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James Madison

**The Debasement Puzzle:  
An Essay on Medieval  
Monetary History** (p. 8)

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## The Debasement Puzzle: An Essay on Medieval Monetary History\*

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*Sometimes, lest worse befall and to avoid scandal, a community tolerates dishonorable and evil things, like brothels. Sometimes also, by necessity or convenience, vile business is tolerated, like money-changing, or evil business, like usury. But there seems to be no reason on earth why so much gain should be allowed from alteration of the coinage for profit.*

—Nicole Oresme<sup>1</sup>

When Henry VIII ascended to the throne of England in 1509, £1 contained slightly less than 6.4 troy ounces of pure silver. Starting in 1542, he began a series of debasements—reductions in the metal content of the currency—that lasted until 1551 and became known as the *Great Debasement*. By the time Henry and his son, Edward VI, stopped altering the coinage, £1 contained less than 1 ounce of silver. During the Great Debasement, minting activity increased by a factor of 2.8, and the Crown raised a quarter of its revenues through the mint. This phenomenon was not unique to England. Between 1290 and 1450, France experienced several episodes of large debasements of its coinage, and each raised significant revenues.<sup>2</sup>

In this article, we show that the experiences of France and England exhibit the following salient features. First, debasements were accompanied by unusually large minting volumes that yielded unusually large revenues for the

sovereign. Second, during most debasements, seigniorage rates increased and revenues rose significantly. Third, both old and new coins circulated side by side following debasements. Finally, old and new coins were valued in circulation by their intrinsic content (circulation by weight) rather than by their legal tender value (circulation by tale). This last observation is well established for gold; silver seems to have circulated by weight in at least some instances.

In the medieval commodity money regime, only metal brought voluntarily to the mint was minted, and the mint retained a fraction of the metal—a charge known as *sei-*

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<sup>1</sup>See Oresme 1956. The quote was translated by the authors.

<sup>2</sup>Other countries, such as Spain, the Low Countries, and Italy, also underwent such episodes. See Hamilton 1936, Munro 1983, and Cipolla 1982.

*gniorage*. In such a regime, large minting volumes following a debasement constitute a puzzle. Debasements are simply an opportunity offered to agents to voluntarily change heavy coins into light ones. If coins are valued in circulation for their intrinsic content, then debasements can provide no additional incentive to bring metal to the mint. Yet, debasements did in fact attract a lot of metal. The puzzle is compounded by the fact that the charge for coining usually increased considerably after a debasement.

Some have argued that the unusually large minting volumes following debasements are consistent with circulation by tale of all coins. This argument is troubling on both the empirical and the theoretical levels. On the empirical level, it is inconsistent with the fact that many coins circulated by weight. Furthermore, if it is posited that coins circulated by tale, then one would expect minting volumes far larger than those that we document. On the theoretical level, circulation by tale is an unsatisfactory argument because it merely replaces the debasement puzzle with another puzzle: Why would coins circulate by tale? No existing model of commodity money delivers circulation by tale as an equilibrium outcome.

A variant of the circulation by tale argument is that after a debasement, people brought in old coins for re-minting to obtain increased purchasing power, because prices did not adjust instantaneously. We present evidence to show that the lag in prices was only a matter of weeks, so that this explanation cannot account for large minting volumes persisting for years after debasements occurred.

Another explanation which has been proposed for this puzzle is that debasements provided debtors with an opportunity to reduce the real burden of their debt, even if coins were valued for their intrinsic content in most other transactions. This explanation suffers from a logical flaw, since it does not explain why debtors and creditors could not come to an arrangement and bypass the sovereign altogether.

We are therefore confronted with a modeling challenge: How do we explain the rush to the mint following debasements? The solution may yield new insights into the reasons people use and hold money. To help solve the challenge, we have identified a number of salient features of debasements. To those we add another fact: minting volumes following *reinforcements* (increases in the metal content of the currency) were also unusually large, about as large as those following debasements. We think that, taken together, these facts will a priori restrict the kind of models that can solve the debasement puzzle.

We proceed as follows. We first present a brief overview of medieval monetary institutions. Next we establish the general features of debasements using evidence from France and England. We then present the puzzle, critique existing explanations, and state the challenge to monetary theory.

### Review of Medieval Monetary Institutions

During the Middle Ages, the monetary system in Europe consisted of silver coins and, from the 13th century onward, gold coins. In France, small quantities of silver were also alloyed with copper to produce billon, from which small coinage (black, or petty, money) could be made in a convenient size.

Coins were produced by mints. (See Saulcy 1879–92, vol. 1, pp. vii–xvi; Blanchet and Dieudonné 1912–36, vol. 2, pp. 7–20; Spufford 1988a.) By the late 13th century, all mints within a given political entity were under direct control of the sovereign. The mints were run as businesses by private entrepreneurs, who leased the physical plant and capital equipment for fixed terms. Individuals (goldsmiths and moneychangers) could come to a counter at the mint and deliver their metal (bullion, old coins, silverware, and goldware), and they would be paid back, within a few weeks, in newly minted coins of the same metal they brought in.<sup>3</sup> They always received back less fine metal than they brought in. Part of what was withheld by the mint paid for production costs and was called *brassage*. The rest was sent to the sovereign as profit, or tax, and was called *seigniorage*.<sup>4</sup> For convenience, we will use *gross seigniorage* for the sum of *brassage* and *seigniorage*.

A sovereign, when sending minting instructions to monetary officers, specified the characteristics of the coins to be minted. A particular coin was defined by its type (that is, the imprint it received during the mechanical process of minting), its weight, and its fineness.

The legal tender value (*LTV*) of a coin is the official number of units of account per coin set by the sovereign. During the Middle Ages, the type did not bear any indication of legal value, but coins with different weight and fineness usually had distinguishing features.

