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**NÉCROLOGIE – OVERLIJDENSBERICHT**

Gay van der Meer (M. Scharloo)
TRAJAN’S RESTORED COINAGE: VOLUME, VALUE AND PURPOSE

Abstract – Trajan “restored” a series of silver and gold coin types, the originals of which date back as far as the 3rd century BC. The purpose of these coins remains unclear and their interpretation is problematic. This paper approaches the problem from the point of view of production. It shows that the coinage could have been produced in sufficient volume to constitute a congiarium, but also that the volume relative to the normal coinage differed substantially between the gold and the silver, suggesting the possibility that the restored coinage had more than one intended function.

Introduction

At an uncertain point in Trajan’s reign a remarkable series of gold and silver coins was issued at Rome. These coins bear old types of the Republic (silver) or the portraits and types of earlier emperors (gold) and also the inscription (on the reverse) IMP[ERATOR] CAES[AR] TRAIAN[US] AUG[USTUS] GER[MANICUS] DAC[ICUS] P[ATER] P[ATRIAE] REST[ITUIT]: the Emperor Trajan […] restored [this coin]. In the most recent survey of Trajan’s restored coin series, Bernhard Woytek has identified a total of 50 Republican denarius types (e.g., Fig. 1) and 23 Imperial aureus types (e.g., Fig. 2).[1]

Fig. 1 – Trajanic restoration of a denarius of T. Carisius, original ca. 45 BC (BMC Trajan 688, © Trustees of the British Museum)

[1] Woytek 2010, p. 641–644. Holger Komnick (2001, p. 132-134) counted 51 Republican and 23 Imperial types; some of the former are removed by Woytek and others added (2010, p. 167-168). In the first comprehensive study of the subject, Mattingly (1926) counted 43 Republican and 22 Imperial types. The change in known types since Mattingly’s study is relatively small, suggesting that we now have a fairly comprehensive knowledge of the original makeup of the series.
The Republican types range in date (of the original coins) from the pre-denarius didrachm coinage of the 3rd century BC to the time of Augustus, while the Imperial series spans rulers from Caesar to Nerva (omitting Caligula, Nero and Domitian while including Pompey). Most Republican types are copied more or less faithfully from their originals; the major exceptions are the additions of false moneyers’ names (Furius Camillus, Cocles, and Decius Mus) to three early anonymous types. The Imperial types on the other hand rely much less, and in some cases not at all, on original models. The presence in the reverse inscription of Trajan’s title Dacicus (awarded AD 102) and the absence of Optimus (awarded AD 114) gives no more than a broad date range for the coins. Two possible dates within this range have been argued for. Most commentators have associated the restoration with a recall of worn coin that is said by Cassius Dio (68.15.1–3) to have occurred after Trajan’s return from his second Dacian war (ca. AD 107). More recently Woytek, building on stylistic and typological observations made in the 1930s by Paul Strack, has argued for a date near the end of the possible range, in the years 112 or 113.

The purpose of Trajan’s restored coinage is a puzzle. It purports to “restore” old coin types, but it is hard to believe that the later coins in the series (up to Nerva, Trajan’s immediate predecessor) would have been in need of restoration. Great care was taken in the careful copying of Republican types, but the volume of the silver coinage (see below) is so small that it could hardly have made a visual impact in the mass of circulating money. Furthermore it is clear that the restored series includes more than simple

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[2] Woytek 2010, nos. 801, 802, 803; Komnick 2001, nos. 2, 1, 3. Occasionally the legends of some original Republican types were altered when copied on the restored denarius, by removing abbreviated praenomina or expanding (correctly or not) ligatures; see Woytek 2004, p. 231–232.

[3] This was the opinion of Harold Mattingly (1926 and BMCRE III) and was also one of the two possibilities suggested by Paul Strack (1932, p. 41–42); it has been followed by a number of scholars since then, e.g. Duncan-Jones 1994, p. 195, n. 8; Harvey 2002, p. 94. Duncan-Jones 1994, p. 206 believes profit could have motivated Trajan’s actions, but Wolfram Weiser (1999) has argued that this was an unlikely motivation.

reproductions: the addition of fictitious names (in the Republican series) and the invention of types (in the Imperial series) show manipulation of the types and legends, presumably with a deliberate purpose or message in mind. Finally, the difference in complexity of message between the gold and silver series challenges assumptions of audience and reception: the message of the silver coinage might be assumed to be targeted at a simpler audience than that of the gold, but the most obscure iconography and complicated epigraphy appears on the silver coinage while the gold is dominated by simple types of emperors, personifications and symbols of victory.

