.471	0.00%	110.000	10	0	0.500	24.000
1492 Nov 20	Angel-Noble	5.157	15.471	0.00%	110.000	6	8	0.333	24.000
1492 Nov 20	Sovereign	15.471	15.471	0.00%	110.000	20	0	1.000	24.000
1526 Aug 22	Sovereign	15.471	14.064	-9.09%	100.000	22	0	1.100	26.400
1526 Aug 22	Ryal, Rose Noble	7.735	14.064	-9.09%	100.000	11	0	0.550	26.400
1526 Aug 22	Angel-Noble	5.157	14.064	-9.09%	100.000	7	4	0.367	26.400
1526 Aug 22	Crown: Rose	3.208	14.256	-7.85%	101.361	4	6	0.225	24.000
1526 Nov 5	Sovereign	15.471	13.752	-2.22%	97.778	22	6	1.125	27.000
1526 Nov 5	Ryal, Rose Noble	7.735	13.752	-2.22%	97.778	11	3	0.563	27.000
1526 Nov 5	Angel-Noble	5.157	13.752	-2.22%	97.778	7	6	0.375	27.000

**ENGLISH GOLD COINAGES: FROM 1464 (EDWARD IV) to 1560 (ELIZABETH I)**

**COMPOSITION OF THE GOLD COINS WITH MINT CHARGES AND MINT PRICES FOR GOLD  
based on the Troy Pound**

**Part 2: pure gold contents and values**

Date	Name of the Gold Coin	grams of pure gold				official value of the coin			
		in the coin	in the pound sterling	per cent change in gold contents	index of gold contents 1526 = 100	in shillings	in pence	in decimal pound sterling	traite value of Troy pound in pounds sterling
1526 Nov 5	St. George Noble	4.584	13.752	-2.22%	97.778	6	8	0.333	27.000
1526 Nov 5	Crown: Double Rose	3.404	13.617	-4.48%	96.823	5	0	0.250	25.125
1526 Nov 5	Half-Crown	1.702	13.617	-4.48%	96.823	2	6	0.125	25.125
1542 May 16	Sovereign	12.42	12.420	-9.69%	88.307	20	0	1.000	28.800
1542 May 16	Ryal, Rose Noble	6.21	12.420	-9.69%	88.307	10	0	0.500	28.800
1542 May 16	Angel-Noble	4.968	12.420	-9.69%	88.307	8	0	0.400	28.800
1544 May 28	Sovereign	12.420	12.420	0.00%	88.307	20	0	1.000	28.8
1544 May 28	Ryal, Rose Noble	6.210	12.420	0.00%	88.307	10	0	0.500	28.8
1544 May 28	Angel-Noble	4.968	12.420	0.00%	88.307	8	0	0.400	28.800
1545 Mar 27	Sovereign	11.405	11.405	-8.17%	81.089	20	0	1.000	30.000

**ENGLISH GOLD COINAGES: FROM 1464 (EDWARD IV) to 1560 (ELIZABETH I)**

**COMPOSITION OF THE GOLD COINS WITH MINT CHARGES AND MINT PRICES FOR GOLD  
based on the Troy Pound**

**Part 2: pure gold contents and values**

Date	Name of the Gold Coin	grams of pure gold				official value of the coin			
		in the coin	in the pound sterling	per cent change in gold contents	index of gold contents 1526 = 100	in shillings	in pence	in decimal pound sterling	traite value of Troy pound in pounds sterling
1545 Mar 27	Ryal, Rose Noble	5.702	11.405	-8.17%	81.089	10	0	0.500	30.000
1545 Mar 27	Angel-Noble	4.562	11.405	-8.17%	81.089	8	0	0.400	30.000
1545 April	Sovereign	11.405	11.405	0.00%	81.089	20	0	1.000	30.000
1545 April	Ryal, Rose Noble	5.702	11.405	0.00%	81.089	10	0	0.500	30.000
1545 April	Angel-Noble	4.562	11.405	0.00%	81.089	8	0	0.400	30.000
1546 Apr 1	Sovereign	10.368	10.368	-9.09%	73.717	20	0	1.000	30.000
1546 Apr 1	Ryal, Rose Noble	5.184	10.368	-9.09%	73.717	10	0	0.500	30.000
1546 Apr 1	Angel-Noble	4.147	10.368	-9.09%	73.717	8	0	0.400	30.000
1546 Apr 1	Crown	2.592	10.368	-9.09%	73.717	5	0	0.250	30
1546 Apr 1	Half-Crown	1.296	10.368	-9.09%	73.717	2	6	0.125	30
1546 Apr 1	Sovereign	10.368	10.368	0.00%	73.717	20	0	1.000	30.000