The mint equivalent (*ME*) of a coin at a given date is the ratio of that coin's *LTV* to its silver or gold content, *C*.

<sup>3</sup>Occasionally, the mint purchased silver bullion with gold coins, for example, from 1359 to 1360 and in 1420 in France.

<sup>4</sup>In most countries, sovereigns had progressively eliminated private mints, and by the 14th century, the seigniorage tax was a monopoly profit.

It represents the number of units of account that the mint produces per unit of weight. The mint price (*MP*) is the number of units of account per unit of weight the mint is willing to pay individuals in exchange for metal. Gross seigniorage is simply the difference,  $ME - MP$ , withheld by the mint. The gross seigniorage rate is  $1 - MP/ME$ .

A *mutation* is any change in *ME*. It can occur with a change in *LTV* or in *C*. Keeping the type of coin unchanged but altering either weight or fineness alters the metallic content of the coin. Altering the type amounts to creating a new coin.

Crying-up, or enhancement, raises the *LTV* of an existing coin holding *C* fixed. Crying-down lowers the *LTV*. When it is set to zero, the coin is decried and ceases to be legal tender. Such changes are a matter of mere decree.

A decrease in *C* is called *debasement*.<sup>5</sup> An increase is called *reinforcement*. Debasement can occur in two ways: by alteration of an existing coin or by introduction of a new coin with a new type and a higher *ME*. Both methods were used in the Middle Ages, but even when the existing coinage was altered, a change in fineness or even in weight was indicated by a small change in the design of the coin.<sup>6</sup> Reinforcements always occurred with the introduction of a new coin, usually distinctive and with high fineness.

As far as we know, metal was brought to the mint voluntarily, even during periods of debasement. This was explicitly true for the Great Debasement.<sup>7</sup> Measures such as the compulsory melting of tableware or demonitization of coins were sometimes taken to mandate reminting. (See Landry 1910, p. 109, n. 4.) But it is doubtful that the sovereign had much power to enforce these measures.

## Features of Debasements

We make use of available data on minting volumes in the Middle Ages to define the main characteristics of debasements. Although the data we use are not new, we have analyzed them more systematically than previously done. We have thereby arrived at four facts: following debasements, minting activity greatly increased; during most debasements, gross seigniorage rates were increased, and seigniorage, ordinarily a trivial source of revenues, became significant; following debasements, both old (heavy) and new (light) coins circulated side by side; and throughout the Middle Ages, gold coins and, in some cases, silver coins were valued in circulation by their intrinsic content (circulation by weight) rather than by their legal tender value (circulation by tale).

## *A Brief History of the Currency in France and England*

In France, the silver currency went through 123 debasements between 1285 and 1490. Of these, 112 reduced the silver content of the currency by more than 5 percent. The single largest debasement reduced it by 50 percent. Gold coinage changed comparatively less in the same period: there were 64 debasements, 48 of which were by more than 5 percent.<sup>8</sup>

Compared to France, England enjoyed monetary stability. While debasements occurred for both silver and gold during the 14th and 15th centuries, they were far less frequent than in France. Seigniorage rates always remained low, debasements occurred at long intervals, and the pound sterling never lost more than 20 percent at a time. This reign of monetary stability ended with the Great Debasement. From 1542 to 1551, silver or gold was debased ten times, and the pound sterling lost 83 percent of its silver content. The gross seigniorage rate went from 2 percent to 57 percent. Yet the volume of minting was so large that the single mint at the Tower of London was not enough, and the sovereign had to open six new mints.

## *Minting Volumes*

Reasonably complete minting data are available for several French mints. As a result, we have analyzed data mint by mint and computed monthly volumes of debasement coinage and nondebasement coinage. *Debasement coinage* is defined as follows: when a debasement has occurred, we count as debasement coinage all coins minted at the

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<sup>5</sup>We thus define debasement as an operation on a coin. In Italy, one coin might be debased, while other coins of the same metal were left unchanged. In French and English practice, the whole denomination structure for a given metal was changed proportionately in the course of a debasement, so that we can think of debasements as operations on the currency.

<sup>6</sup>The change was called a *différent*, and its use was almost always specified by the sovereign in the minting order. See Blanchet and Dieudonné 1912–36, vol. 2, p. 57. Out of the hundreds of debasements that occurred since Philip IV, Lafaurie (1951) reports only fourteen instances in which no mark of difference was used in a silver coin (five instances during 1359 and 1360, the rest from 1419 to 1422), and in only three instances was the fineness altered without changing the weight. In 1388, one gold coin was debased by weight with no mark of difference. Debasements could in principle be carried out secretly, and there is evidence that this was attempted several times. In practice, it is unlikely that money changers and bullion merchants (among which mint masters were recruited) could have been fooled very long. The speed at which debasements followed one another suggests no more than a few weeks, if at all. See Saulcy 1879–92 and the appendix for details. The appendix is available from the authors. It is also available on the Web (<http://woodrow.mpls.frb.fed.us>).

<sup>7</sup>Jenkinson (1805, p. 119) states, "As the old Coins were brought in voluntarily, it was not thought necessary, on these occasions, to issue a proclamation for calling them in; nor have I found any proclamation for that purpose."

<sup>8</sup>The data on mint prices and mint equivalents are contained in the appendix.