**Function of the Restored Coinage**

The purpose of this paper is to investigate this coinage from an overlooked perspective, viz. from the point of view of its production: how many coins would have been produced, what function a coinage of this value could have had, and how these coins would have related to the normal coinage produced by the Roman mint. This makes it possible to provide a practical, physical context for Trajan’s restored coinage.

The information required by this approach is obtained from data on die identifications and coin counts in both the restored and the regular coinage. By applying statistical formulae to counts of dies and coins it is possible to estimate the original number of dies used to strike the coinage, and from this to estimate its possible value. This estimate can provide a rough guide to the potential practical use of the restored coinage, especially in evaluating its suitability for use in a coherent body as a single payment. The die counts can also be compared to available data for the main coinage, making it possible to evaluate the size of the restored coinage in relation to it. The basis for these calculations are the die and coin counts published by Komnick.\[5\]

The following table gives a synopsis of the die and coin counts for the *denarii* and the *aurei*.\[6\]

<table>
<thead>
<tr>
<th>Denomination</th>
<th>Obverse dies</th>
<th>Reverse dies</th>
<th>Coins</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>denarii</em></td>
<td>43</td>
<td>51</td>
<td>158</td>
</tr>
<tr>
<td><em>aurei</em></td>
<td>32</td>
<td>35</td>
<td>124</td>
</tr>
</tbody>
</table>

*Table 1 – Die and coin counts for Trajan’s restored coinage*

\[5\] Although Woytek (2010) has published more specimens of Trajan’s restored coinage than were known to Komnick (2001) – 189 *denarii* versus Komnick’s 164, and 172 *aurei* versus Komnick’s 121 – both the obverse and reverse die counts and the coin counts used here depend on Komnick since Woytek does not give die counts.

\[6\] The totals given here differ from those given by Komnick (2001, p. 135) because duplicates identified by Woytek have been eliminated (subtracting three duplicates, of types 805, 825 and 832, for the *denarii*, and subtracting one duplicate of type 865 for the *aurei*), because non-confirmable *denarius* types 821, 835 and 840 have been removed, and because the four hybrid *aurei* identified by Komnick have been added to the total coin count.
The first point that must be made is that the ratio of coins to dies for both the *aurei* and the *denarii* is high. There are 3.9 coins to every documented *aureus* obverse die (if Woytek’s coin count is used the ratio is greater than 5 coins per obverse die); comparable studies of roughly contemporary gold coinage of Trajan have yielded a ratio of 4.6 coins per obverse die, and a study of the *aurei* of Faustina the Elder yielded 5.9 coins per obverse die.\(^\text{[7]}\) The ratio for *denarii* is slightly lower, at 3.7 coins per identified obverse die, but in fact this is a high number when compared to other die studies of *denarii*. Duncan-Jones found a ratio of 1.9 coins per die in a slightly smaller sample (147 coins) of *denarii* of Aelius.\(^\text{[8]}\) The main reason for this high ratio in both metals, but especially for the *denarii*, is likely the strong interest of collectors in these (mostly) rare coin types. The main implication of these high ratios is that the likelihood of discovery of new dies (and thus potentially new types) is relatively low. Warren Esty provides a formula for estimating the coverage of the sample, “the probability that the next coin discovered from that issue will be from a die already observed in the sample.”\(^\text{[9]}\) Applying that formula to the data for Trajan’s restored coinage, the estimated coverage is 92-94% for the *denarii* and 90% for the *aurei*.\(^\text{[10]}\) This provides a good basis for estimation of the original number of dies used to strike this coinage.

### The Original Number of Dies

The number of dies observed in the sample is necessarily less than the original number of dies actually used to strike these coins. It is possible to estimate the number of obverse dies in the original population using statistical formulæ; in this study I have used the generally accepted formulæ devised by Warren Esty.\(^\text{[11]}\) There are two steps in the calculations: first the calcula-

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\(^\text{[7]}\) See Beckmann 2007, p. 78-79 and Beckmann 2012, p. 9. For a summary of other die studies of Imperial gold, see Bland 2013, p. 268-269. For Woytek’s numbers, see above, n. 5.