**ENGLISH GOLD COINAGES: FROM 1464 (EDWARD IV) to 1560 (ELIZABETH I)**

**COMPOSITION OF THE GOLD COINS WITH MINT CHARGES AND MINT PRICES FOR GOLD  
based on the Troy Pound**

**Part 2: pure gold contents and values**

Date	Name of the Gold Coin	grams of pure gold				official value of the coin			
		in the coin	in the pound sterling	per cent change in gold contents	index of gold contents 1526 = 100	in shillings	in pence	in decimal pound sterling	traite value of Troy pound in pounds sterling
<b>1546 Apr 1</b>	Ryal, Rose Noble	5.184	10.368	0.00%	73.717	10	0	0.500	30.000
<b>1546 Apr 1</b>	Angel-Noble	4.147	10.368	0.00%	73.717	8	0	0.400	30.000
<b>1546 Apr 1</b>	Crown	2.592	10.368	0.00%	73.717	5	0	0.250	30.000
<b>1546 Apr 1</b>	Half-Crown	1.296	10.368	0.00%	73.717	2	6	0.125	30.000
<b>1547 April</b>	Sovereign	10.368	10.368	0.00%	73.717	20	0	1.000	30
<b>1547 April</b>	Ryal, Rose Noble	5.184	10.368	0.00%	73.717	10	0	0.500	30
<b>1547 April</b>	Angel-Noble	4.147	10.368	0.00%	73.717	8	0	0.400	30.000
<b>1547 April</b>	Crown	2.592	10.368	0.00%	73.717	5	0	0.250	30.000
<b>1547 April</b>	Half-Crown	1.296	10.368	0.00%	73.717	2	6	0.125	30.000
<b>1548 Feb 16</b>	Sovereign	10.368	10.368	0.00%	73.717	20	0	1.000	30.000
<b>1549 Jan 24</b>	Sovereign	10.063	10.063	-2.94%	71.549	20	0	1.000	34
<b>1549 Jan 24</b>	Ryal, Rose	5.031	10.063	-2.94%	71.549	10	0	0.500	34



**ENGLISH GOLD COINAGES: FROM 1464 (EDWARD IV) to 1560 (ELIZABETH I)**

**COMPOSITION OF THE GOLD COINS WITH MINT CHARGES AND MINT PRICES FOR GOLD  
based on the Troy Pound**

**Part 2: pure gold contents and values**

Date	Name of the Gold Coin	grams of pure gold				official value of the coin			
		in the coin	in the pound sterling	per cent change in gold contents	index of gold contents 1526 = 100	in shillings	in pence	in decimal pound sterling	traite value of Troy pound in pounds sterling
<b>1549 Jan 24</b>	Noble Crown	2.516	10.063	-2.94%	71.549	5	0	0.250	34.000
<b>1549 Jan 24</b>	Half-Crown	1.258	10.063	-2.94%	71.549	2	6	0.125	34.000
<b>1550 Dec 18</b>	Sovereign	15.471	12.892	28.12%	91.667	24	0	1.200	28.800
<b>1550 Dec 18</b>	Ryal, Rose	7.735	12.892	28.12%	91.667	12	0	0.600	28.800
<b>1550 Dec 18</b>	Noble Angel-Noble	5.157	12.892	28.12%	91.667	8	0	0.400	28.800
<b>1551 Oct 5</b>	Sovereign	15.471	10.314	-20.00%	73.333	30	0	1.500	36
<b>1551 Oct 5</b>	Angel-Noble	5.157	10.314	-20.00%	73.333	10	0	0.500	36
<b>1551 Oct 5</b>	Sovereign	10.368	10.368	-19.58%	73.717	20	0	1.000	33.000
<b>1551 Oct 5</b>	Ryal, Rose	5.184	10.368	-19.58%	73.717	10	0	0.500	33.000
<b>1551 Oct 5</b>	Noble Crown	2.592	10.368	-19.58%	73.717	5	0	0.250	33.000
<b>1553 Aug 20</b>	Sovereign	15.471	10.314	0.00%	73.333	30	0	1.500	36.000