Table 1  
Minting Volume in Medieval France  
During and After Debasements  
At Selected Mints, 1354–1490

Mint	Mint's Share of Output (%)	Debasement Months		Nondebasement Months		Output Ratio (1)/(2)
		(1) Mean Monthly Output (kg)	Number of Months	(2) Mean Monthly Output (kg)	Number of Months	
<b>Silver</b>						
Toulouse	11.2	132.6	146	67.4	374	2.0
Romans	9.8	108.7	93	30.7	790	3.5
Troyes	9.7	115.4	89	63.8	359	1.8
Poitiers	7.7	232.6	69	198.8	74	1.2
Rouen	6.4	373.7	45	228.2	39	1.6
Crémieu	5.5	83.8	90	37.8	452	2.2
St. Pourçain	5.4	190.5	70	100.9	83	1.9
Tournai	5.3	—	0	87.0	87	—
Montpellier	4.8	89.6	73	25.0	497	3.6
Dijon	4.5	316.6	34	27.7	247	11.4
<b>Gold</b>						
Paris	18.9	84.7	32	28.7	412	3.0
Tournai	15.4	—	0	62.1	108	—
Montpellier	14.9	16.4	34	27.3	522	.6
Toulouse	14.3	20.6	49	19.4	475	1.1
Troyes	4.8	7.4	16	9.7	185	.8

Sources: Saulcy 1879–92; Miskimin 1963, 1984; and Sussman 1990

new *LTV* in the following 12 months or until another mutation occurred.

Table 1 shows the results for the most productive mints: for silver, ten mints accounted for 70 percent of the known volume between 1354 and 1490, while for gold, five mints accounted for 68 percent.<sup>9</sup> For silver, the increase in volume following debasement is quite clear. For all mints except one, the ratio of debasement average to nondebasement average is 1.6 or more. An average of

these ratios, weighted by shares in total output, is 2.0. For gold, however, the picture is less clear. While the Paris mint shows a ratio of 3, the other mints show ratios of 1.1 or less.

For England, we have annual series for the whole of the country. The debasements were usually distinct enough that

<sup>9</sup>The minting data we use come from Saulcy 1879–92 and Miskimin 1963, 1984, as supplemented by Sussman 1990.

Charts 1 and 2

Minting Volume in Medieval England Before and After Debasements

Chart 1 Silver

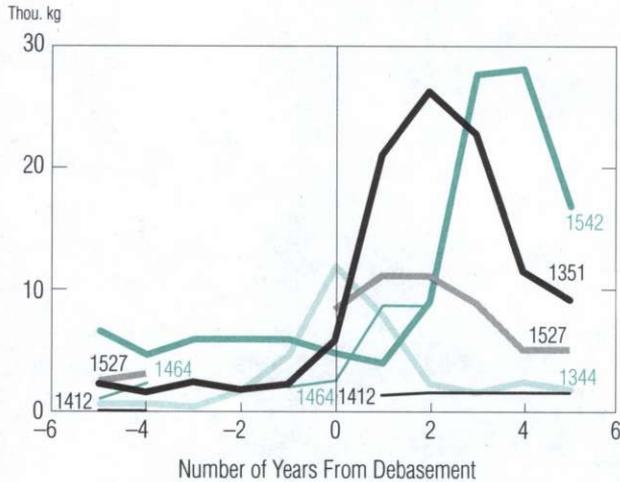
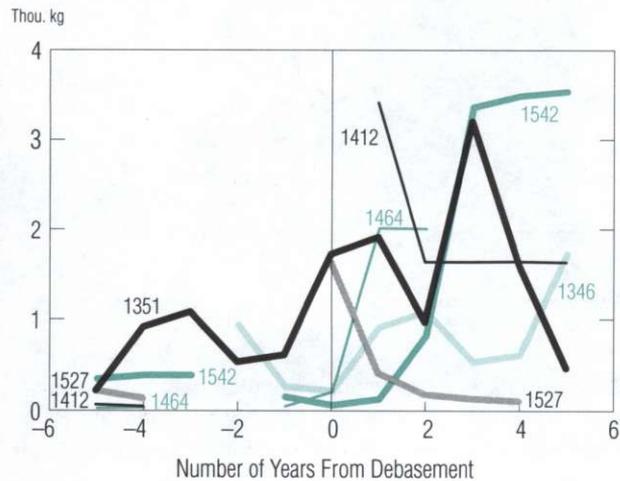


Chart 2 Gold



Source: Challis 1992a

a comparison of output before and after debasement is possible. This is done in Charts 1 and 2, which show the minting of silver and gold in the five years preceding and the five years following each of six debasements. The year in which the debasement occurred is labeled year 0.

The contrast between the minting volumes preceding and following debasements is quite sharp. The increase in silver minting following debasements was dramatic. In all cases, it at least doubled, and following the debasement of 1412, minting volume increased by a factor of almost 130. The increase in gold minting following debasements was less dramatic. Nonetheless, gold minting was always larger after debasements, and for two debasement periods, minting volume went up by factors of 30 and 49.<sup>10</sup>

*Seigniorage Rates*

We have examined gross seigniorage rates for France and England during the same period. The increases in minting volumes appear to have coincided with increases in seigniorage rates. In France, over the period from 1354 to 1490 (the period for which we have minting data), the gross seigniorage rate during normal years was 7.5 percent for silver and 2.0 percent for gold.<sup>11</sup> In debasement years, however, the seigniorage rates were, on average, 21.7 percent for silver and 4.3 percent for gold. In some specific periods of repeated debasements, such as from 1419 to 1422, the rate fluctuated between 40 and 60 percent for silver.

In England, we find that the rates were much more stable than they were in France, but the same pattern emerges with substantially higher rates of gross seigniorage during debasement periods. In the period between 1280 and 1600, the average rate in normal years was 4.6 percent for silver and 1.1 percent for gold. In debasement years, it was 16.2 percent for silver and 6.9 percent for gold. The Great Debasement stands out with extraordinary rates, between 41 and 57 percent for silver and between 3 and 13 percent for gold.