\(^\text{[8]}\) Duncan-Jones 1994, p. 152.

\(^\text{[9]}\) Esty 2006, p. 360.

\(^\text{[10]}\) I use Esty’s formula (1) to estimate coverage (Esty 2006, p. 360). The data for singletons (i.e. dies represented by a single coin) is taken from Komnick’s die catalogue. The formula is: coverage of the sample = 1 - number of dies [obverse or reverse] represented by a single coin in the sample/number of coins in the sample:

- for the *denarii*: Obverses: \(1 - \frac{9}{158} = 94.3\%\); Reverses: \(1 - \frac{12}{158} = 92.4\%\)
- for the *aurei*: Obverses: \(1 - \frac{12}{124} = 90.3\%\); Reverses: \(1 - \frac{13}{124} = 89.5\%\).

\(^\text{[11]}\) On the suitability of Esty’s formulæ compared to those of others, particularly since it accounts for singletons, see de Callataÿ 1995, p. 294-295. Even Buttrey, otherwise a critic of attempts to calculate ancient coin production, accepted that statistical estimates such as Esty’s of the original number of dies “are statistically sound and genuinely useful” (Buttrey 1994, p. 341).
tion of a “point estimate” of the original number of dies, then the calculation of the “confidence interval”, a range between which one can say with a certain degree of confidence (here 95%) that the actual original number is likely to lie. Using data from Komnick’s die study, a calculation of the point estimate yields 50 obverse and 62 reverse dies for the silver, 42 obverse and 46 reverse dies for the gold. After applying the formula to calculate the confidence interval, it can be said with 95% confidence that for the denarius the original number of obverse dies was between 44 and 57, while for the aurei the original number of dies was between 36 and 49.

**Number Coins Struck and Total Value**

It is possible, though problematic, to take these calculations one step further and produce some estimates of the number of coins that these dies may have struck. Estimates of ancient coin production involve the multiplication of the estimated number of original dies (expressed as a range) by an estimated average coin production per die, working with the assumption that all dies were used to exhaustion (the point at which they became damaged or broke entirely). The procedure has been much discussed. The value of such calculations for drawing large-scale conclusions about the Roman economy is debatable, but with a relatively small, self-contained group of coins like Trajan’s restored coinage, it should at least be possible to arrive at an esti-

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[12] Formula (2) in Esty 2006: estimate of the original number of dies = (number of different dies in sample / estimated coverage of sample) × (1 + number of dies that struck exactly one coin / 2 × number of different dies in the sample):

- for the denarius: Obverses: \((43/0.943)\times[1+9/(12\times43)] = 50.4\)
  Reverses: \((51/0.924)\times[1+12/(2\times51)] = 61.7\)
- for the aurei: Obverses: \((32/0.903)\times[1+12/(2\times32)] = 42.1\)
  Reverses: \((35/0.895)\times[1+13/(2\times35)] = 46.4\).

[13] Formula (4) in Esty 2006, employing the wording suggested by Esty on p. 361: The formula is: confidence intervals = point estimate of number of dies × (2 × point estimate / number of coins) ^ 2 × square root of 2 × point estimate:

- for denarius obverse dies: \(50 \times (100/158)^2 \pm (100/158) \times \sqrt{100} = 50.4 \pm 6.3\) or \([44, 57]\)
- for aureus obverse dies: \(42 \times (84/124)^2 \pm (84/124) \times \sqrt{84} = 42.6 \pm 6.2\) or \([36, 49]\)

Following Esty I have rounded the resulting numbers before adding or subtracting to obtain maximum/minimum die estimates.

[14] The sharpest critique of this approach is Butrey 1994 (retracting the critique of statistical die estimates by the same author in his 1993 article, but expanding the criticism of estimates of die productivity), who emphasizes especially the lack of clear evidence for ancient die productivity. On the other hand de Callataÿ (1995) has defended the approach and pointed out that there is some documented production data, though mostly from the medieval world. For another defence of the procedure (and its use on an ambitious scale) see Duncan-Jones 1994 p. 165; for a critique of Duncan-Jones’ method, see Howgego 1996.
mate of the range of potential output of the dies.\textsuperscript{[15]} This output range may then be compared to the potential costs of different uses of the coinage.