**ENGLISH GOLD COINAGES: FROM 1464 (EDWARD IV) to 1560 (ELIZABETH I)**

**COMPOSITION OF THE GOLD COINS WITH MINT CHARGES AND MINT PRICES FOR GOLD  
based on the Troy Pound**

**Part 2: pure gold contents and values**

Date	Name of the Gold Coin	grams of pure gold				official value of the coin			
		in the coin	in the pound sterling	per cent change in gold contents	index of gold contents 1526 = 100	in shillings	in pence	in decimal pound sterling	traite value of Troy pound in pounds sterling
1553 Aug 20	Ryal, Rose Noble	7.735	10.314	0.00%	73.333	15	0	0.750	36.000
1553 Aug 20	Angel-Noble	5.157	10.314	0.00%	73.333	10	0	0.500	36.000
1557 Aug 5	Angel-Noble	5.157	10.314	0.00%	73.333	10	0	0.500	36
1558 Apr 30	Sovereign	15.471	10.314	0.00%	73.333	30	0	1.500	36.000
1558 Apr 30	Angel-Noble	5.157	10.314	0.00%	73.333	10	0	0.500	36.000
1558 Apr 30	Sovereign	10.368	10.368	0.52%	73.717	20	0	1.000	33.000
1558 Apr 30	Ryal, Rose Noble	5.184	10.368	0.52%	73.717	10	0	0.500	33.000
1558 Apr 30	Crown	2.592	10.368	0.52%	73.717	5	0	0.250	33
1559 Jan	Sovereign	15.471	10.314	0.00%	73.333	30	0	1.500	36
1559 Jan	Ryal, Rose Noble	7.735	10.314	0.00%	73.333	15	0	0.750	36.000
1559 Jan	Angel-Noble	5.157	10.368	0.00%	73.717	10	0	0.500	36.000

**ENGLISH GOLD COINAGES: FROM 1464 (EDWARD IV) to 1560 (ELIZABETH I)**

**COMPOSITION OF THE GOLD COINS WITH MINT CHARGES AND MINT PRICES FOR GOLD  
based on the Troy Pound**

**Part 2: pure gold contents and values**

Date	Name of the Gold Coin	grams of pure gold				official value of the coin			
		in the coin	in the pound sterling	per cent change in gold contents	index of gold contents 1526 = 100	in shillings	in pence	in decimal pound sterling	traite value of Troy pound in pounds sterling
<b>1559 Jan</b>	Sovereign	10.368	10.368	0.00%	73.717	20	0	1	33.000
<b>1559 Jan</b>	Angel-Noble	5.184	10.368	0.00%	73.717	10	0	0.5	33
<b>1559 Jan</b>	Crown	2.592	10.368	0.00%	73.717	5	0	0.250	33
<b>1560 Nov 8</b>	Sovereign	15.471	10.314	0.00%	73.333	30	0	1.500	36
<b>1560 Nov 8</b>	Ryal, Rose Noble	7.735	10.314	0.00%	73.333	15	0	0.750	36
<b>1560 Nov 8</b>	Angel-Noble	5.157	10.314	0.00%	73.333	10	0	0.500	36.000
<b>1560 Nov 8</b>	Sovereign	10.368	10.368	0.00%	73.717	20	0	1.000	33.000
<b>1560 Nov 8</b>	Angel-Noble	5.184	10.368	0.00%	73.717	10	0	0.500	33.000
<b>1560 Nov 8</b>	Crown	2.592	10.368	0.00%	73.717	5	0	0.250	33