Revenues collected during debasements were large. There are two ways one might define *large*: in comparison with nondebasement years and in comparison with other

<sup>10</sup>We also consider minting data for the Low Countries (from 1334 to 1495) from Miskimin 1963 and 1984. The mean gold output was 925 kg in debasement years compared with 496 kg in nondebasement years. The contrast for silver output is not as sharp: 5,400 kg in debasement years compared with 5,100 kg in nondebasement years.

<sup>11</sup>The gross seigniorage rate included minting costs. In 1401, these costs were around 3 percent for silver and 0.5 percent for gold. See Saulcy 1879-92, vol. 2, p. 113.

Tables 2 and 3

Total Government Revenues and Seigniorage  
in Medieval France and England

Table 2 France, 1286–1480

(Current Livres Tournois, Unless Specified Otherwise)

Period	Annual Revenues (Thou.)		Mint as % of Total
	Total	Mint	
1286–87	756.2	—	—
1289–90	936.3	—	—
1299*	1,965.0	978.7	50
1322	477.4	.5	0
1327†	1,254.5	786.7	63
1329§	1,150.0	41.6	4
1330–31	820.3	—	—
1349*§	1,954.4	1,380.0	71
1354–60*	97.7**	—	—
1361–80	1,800.0	—	—
1388–89	2,500.0	17.9	1
1418*	674.6	513.1	76
1419–20*	1,151.9	1,053.3	91
1460–80	1,800.0	—	—

\*Debasement occurred during this or the preceding year.

†Period is the first half of the year; amounts are at an annual rate.

§Period is the second half of the year; amounts are at an annual rate.

\*\*Amount is in 1330 currency; in 1361 currency, it is 162.5 thousand.

Table 3 England, 1323–1547

(Current Pounds Sterling)

Period	Annual Revenues (Thou.)		Mint as % of Total
	Total	Mint	
1323–42	—	.1	—
1343–44*	—	1.7	—
1378–99	114	—	—
1400–1410	73	—	—
1452–63	31	—	—
1463–66*	(30)	5.2	17
1470–83	27	.5	2
1505–9	142	.1	0
1530	100	0	0
1535–39†	212	—	—
1540–43†§	429	—	—
1544–47*†§**	570	150.0	26

\*Debasement occurred during this period.

†The sales of monasteries accounted for £60,000 in the years 1535–39, £144,000 in the years 1540–44, and £135,000 in the years 1545–47.

§Taxes, parliamentary or otherwise, amounted to £0.92 million in the years 1540–47, or £115,000 annually.

\*\*Mint revenues were £1.2 million in the years 1544–51, or £150,000 annually.

Sources: France: Saulcy 1879–92, vol. 1; Vuitry 1883, vol. 2, p. 674; Fawtier 1930; Lot and Fawtier 1958, vol. 2, pp. 191, 231–32, 270; Rey 1965, pp. 35, 80–90, 96–99, 164, 404; and Pocquet de Haut-Jussé 1937

England: Steel 1954, Appendix C; Williams 1979, p. 58; Dietz 1920, pp. 86, 138–40, 159; Mayhew 1992, Tables 4 and 5; and Challis 1992b, Tables 12 and 18

sources of revenues for the sovereign. In the first sense, since mint output increased sharply during debasements and seigniorage rates did not fall and often increased considerably, revenues were indeed large.

The second sense requires a comparison with total government revenues. Unfortunately, the data are very fragmentary. For France, the available data are shown in Table 2. It appears that seigniorage was a negligible source of revenues during normal years, usually 5 percent or less. But in debasement years, seigniorage could represent 50 percent or more of revenues, as in the years 1299, 1327, and 1349. We also have some estimate of seigniorage revenues during the two major debasement periods in France—the 1350s and the 1410s—but they require some comments. Concerning the 1410s, the amounts shown in Table 2 correspond to revenues in the areas of France under the control of the sovereign. As a host of taxes had just been abolished, it is not surprising that the share of seigniorage in total revenues was extremely high: between 75 and 90 percent. Concerning the 1350s, the seigniorage collected should be compared with some contemporaneous total revenue figure, which we do not have. If we compare seigniorage with revenues in the 1330s or in the 1370s, the ratio of seigniorage to total revenues is from 8 to 12 percent. In all likelihood, the ratio was in fact much higher, since the country was at war and regular tax collection probably at a low. In any case, from 8 to 12 percent is still a larger share of revenues than in nondebasement periods.

The revenues from minting activity in England have a striking resemblance to those of France. As in France, seigniorage revenues were negligible in nondebasement years, but they were substantial in debasement periods. As noted previously, in nondebasement years, the gross seigniorage rate was very low. A low rate of seigniorage bearing on a small volume of minting could not have produced large revenues. Table 3 confirms that seigniorage was never more than 2 percent of revenues in nondebasement periods. In contrast, during the Great Debasement, even as Henry VIII was extracting resources from all possible sources (forced loans and the sale of monasteries), seigniorage brought in 25 percent of revenues. Similarly, between 1463 and 1466, seigniorage amounted to 17 percent of revenues in the immediately preceding years.

#### *Concurrent Circulation of Different Coins*

There are two kinds of evidence we can use to establish concurrent circulation of different coins following debasements. One is direct. Testimony from contemporary sources

such as monetary laws provide evidence of concurrent circulation. After mutations, several coins were given new legal tender values, which implies that they were circulating.<sup>12</sup> The other kind of evidence is indirect. Although minting volumes following debasements were large relative to volumes in normal times, they were not large relative to the total stock of coins prior to debasement. In other words, all old coins were probably not taken in for recoinage.