There have been a number of different attempts to estimate the number of coins that each die could produce, drawing on data from die studies, hoard analysis, medieval mint records, and modern experiments. The only ancient source where we have a good estimate of both dies and total production is the Aphictyonic coinage of Delphi, for which we have epigraphic records of the amount of silver bullion turned into coin and estimates of the die counts from die study.\textsuperscript{[16]} This shows that the minters produced between 23,000 and 47,000 coins per die. Medieval mint records show silver coin production varying between 2,000 and 78,000 coins per die, with an average range between 30,000 and 35,000; this sits comfortably in the middle of the Delphic estimates.\textsuperscript{[17]}

Working with low/high estimates of 30,000/35,000 for the denarii and using the lowest and highest number of dies estimated at the 95% confidence level, the following are the production estimates and the value range expressed in the standard Roman unit of account, the sestertius (abbreviated HS; it had a value of \(\frac{1}{4}\) of a denarius or \(\frac{1}{500}\) of an aureus).\textsuperscript{[18]}

<table>
<thead>
<tr>
<th>Count</th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>~1.3M coins</td>
<td>~2.0M coins</td>
</tr>
<tr>
<td>Value</td>
<td>~5M HS</td>
<td>~8M HS</td>
</tr>
</tbody>
</table>

\textit{Table 2 – Production estimates for restored denarii} (\(m = \text{million}\))

Since there are no reliable ancient records for gold coin production, one option would be to assume a similar level of production per die as for the denarii; the coins were similar in size (the aureus being somewhat larger), though not in weight (the aureus weighing twice as much as the denarius). On the other hand, medieval records for gold coinage show outputs ranging between 2,500 and 12,000 coins per die; as de Callataÿ remarks, this is notably lower than for silver, but the data is consistent across a number of

\textsuperscript{[15]} See Howgego 1992, p. 2–4 for a discussion of the many variables involved in large-scale calculations using this data.

\textsuperscript{[16]} de Callataÿ 1995, p. 297–301, notes that other attempts to estimate production from die studies and hoard statistics of ancient coinage contain many variables and unknowns, while Sellwood’s modern experiments were conducted mainly to disprove a theory of very low coin production and ceased before the dies became worn.

\textsuperscript{[17]} The sources for this data are collected by de Callataÿ (1995, p. 300).

\textsuperscript{[18]} Multiplying lowest estimated number of dies by lowest estimated production, and vice versa.
mints. [19] If the estimates of *aureus* dies derived above are combined with these two possible production estimates, the following figures result:

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>~1.1 M coins</td>
<td>~1.7 M coins</td>
</tr>
<tr>
<td>Value</td>
<td>~110 M HS</td>
<td>~170 M HS</td>
</tr>
</tbody>
</table>

*Table 3 – Production estimates for aurei if similar to denarii*

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count</td>
<td>~0.1 M coins</td>
<td>~0.6 M coins</td>
</tr>
<tr>
<td>Value</td>
<td>~9 M HS</td>
<td>~60 M HS</td>
</tr>
</tbody>
</table>

*Table 4 – Production estimates for aurei, Medieval model*

These estimates allow us to make some observations on the potential use of this coinage. One possibility is that it was allowed to enter circulation by normal means, which was presumably in the form of payment to public employees, especially to members of the army. The *aurei* would have been sufficient in number and value to constitute a substantial contribution to the normal budget (perhaps 600–800 M HS/year; *on this, see below*); the *denarii* on the other hand, small in both volume and value, would have been able to make little impact in the overall imperial expenses.