**ENGLISH GOLD COINAGES: FROM 1464 (EDWARD IV) to 1560 (ELIZABETH I)**

**COMPOSITION OF THE GOLD COINS WITH MINT CHARGES AND MINT PRICES FOR GOLD**

based on the Troy Pound

**Part 3: mint charges and mint prices for gold (Troy pounds)**

**Total mint charges and mint prices  
per Troy Pound of gold**

**in term of the current alloy of the gold coins struck  
in decimal pounds sterling**

**Total mint charges and mint prices  
per Troy Pound of gold**

**in term of 24 carat gold (fine) in decimal pounds  
sterling**

<b>Date</b>	<b>Name of the Gold Coin</b>	<b>Traite value of Troy lb of coined gold of current alloy</b>	<b>Total mint charges per Troy pound of coined gold</b>	<b>Per cent of the Traite value</b>	<b>Mint Price for gold bullion of the current fineness</b>	<b>Per cent of the Traite value</b>	<b>Traite value of Troy lb of coined gold of 24 carats</b>	<b>Total mint charges per Troy pound of coined gold</b>	<b>Per cent of the Traite value</b>	<b>Mint Price for gold bullion of 24 carats</b>	<b>Per cent of the Traite value</b>
<b>1464 Aug 13</b>	Noble	22.222	2.667	12.00%	19.556	88.00%	22.339	2.681	12.00%	19.658	88.00%
<b>1465 Mar 6</b>	Ryal, Rose Noble	24.000	1.111	4.63%	22.889	95.37%	24.126	1.117	4.63%	23.009	95.37%
<b>1465 Mar 6</b>	Angel-Noble	24.000	1.111	4.63%	22.889	95.37%	24.126	1.117	4.63%	23.009	95.37%
<b>1469 Mar 2</b>	Ryal, Rose Noble	24.000	0.773	3.22%	23.227	96.78%	24.126	0.777	3.22%	23.348	96.78%

**Part 3: mint charges and mint prices for gold (Troy pounds)**

Date	Name of the Gold Coin	Total mint charges and mint prices per Troy Pound of gold					Total mint charges and mint prices per Troy Pound of gold				
		in term of the current alloy of the gold coins struck in decimal pounds sterling					in term of 24 carat gold (fine) in decimal pounds sterling				
		Traite value of Troy lb of coined gold of current alloy	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of the current fineness	Per cent of the Traite value	Traite value of Troy lb of coined gold of 24 carats	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of 24 carats	Per cent of the Traite value
1469 Mar 2	Angel-Noble	24.000	0.773	3.22%	23.227	96.78%	24.126	0.777	3.22%	23.348	96.78%
1471 Mar 6	Ryal, Rose Noble	24.000	0.56	2.33%	23.440	97.67%	24.126	0.563	2.33%	23.563	97.67%
1471 Mar 6	Angel-Noble	24.000	0.560	2.33%	23.440	97.67%	24.126	0.563	2.33%	23.563	97.67%
1477 Feb 3	Ryal, Rose Noble	24.000	0.400	1.67%	23.600	98.33%	24.126	0.402	1.67%	23.724	98.33%
1477 Feb 3	Angel-Noble	24.000	0.400	1.67%	23.600	98.33%	24.126	0.402	1.67%	23.724	98.33%
1489 Oct 28	Sovereign	24.000	n.a.		n.a.		24.126	n.a.		n.a.	
1492 Nov 20	Ryal, Rose Noble	24.000	0.133	0.56%	23.867	99.44%	24.126	0.134	0.56%	23.992	99.44%
1492 Nov 20	Angel-Noble	24.000	0.133	0.56%	23.867	99.44%	24.126	0.134	0.56%	23.992	99.44%
1492 Nov 20	Sovereign	24.000	0.133	0.56%	23.867	99.44%	24.126	0.134	0.56%	23.992	99.44%