This conclusion is based on a rough comparison of the total minting of silver or gold during debasement periods with the total supply of silver or gold coins immediately before such periods. Although there is very little hard evidence on the supply of silver and gold coins in France or England from 1300 to 1600 on which to base this comparison, there is enough information to estimate a range in which per capita money holdings were likely to fall. We estimate that real per capita money holdings (in pure silver equivalents) ranged from 33 g to 95 g, with the median around 70 g.<sup>13</sup>

In Tables 4 and 5 we show the total minting of silver and gold computed in silver equivalents and reduced to per capita terms during debasement periods.<sup>14</sup>

In France, the comparison with money holdings seems to imply concurrent circulation, because minting volumes were very small relative to total money stocks. In most debasements, the minting of either silver or gold coins amounted to less than 1 gram per capita. In fact, the larg-

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<sup>12</sup>In France, the debasement of 1303 was followed by a reinforcement in the years from 1305 to 1306 and by another debasement in 1311. During the final reinforcement of 1313, an edict was passed setting the legal tender value of several billon coins: the old *doubles* of 1303, the *gros* and *obole tierce* of 1306, the *deniers* of 1307, and the *bourgeois* of 1311. Thus coins from two cycles of debasement and reinforcement were presumed to be in the public's hands. Similarly, during the short-lived reinforcement of March 1356, legal tender values were set for the newly minted *gros*, the old *blancs à la queue* of July 1355, the most recently debased *blancs à la queue* of November 1355, and even the old "full-weight" *gros* minted from 1329 to 1337. The ordinance of February 2, 1353, which decried all but the most recent silver and gold coins, complained that "the people give currency to all sorts of coins, and for the price that it pleases" (Sauley 1879-92, vol. 1, pp. 186, 309, 357).

<sup>13</sup>For England, we use money stock estimates from Mayhew 1974 and population numbers from Russell 1948. For France, we use money stocks from Glassman and Redish 1985 and Riley and McCusker 1983 and population numbers from Dupâquier 1988. As a point of comparison, if we assume five people per household, then 95 g of silver per head would have amounted to approximately four to six months' wages for a carpenter. (See Phelps-Brown and Hopkins 1962 and Baulant 1971 for wages and the appendix to convert metal into units of account.) See also Riley and McCusker 1983 for similar numbers in the 17th and 18th centuries in France.

<sup>14</sup>Here, we define a debasement period as the year in which the debasement occurred plus the next three years or until a reinforcement occurred, whichever was shorter. We want to allow for the possibility that the stock of money would take more than a year to flow through the mints.

Tables 4 and 5

**Total Minting Activity During Debasements  
in Medieval France and England**

Table 4 France, 1354–1489

Period	Population (Mil.)	Silver Minting		Gold Minting		Mint Ratio*	Total Mining in Silver (Grams/Capita)
		Kilograms (Thou.)	Grams/ Capita	Kilograms	Grams/ Capita		
1354–60	8.25	73.16	8.9	5,931	.72	10.0	16.0
1365–66	8.25	3.61	.4	—	—	10.0	.4
1389–90	8.25	6.91	.8	—	—	9.6	.8
1411–12	9.25	3.40	.4	—	—	8.6	.4
1414–15	9.25	3.64	.4	—	—	8.6	.4
1417–24	9.25	61.10	6.6	3,203	.35	10.9	10.4
1424–29	10.25	16.29	1.6	1,204	.12	9.6	2.8
1431	10.25	.44	0	50	0	10.1	0
1434–36	10.25	2.40	.2	139	.01	10.5	.3
1447	11.25	.35	0	74	.01	10.7	.1
1473–76	11.25	.62	.1	2	0	10.3	.1
1488–89	12.00	.39	0	14	0	11.0	0

Table 5 England, 1344–1549

Period	Population (Mil.)	Silver Minting		Gold Minting		Mint Ratio*	Total Mining in Silver (Grams/Capita)
		Kilograms (Thou.)	Grams/ Capita	Kilograms (Thou.)	Grams/ Capita		
1344–47	3.70	23.4	6.3	—	—	—	6.3
1346–49	3.70	—	—	2.8	.74	11.16	8.3
1351–54	2.20	75.7	20.5	7.8	2.11	11.57	44.9
1412–15	2.50	4.3	2.1	6.7	3.18	10.39	35.1
1464–66	3.25	19.7	8.6	4.2	1.83	12.16	30.9
1527–30	3.88	39.3	12.3	2.3	.73	11.51	20.7
1542–49	3.96	111.9	33.9	14.0	4.25	8.14	68.5

\*The mint ratio is that which prevails in the periods after the debasements ended.  
Minting volumes are attributed to debasements as described in the text.

Sources: France: Saulcy 1879–92, Dupâquier 1988, author appendix (<http://woodrow.mpls.frb.fed.us>)  
England: Russell 1948, Challis 1992a

est minting of silver and gold coins during any debasement period was only 16 g of pure silver per capita during the debasement period from 1354 to 1360. This is only about one-half of the lower end of our range of per capita holdings of pure silver during this period.

The evidence for England is shown in Table 5. It shows that minting was generally a larger fraction of the money stock than in France, although taken as a whole, it still indicates that there were old coins in existence that were not reminted and that could, therefore, have remained in circulation.

Of the seven debasement periods that we consider, three (1351–54, 1412–15, and 1542–49) show minting volumes within our range of money stock estimates. However, between 1412 and 1415, silver minting was only 12 percent by value of the total, which seems much too low to be the entire stock of silver money. Between 1542 and 1549, total minting was only once or twice as large as the money stock. Since this period in fact covers ten debasements over a period of eight years, it is hard to imagine that this amount of minting represents the whole stock of silver and that coins of different debasement vintages were not in circulation concurrently during the period. That leaves only the 1351–54 debasement period as a possible exception to our characterization.