**Part 3: mint charges and mint prices for gold (Troy pounds)**

Date	Name of the Gold Coin	Total mint charges and mint prices per Troy Pound of gold					Total mint charges and mint prices per Troy Pound of gold				
		in term of the current alloy of the gold coins struck in decimal pounds sterling					in term of 24 carat gold (fine) in decimal pounds sterling				
		Traite value of Troy lb of coined gold of current alloy	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of the current fineness	Per cent of the Traite value	Traite value of Troy lb of coined gold of 24 carats	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of 24 carats	Per cent of the Traite value
1526 Aug 22	Sovereign	26.400	n.a.		n.a.		26.538	n.a.		n.a.	
1526 Aug 22	Ryal, Rose Noble	26.400	n.a.		n.a.		26.538	n.a.		n.a.	
1526 Aug 22	Angel-Noble	26.400	n.a.		n.a.		26.538	n.a.		n.a.	
1526 Aug 22	Crown: Rose	24.000	n.a.		n.a.		26.182	n.a.		n.a.	
1526 Nov 5	Sovereign	27.000	0.138	0.51%	26.863	99.49%	27.141	0.138	0.51%	27.003	99.49%
1526 Nov 5	Ryal, Rose Noble	27.000	0.138	0.51%	26.863	99.49%	27.141	0.138	0.51%	27.003	99.49%
1526 Nov 5	Angel-Noble	27.000	0.138	0.51%	26.863	99.49%	27.141	0.138	0.51%	27.003	99.49%
1526 Nov 5	St. George Noble	27.000	0.138	0.51%	26.863	99.49%	27.141	0.138	0.51%	27.003	99.49%
1526 Nov 5	Crown: Double Rose	25.125	0.150	0.60%	24.975	99.40%	27.409	0.164	0.60%	27.245	99.40%
1526 Nov 5	Half-Crown	25.125	0.150	0.60%	24.975	99.40%	27.409	0.164	0.60%	27.245	99.40%

**Part 3: mint charges and mint prices for gold (Troy pounds)**

Date	Name of the Gold Coin	Total mint charges and mint prices per Troy Pound of gold					Total mint charges and mint prices per Troy Pound of gold				
		in term of the current alloy of the gold coins struck in decimal pounds sterling					in term of 24 carat gold (fine) in decimal pounds sterling				
		Traite value of Troy lb of coined gold of current alloy	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of the current fineness	Per cent of the Traite value	Traite value of Troy lb of coined gold of 24 carats	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of 24 carats	Per cent of the Traite value
<b>1542 May 16</b>	Sovereign	28.800	1.200	4.17%	27.600	95.83%	30.052	1.252	4.17%	28.800	95.83%
<b>1542 May 16</b>	Ryal, Rose Noble	28.800	1.200	4.17%	27.600	95.83%	30.052	1.252	4.17%	28.800	95.83%
<b>1542 May 16</b>	Angel-Noble	28.800	1.200	4.17%	27.600	95.83%	30.052	1.252	4.17%	28.800	95.83%
<b>1544 May 28</b>	Sovereign	28.800	1.200	4.17%	27.600	95.83%	30.052	1.252	4.17%	28.800	95.83%
<b>1544 May 28</b>	Ryal, Rose Noble	28.800	1.200	4.17%	27.600	95.83%	30.052	1.252	4.17%	28.800	95.83%
<b>1544 May 28</b>	Angel-Noble	28.800	1.200	4.17%	27.600	95.83%	30.052	1.252	4.17%	28.800	95.83%
<b>1545 Mar 27</b>	Sovereign	30.000	2.500	8.33%	27.500	91.67%	32.727	2.727	8.33%	30.000	91.67%
<b>1545 Mar 27</b>	Ryal, Rose Noble	30.000	2.500	8.33%	27.500	91.67%	32.727	2.727	8.33%	30.000	91.67%
<b>1545 Mar 27</b>	Angel-Noble	30.000	2.500	8.33%	27.500	91.67%	32.727	2.727	8.33%	30.000	91.67%

**Part 3: mint charges and mint prices for gold (Troy pounds)**

Date	Name of the Gold Coin	Total mint charges and mint prices per Troy Pound of gold					Total mint charges and mint prices per Troy Pound of gold				
		in term of the current alloy of the gold coins struck in decimal pounds sterling					in term of 24 carat gold (fine) in decimal pounds sterling				
		Traite value of Troy lb of coined gold of current alloy	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of the current fineness	Per cent of the Traite value	Traite value of Troy lb of coined gold of 24 carats	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of 24 carats	Per cent of the Traite value
1545 April	Sovereign	30.000	1.950	6.50%	28.050	93.50%	32.727	2.127	6.50%	30.600	93.50%
1545 April	Ryal, Rose Noble	30.000	1.950	6.50%	28.050	93.50%	32.727	2.127	6.50%	30.600	93.50%
1545 April	Angel-Noble	30.000	1.950	6.50%	28.050	93.50%	32.727	2.127	6.50%	30.600	93.50%
1546 Apr 1	Sovereign	30.000	4.500	15.00%	25.500	85.00%	36.000	5.400	15.00%	30.600	85.00%
1546 Apr 1	Ryal, Rose Noble	30.000	4.500	15.00%	25.500	85.00%	36.000	5.400	15.00%	30.600	85.00%
1546 Apr 1	Angel-Noble	30.000	4.500	15.00%	25.500	85.00%	36.000	5.400	15.00%	30.600	85.00%
1546 Apr 1	Crown	30.000	4.500	15.00%	25.500	85.00%	36.000	5.400	15.00%	30.600	85.00%
1546 Apr 1	Half-Crown	30.000	4.500	15.00%	25.500	85.00%	36.000	5.400	15.00%	30.600	85.00%
1546 Apr 1	Sovereign	30.000	4.000	13.33%	26.000	86.67%	36.000	4.800	13.33%	31.200	86.67%
1546 Apr 1	Ryal, Rose Noble	30.000	4.000	13.33%	26.000	86.67%	36.000	4.800	13.33%	31.200	86.67%
1546 Apr 1	Angel-Noble	30.000	4.000	13.33%	26.000	86.67%	36.000	4.800	13.33%	31.200	86.67%



**Part 3: mint charges and mint prices for gold (Troy pounds)**

Date	Name of the Gold Coin	Total mint charges and mint prices per Troy Pound of gold					Total mint charges and mint prices per Troy Pound of gold				
		in term of the current alloy of the gold coins struck in decimal pounds sterling					in term of 24 carat gold (fine) in decimal pounds sterling				
		Traite value of Troy lb of coined gold of current alloy	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of the current fineness	Per cent of the Traite value	Traite value of Troy lb of coined gold of 24 carats	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of 24 carats	Per cent of the Traite value
<b>1546 Apr 1</b>	Crown	30.000	4.000	13.33%	26.000	86.67%	36.000	4.800	13.33%	31.200	86.67%
<b>1546 Apr 1</b>	Half-Crown	30.000	4.000	13.33%	26.000	86.67%	36.000	4.800	13.33%	31.200	86.67%
<b>1547 April</b>	Sovereign	30.000	1.000	3.33%	29.000	96.67%	36.000	1.200	3.33%	34.800	96.67%
<b>1547 April</b>	Ryal, Rose Noble	30.000	1.000	3.33%	29.000	96.67%	36.000	1.200	3.33%	34.800	96.67%
<b>1547 April</b>	Angel-Noble	30.000	1.000	3.33%	29.000	96.67%	36.000	1.200	3.33%	34.800	96.67%
<b>1547 April</b>	Crown	30.000	1.000	3.33%	29.000	96.67%	36.000	1.200	3.33%	34.800	96.67%
<b>1547 April</b>	Half-Crown	30.000	1.000	3.33%	29.000	96.67%	36.000	1.200	3.33%	34.800	96.67%
<b>1548 Feb 16</b>	Sovereign	30.000	1.000	3.33%	29.000	96.67%	36.000	1.200	3.33%	34.800	96.67%
<b>1549 Jan 24</b>	Sovereign	34.000	1.000	2.94%	33.000	97.06%	37.091	1.091	2.94%	36.000	97.06%
<b>1549 Jan 24</b>	Ryal, Rose Noble	34.000	1.000	2.94%	33.000	97.06%	37.091	1.091	2.94%	36.000	97.06%
<b>1549 Jan 24</b>	Crown	34.000	1.000	2.94%	33.000	97.06%	37.091	1.091	2.94%	36.000	97.06%