### *Circulation by Tale or by Weight*

With regard to the relative values at which old and new coins circulated, there is apparently no contention that gold coins circulated in any other way than at their intrinsic value. For silver coins, opinions are divided. A strong proponent of circulation by weight is Harry Miskimin (1983, p. 84), who writes that in the Middle Ages, “coins are weighed and circulate as bullion; the market rate for bullion then dominates over all official rates.” Other authors have flatly stated that silver circulated by tale, however. Some state it as a working assumption and condition their whole work on it, as does John Gould (1970) in his explanation of the Great Debasement.<sup>15</sup> Others, such as John Munro (1983, p. 109), simply assert that “silver coins in particular normally circulated by ‘tale,’ at decreed face values, and not by weight.”

Despite such assertions, we have been unable to find authors who provide evidence for circulation by tale. In contrast, we have found numerous indications to the contrary, which show that even silver coins did not circulate by tale in late-medieval Europe. Some anecdotal evidence comes from a diary kept by an anonymous Parisian cleric

between 1405 and 1449.<sup>16</sup> Other indications that silver coins circulated by weight can be found in contemporary account books.<sup>17</sup> Such evidence leads us to conclude that there were cases in which silver coins circulated by weight, although there may have been cases where they circulated by tale and perhaps times when both types of circulation occurred simultaneously.

### **The Modeling Challenge**

If the model we use to think of money in medieval times is a model of commodity money, then the facts we have documented in the previous section are very puzzling. Since debasements are simply an opportunity to change heavy coins into light coins, and at a cost, they provide no additional incentive to bring metal to the mint. Why, then, did debasements lead people to voluntarily increase the amount of metal they brought to the mint?

### *Existing Explanations*

One commonly finds in the literature that the large minting volumes following debasements are easily explained

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<sup>15</sup>Gould (1970, p. 16) justifies his assumption by saying that “the law was thus on the side of fiat value rather than intrinsic value” and by appealing to a convenience argument.

<sup>16</sup>The writer is commonly known as the *bourgeois of Paris*, but his name has not survived. Evidence internal to the manuscript shows him to be a cleric, probably a doctor of the Sorbonne and a canon of Notre Dame. In the years from 1419 to 1420, his diary gives prices for new silver coins in terms of old billon coins. In June 1419, he complains, on the occasion of a new issue of coins, that “purchases always required discussions” (*par achat courait toujours marchandise*) (*Journal* 1990, secs. 254, 261, 284).

<sup>17</sup>One finds silver receipts in different coins converted to gold coin values, or to a fixed “strong” silver coin value. D’Avenel (1894, vol. 1, pp. 53–55), claims that during the debasements of Philip IV (1295–1313) most real estate sales contracts were specified in strong money. Borrelli de Serres (1895–1909, vol. 2, pp. 529–30) provides other examples, among which is an account book of 1305 attesting to the joint circulation of *gros* worth 21d., 34d., and 36d. in 1305, before the reinforcement. After the 1329 reinforcement, accountants at the Saint-Denis abbey broke down their receipts into weak, medium, and strong currency (Miskimin 1963, p. 61). A city treasurer in Tours in 1359 counts “24s. which are worth 132s. 9d.” The Saint-Jacques Hospital in Paris in 1360 separates receipts into strong, medium, and weak money. D’Avenel (1894) adds that in such separate accounts, receipts in strong money dominate. There is evidence that even royal accountants made the distinction in their own receipts: in September 1421, the wages of a royal officer were given as 6 *sous paris* (7.5st.) per day in weak money (*foible monnaie*) converted, for the accounts, into 1.5 *sous paris* in strong money, the exchange rate being 4dp. in strong money per weak *gros* of 20dp. (*forte monnaie*, 4d. *pour gros*; Douët-Darcq 1865, p. 273). (See also Fawtier 1930, p. 38.) There are also examples of accounts where all silver coins are converted into gold coins for bookkeeping purposes. Wolff (1954, p. 311, pp. 337–39) finds plenty of evidence of concurrent circulation of silver coins with different market values. Accountants and merchants would count in *livres* of this or that coin and convert to gold coins to keep track of the different values of the silver coins. The accounts of the abbey of Saint-Denis near Paris in the years 1358 and 1359 show the same practice as do the accounts of the Bonis brothers in Montauban in the 1340s and 1350s. See Fourquin 1964, p. 285, for Saint-Denis; and Forestié 1890 for Montauban. In 1432, archives in Toulouse reveal the simultaneous circulation of four different gold coins.

in the context of circulation by tale.<sup>18</sup> The by-tale explanation posits a price configuration (the legal exchange rate between coins), and arbitrage is used to account for the large minting volumes (Sussman 1993). Since the same amount of goods can be bought with fewer new coins than old coins, there is a clear incentive for agents to convert old coins into new coins.

This explanation is unsatisfactory on both theoretical and empirical grounds. Circulation by tale does not explain the debasement puzzle, but rather replaces it with another puzzle: why would coins circulate by tale? Standard price theory does not predict that different amounts of the same commodity would have the same price, and no existing model of commodity can explain why coins of different weight would exchange at par. Circulation by tale is therefore not an innocuous assumption but runs counter to existing theory.

This explanation also runs counter to the evidence. As documented previously, there were many cases in which coins circulated by weight. Further, a clear implication of the by-tale explanation is that there should be a virtually complete recoinage following every debasement, and, as we have shown, this prediction is not verified.<sup>19</sup>

Another existing explanation, which we call the *money rents explanation*, is that debasements allow debtors to reduce the real value of their debts legally, even if coins are valued by weight for most other transactions. This explanation is proposed by Miskimin (1963, p. 44) as an alternative to the assumption of circulation by tale.<sup>20</sup> As long as the mint price for new coins is higher than the mint equivalent for old coins, a holder of old coins receives more units of account by converting old coins into new coins. When contracts are denominated in units of account and when creditors have to accept any coin at its face value in payment, debasements offer debtors the means to reduce the real value of any such debt. This opportunity exists no matter how the coins are traded in other transactions.