**Part 3: mint charges and mint prices for gold (Troy pounds)**

Date	Name of the Gold Coin	Total mint charges and mint prices per Troy Pound of gold					Total mint charges and mint prices per Troy Pound of gold				
		in term of the current alloy of the gold coins struck in decimal pounds sterling					in term of 24 carat gold (fine) in decimal pounds sterling				
		Traite value of Troy lb of coined gold of current alloy	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of the current fineness	Per cent of the Traite value	Traite value of Troy lb of coined gold of 24 carats	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of 24 carats	Per cent of the Traite value
1549 Jan 24	Half-Crown	34.000	1.000	2.94%	33.000	97.06%	37.091	1.091	2.94%	36.000	97.06%
1550 Dec 18	Sovereign	28.800	1.650	5.73%	27.150	94.27%	28.951	1.659	5.73%	27.292	94.27%
1550 Dec 18	Ryal, Rose Noble	28.800	1.650	5.73%	27.150	94.27%	28.951	1.659	5.73%	27.292	94.27%
1550 Dec 18	Angel-Noble	28.800	1.650	5.73%	27.150	94.27%	28.951	1.659	5.73%	27.292	94.27%
1551 Oct 5	Sovereign	36.000	0.138	0.38%	35.863	99.62%	36.188	0.138	0.38%	36.050	99.62%
1551 Oct 5	Angel-Noble	36.000	0.138	0.38%	35.863	99.62%	36.188	0.138	0.38%	36.050	99.62%
1551 Oct 5	Sovereign	33.000	0.150	0.45%	32.850	99.55%	36.000	0.164	0.45%	35.836	99.55%
1551 Oct 5	Ryal, Rose Noble	33.000	0.150	0.45%	32.850	99.55%	36.000	0.164	0.45%	35.836	99.55%
1551 Oct 5	Crown	33.000	0.150	0.45%	32.850	99.55%	36.000	0.164	0.45%	35.836	99.55%
1553 Aug 20	Sovereign	36.000	0.200	0.56%	35.800	99.44%	36.188	0.201	0.56%	35.987	99.44%

**Part 3: mint charges and mint prices for gold (Troy pounds)**

Date	Name of the Gold Coin	Total mint charges and mint prices per Troy Pound of gold					Total mint charges and mint prices per Troy Pound of gold				
		in term of the current alloy of the gold coins struck in decimal pounds sterling					in term of 24 carat gold (fine) in decimal pounds sterling				
		Traite value of Troy lb of coined gold of current alloy	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of the current fineness	Per cent of the Traite value	Traite value of Troy lb of coined gold of 24 carats	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of 24 carats	Per cent of the Traite value
1553 Aug 20	Ryal, Rose Noble	36.000	0.200	0.56%	35.800	99.44%	36.188	0.201	0.56%	35.987	99.44%
1553 Aug 20	Angel-Noble	36.000	0.200	0.56%	35.800	99.44%	36.188	0.201	0.56%	35.987	99.44%
1557 Aug 5	Angel-Noble	36	0.2	0.56%	35.800	99.44%	36.188	0.201	0.56%	35.987	99.44%
1558 Apr 30	Sovereign	36.000	0.200	0.56%	35.800	99.44%	36.188	0.201	0.56%	35.987	99.44%
1558 Apr 30	Angel-Noble	36.000	0.200	0.56%	35.800	99.44%	36.188	0.201	0.56%	35.987	99.44%
1558 Apr 30	Sovereign	33.000	0.200	0.61%	32.800	99.39%	36.000	0.218	0.61%	35.782	99.39%
1558 Apr 30	Ryal, Rose Noble	33.000	0.200	0.61%	32.800	99.39%	36.000	0.218	0.61%	35.782	99.39%
1558 Apr 30	Crown	33.000	0.200	0.61%	32.800	99.39%	36.000	0.218	0.61%	35.782	99.39%
1559 Jan	Sovereign	36.000	0.200	0.56%	35.800	99.44%	36.188	0.201	0.56%	35.987	99.44%
1559 Jan	Ryal, Rose Noble	36.000	0.200	0.56%	35.800	99.44%	36.188	0.201	0.56%	35.987	99.44%