There is an immediate logical difficulty with this explanation. Although it suggests an incentive for bringing coins to the mint, it does not rule out stronger incentives not to bring coins to the mint. In fact, following a debasement, debtors and creditors could get together and renegotiate the debt contract. Once a debasement has occurred, nominal creditors face the prospect of real losses if debtors pay their obligations in the new, lighter coins. But the debtors, to obtain the new, lighter coins, have to pay a large tax to the sovereign. Thus, creditors can reduce their loss and

debtors can increase their gain by bypassing the mint altogether and renegotiating between themselves the real amount of the debt.<sup>21</sup>

A variant of the money rents explanation, which is suggested by Adolphe Landry (1910) and Michael Bordo (1986), among others, is based on sluggish price adjustment. (See also Miskimin 1963.) After a debasement, people brought in old coins for reminting to obtain increased purchasing power, because prices did not adjust instantaneously after the debasement occurred.

This explanation is not supported by empirical evidence. The study of wheat prices by Miskimin (1963) shows that changes in mint equivalents were reflected in these prices.

We have developed other evidence from another source. Édouard Forestié (1890) published the complete text of the account book of two merchant brothers in Montauban, a town in the south of France. Usually, in the course of a transaction, these merchants recorded the cur-

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<sup>18</sup>Here, for example, is how Glassman and Redish (1988, p. 79) discuss the Great Debasement of 1542 in England: "to the extent that all groats, both heavy and light, were accepted for 4d in the marketplace, there was an incentive to sell old groats to the mint, and indeed mint output increased dramatically in the mid-1540s" (our emphasis). Spufford (1988b, pp. 289, 307) states that debasement of coinage "made it profitable for all his subjects who had precious metal or currency to bring it to the mint to be recoined. . . . [The sovereign's subjects'] self-interest dictated that, however much they might disapprove of the process [of debasement], they preferred more new coins to fewer older ones" (our emphasis). Likewise, Bordo (1986, p. 340) offers the following explanation: "by debasing the coinage. . . the king would gain seigniorage revenue while the holder of bullion or coin would gain to the extent he could exchange new coins at the previous par value" (our emphasis). However, Bordo (p. 342) adds that "debasement was a viable source of revenue until prices adjusted to reflect the decline in the intrinsic value of royal money." He later notes Miskimin's findings: "the public refused to accept royal money at face value, treating it instead as equivalent to bullion" and continued to do so "until the end of the fifteenth century" (Bordo, p. 343).

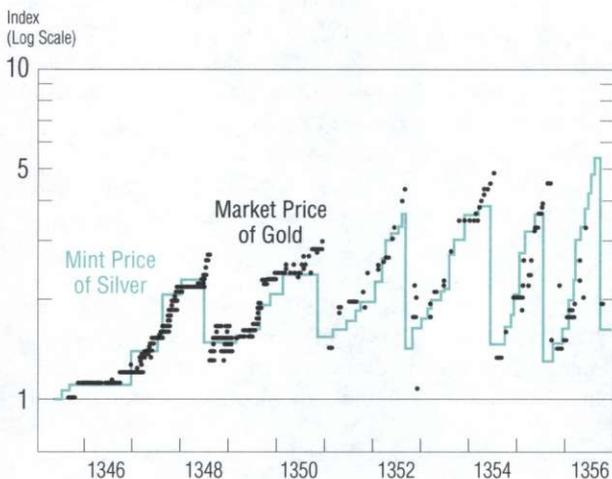
<sup>19</sup>An appeal to legal tender laws is not convincing in the context of medieval Europe, given the documented violations and the paucity of enforcement means. Miskimin (1983, p. 84) notes: "[Gresham's law] assumes that the government possesses enough political force to insist upon the legal tender value of the coinage and to decree circulation at par. There is, however, substantial evidence that neither the French nor the English monarchies gained this power until the end of the middle ages. . . . Coins are weighed and circulate as bullion; the market rate for bullion then dominates over all official rates."

<sup>20</sup>The explanation first appears in Landry 1910, p. 124, n. 1. Glassman and Redish (1988) explain currency depreciation in early modern Europe as the result of the imperfections of bimetalism and wear and tear on the coinage itself. Their explanation does not address the kinds of debasements that we observe in France and during the Great Debasement in England.

<sup>21</sup>There is some indirect evidence that such renegotiations could occur. In July 1421, a reinforcement occurred in the English-controlled parts of France, including Paris. Landlords prepared to take advantage of a fourfold increase in the real value of leases, and tenants prepared to riot. Paris officials then announced that the coming term would be payable in old (weak) currency and gave tenants the right to renegotiate, with an option to cancel their leases if they were not satisfied. This measure amounted to a redistribution of bargaining power within an ongoing negotiation (*Journal* 1990, sec. 314).

Chart 3  
Market Price of Gold and Mint Price of Silver  
in France,\* 1345–56

Index, January 1345 = 1



\*These are the market price of a gold écu in Montauban and the official mint price of silver coinage set at Toulouse.

Source: Forestié 1890

rent price (in units of account) of a gold coin.<sup>22</sup> In Chart 3, we plot an index of the price of this gold coin (normalized to 1 in January 1345, at the beginning of the sample) against an index of the official mint price of silver in nearby Toulouse. Note that the scale is logarithmic. The graph shows clearly the frequent and large debasements, followed by reinforcements, that the silver currency underwent. It also shows that the movements in the market price of gold track the movements in the mint price very closely. Even if price adjustment did not occur instantaneously, the lag could only have been a matter of a few weeks. Thus, sluggish price adjustment cannot account for large minting volumes occurring for years following a debasement.