**Part 3: mint charges and mint prices for gold (Troy pounds)**

Date	Name of the Gold Coin	Total mint charges and mint prices per Troy Pound of gold					Total mint charges and mint prices per Troy Pound of gold				
		in term of the current alloy of the gold coins struck in decimal pounds sterling					in term of 24 carat gold (fine) in decimal pounds sterling				
		Traite value of Troy lb of coined gold of current alloy	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of the current fineness	Per cent of the Traite value	Traite value of Troy lb of coined gold of 24 carats	Total mint charges per Troy pound of coined gold	Per cent of the Traite value	Mint Price for gold of 24 carats	Per cent of the Traite value
1559 Jan	Angel-Noble	36.000	0.200	0.56%	35.800	99.44%	36.188	0.201	0.56%	35.987	99.44%
1559 Jan	Sovereign	33.000	0.200	0.61%	32.800	99.39%	36.000	0.218	0.61%	35.782	99.39%
1559 Jan	Angel-Noble	33.000	0.200	0.61%	32.800	99.39%	36.000	0.218	0.61%	35.782	99.39%
1559 Jan	Crown	33.000	0.200	0.61%	32.800	99.39%	36.000	0.218	0.61%	35.782	99.39%
1560 Nov 8	Sovereign	36.000	0.200	0.56%	35.800	99.44%	36.188	0.201	0.56%	35.987	99.44%
1560 Nov 8	Ryal, Rose Noble	36.000	0.200	0.56%	35.800	99.44%	36.188	0.201	0.56%	35.987	99.44%
1560 Nov 8	Angel-Noble	36.000	0.200	0.56%	35.800	99.44%	36.188	0.201	0.56%	35.987	99.44%
1560 Nov 8	Sovereign	33.000	0.200	0.61%	32.800	99.39%	36.000	0.218	0.61%	35.782	99.39%
1560 Nov 8	Angel-Noble	33.000	0.200	0.61%	32.800	99.39%	36.000	0.218	0.61%	35.782	99.39%
1560 Nov 8	Crown	33.000	0.200	0.61%	32.800	99.39%	36.000	0.218	0.61%	35.782	99.39%



Name of the Coin	22 August 1526					5 November 1526				
	grams fine gold	value in: shillings	pence	total in pence	percent change	grams fine gold	value in: shillings	pence	total in pence	percent change
<b>FOREIGN COINS</b>										
<b>Ducat and Florin</b>	3.559	4	8	56	3.70%	3.559				
<b>Écu au soleil</b>	3.296	4	6	54	3.85%	3.296				
<b>Écu à la couronne</b>	3.275					3.275				
<b>Réal d'Or</b>	5.275					5.275				
<b>Carolus florin</b>	1.700					1.7				
<b>Rhenish florin</b>	2.527					2.527				
<b>ENGLISH COINS</b>										
<b>Sovereign</b>	15.471	22	0	264	10.00%	15.471	22	6	270	2.27%
<b>Ryal, or Rose Noble</b>	7.735	11	0	132	10.00%	7.735	11	3	135	2.27%
<b>Angel Noble</b>	5.157	7	4	88	10.00%	5.157	7	6	90	2.27%
<b>Crown of the Rose</b>	3.208	4	6	54		3.404	5	0	60	11.11%
<b>St. George Noble</b>						4.584	6	8	80	

**Sources for Tables 1 - 3**

Christopher E. Challis, 'Appendix 2: Mint Contracts, 1279 - 1817', in C. E. Challis, ed., *A New History of the Royal Mint* (Cambridge and New York: Cambridge University Press, 1992), pp. 699-758.

J. D. Gould, *The Great Debasement: Currency and the Economy in Mid-Tudor England* (Oxford: Clarendon Press, 1970), Tables I and II, pp. 11-12.

Paul L. Hughes and James F. Larkin, eds., *Tudor Royal Proclamations*, 2 vols. (New Haven and London: Yale University Press, 1964), Vol. I: *The Early Tudors (1485-1553)*.