#### Minting Volumes Following Reinforcements

Rejection of the existing explanations leaves us with the modeling challenge of solving the debasement puzzle. We add another striking feature of monetary mutations that compounds the challenge. We now establish that minting volumes after reinforcements were as large, if not larger,

than volumes following debasements.

Since there was only one reinforcement in England during the period under consideration (in 1551) and there are no minting data for the years immediately following, we rely exclusively on French data, which are shown in Table 6. This table is similar to Table 1, except that we now separate data into debasement minting, normal minting, and reinforcement minting. Normal periods are those during which no mutation occurred.

For silver, the increase in volumes following mutations is clear. In fact, our characterization of minting volumes following debasements is strengthened when the distinction is made between normal and reinforcement periods. Of the ten most active mints, only Tournai stands apart: the minting data come from a period during which this mint operated independently of the rest of France and did not engage in much debasing or reinforcing. All others, except Crémieu, show twice as much minting in debasement and reinforcement periods as in normal periods. The average of these ratios, weighted by output shares, is 10.7 for debasement and 8.1 for reinforcement. For gold, the result is once again less strong, although still noticeable. Output-weighted ratios are 1.6 and 2.5 for debasement and reinforcement, respectively.

#### Conclusion

In this article, we have established several facts about debasements, in particular that debasements were accompanied by unusually large minting volumes and large revenues for the sovereign. We have also established that following debasements, old and new coins circulated side by side and, at least some of the time, exchanged at prices which reflected their intrinsic content. These facts are puzzling, for if silver and gold coins are commodity monies that exchange by weight, debasements provide no additional incentives to bring metal to the mint.

We reject the widespread explanation based on the view that coins circulated by tale because it is contradicted by the evidence and is theoretically unsatisfactory. We also reject another explanation of the debasement puzzle, which is that debased coins were used to reduce the real burden of debts denominated in nominal terms. This explanation has

<sup>22</sup>The source and nature of this price is not entirely clear, but it varies day to day, and the typical formula ("*escut d'aur a . . .*", gold coin at . . .) suggests a market price. The nature of the gold coin is clear: it is called *escut d'aur*, or *gold écu*, in the text, a coin issued beginning in April 1343, at 24 carats, weighing 4.53 g (54 to the marc). The fineness of the écu was lowered progressively to 18 carats by September 1351. We assume that the écu quoted is the most recently minted coin, and its fineness is known, so that we scale the price of the écu by its current fineness.

Table 6  
Minting Volume in Medieval France  
During Debasement, Normal, and Reinforcement Months  
At Selected Mints, 1354–1490

Mint	Mint's Share of Output (%)	Debasement		Normal		Reinforcement		Output Ratios	
		Number of Months	Mean Monthly Output (kg)	Number of Months	Mean Monthly Output (kg)	Number of Months	Mean Monthly Output (kg)	Debasement/Normal	Reinforcement/Normal
<b>Silver</b>									
Toulouse	11.2	146	132.6	302	26.5	72	238.5	5.0	9.0
Romans	9.8	93	108.7	743	26.8	47	51.5	4.1	1.9
Troyes	9.7	89	115.4	309	20.7	50	436.3	5.6	21.1
Poitiers	7.7	69	232.6	44	32.6	30	436.5	7.1	13.4
Rouen	6.4	45	373.7	10	6.7	29	310.6	55.6	46.2
Crémieu	5.5	90	83.8	406	38.5	46	26.6	2.2	.7
St. Pourçain	5.4	70	190.5	41	58.7	42	142.1	3.2	2.4
Tournai	5.3	0	—	70	328.9	17	9.2	—	0
Montpellier	4.8	73	89.6	475	19.2	22	155.9	4.7	8.1
Dijon	4.5	34	316.6	229	17.2	18	171.3	18.4	10.0
<b>Gold</b>									
Paris	18.9	32	84.7	412	28.7	0	—	3.0	—
Tournai	15.4	0	—	104	55.0	4	75.3	—	1.4
Montpellier	14.9	34	16.4	507	25.8	15	77.2	.6	3.0
Toulouse	14.3	49	20.6	454	19.4	21	18.2	1.1	.9
Troyes	4.8	16	7.4	182	8.6	3	76.9	.9	9.0

Sources: Saulcy 1879–92; Miskimin 1963, 1984; and Sussman 1990

a logical flaw: following debasements, debtors and creditors could renegotiate nominal debt payments to avoid the seigniorage tax, and reminting would not have to occur. We also reject an explanation based on sluggish price adjustment because the data suggest that prices adjusted relatively quickly.

In our opinion, the facts we have presented suggest that existing models of commodity money, which assume well-informed agents, are not capable of successfully confronting the facts we present.<sup>23</sup> A potentially fruitful line of research may be to weaken the full-information assumption.

Whatever the nature of the model that will solve the debasement puzzle, we think that it will deepen our understanding of commodity money and of money itself.

<sup>23</sup>Sargent and Smith (1995) study a model of commodity money with full information and a cash-in-advance constraint, and they propose to shed light on, among other things, medieval debasements. The cash-in-advance constraint requires that, if coins do circulate, they circulate by tale. Thus circulation by tale is assumed, not explained. Empirically, we find this assumption unwarranted. Theoretically, the model only explores the internal consistency of the concept of debasement in an economy where debased coins will circulate, if they do, at par with the original coins. It does not provide a complete, structural explanation of debasements.

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