Given the great care taken in producing the *denarii*, other possible uses should be considered. Foremost among these is as a single, unified distribution to the urban populace of Rome. Such distributions were normally known as *congiaria* (singular *congiarium*) and took the form of a cash hand-out made by the emperor to the urban populace at special times such as when ascending the throne, assuming an important office or when celebrating a triumph. The value of these handouts varied; we have a few specific references where either the total value is recorded or the total number of recipients and the amount given to each is recorded; we also have records of a number of other distributions for which we know only the amount per head. Suetonius (*Aug. 101.2*) says that Augustus left 40 million HS in his will to be distributed to the people. Augustus recorded the distributions he

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[19] de Callataÿ 1995, p. 298. Duncan-Jones (1994, p. 164) argues that since silver coins outnumber gold coins in archaeological finds by about 10:1 but the die ratio of silver to gold is much higher, then the dies for gold must have produced more coins. This is, as de Callataÿ notes, in conflict with medieval evidence and does not take into account other possible factors affecting archaeological finds. There is a general idea that gold – being ‘softer’ than silver – would be easier to strike, but gold (as any other metal) becomes harder through forging, and Roman gold coins had much higher relief than silver coins, increasing the forging that the gold would undergo.
made while living in his *Res Gestae* (15); his first three distributions were worth 100 million HS (400 per person, not less than 250,000 recipients), his fourth 77 million (240 per person, 320,000 recipients) and his last 48 million (240 each to 200,000 recipients). Dio (55.10.1) says that Augustus limited the recipients to 200,000 which gives us a baseline to multiply the values of distributions by later emperors (though van Berchem estimates a lower number), about which we normally only know the value per person. [20] These normally ranged in value between 240 and 400 HS per person, giving a total value with a notional 200,000 recipients of between 48 and 80 million HS. [21]

The calculations above indicate that the restored *denarii* alone would not have been of sufficient value for such a distribution, but that when combined with the *aurei* would more than suffice. The crucial question is could the gold and silver together have constituted a suitable amount for distribution per person? That is, given the production numbers indicated by the estimates above, could the gold and silver coins have been used in a practical way to dispense a handout of normal value? The evidence for exactly what denomination of coins was normally used in distributions is unclear. All three denominations (sestertii, *denarii* and *aurei*) are mentioned by the various sources (Augustus for example mentions both *sestertii* and *denarii* in the *Res Gestae*) but bronze can be ruled out for its sheer impracticality (400 sestertii weighed about 10 kg) and it would seem better to assume that the goal in these sources was to express the overall value rather than describe the actual denominations used in the distribution. That leaves either *denarii* (worth 4 HS each) or *aurei* (worth 100 HS), which could have been used alone or mixed (though we have no evidence of mixed denomination handouts). Values totalling in even hundreds could be easily dispensed in gold, but values like 240 HS could not be given out entirely in *aurei* and would have required either *denarii* alone or a mix of gold and silver.

The production estimates for Trajan’s restored coinage give us a range of absolute numbers of both *denarii* (1.3–2.0 M) and *aurei* (0.1–1.7 M). These numbers, along with an assumed recipient base of 200,000 people, limit the combinations of values that could be handed out. Assuming that both silver and gold were used, only one of the historically attested values of *coniaria* (per person) could easily have been made up using the numbers of coins indicated by the estimates: 240 HS. This value could have been achieved by a distribution of 10 *denarii* and 2 *aurei* per person, or 2.0 million *denarii* and 0.4 million *aurei* total (for 200,000 recipients). This is at the top end of the

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[20] Van Berchem (1939, p. 29–30) calculates that the distribution of Augustus’ posthumous largess, with a total value of 40M HS, would only have reached 150,000 recipients.

[21] Our evidence for the occurrence of *coniaria* comes from a variety of sources, especially ancient texts, calendars and the coinage itself (for a survey of the known *coniaria* of the imperial period see Barbieri 1949).
estimated production capacity of the restored denarius dies and at the top end of the Medieval-based estimate for the aureus die production, though much below the lowest total suggested if we assume the aureus dies produced a similar number of coins as the denarius dies. In the end it is the denarius numbers that restrict the possibilities (within the range of the documented values for congiaria, that is). The next-highest commonly attested value for congiaria is 300 pieces; this could have been distributed in aurei alone, but if denarii were to make up part of each handout then 25 would be needed per head (along with 2 aurei), for a total of 5.0 million denarii, more than twice the highest production estimate.

These calculations suggest that Trajan’s restored coinage was produced in sufficient numbers to be practically usable in a normal congiarium distribution with a value of 240 pieces per recipient. But how likely is it that it was so used? No congiarium is recorded for Trajan in 112/113; his coinage records only three such events, the last in 107. The main historical source for the period is Dio; his text is very fragmentary and does not record any of Trajan’s congiaria. The Fasti Ostienses, the municipal calendar of Ostia that also includes mention of many important events that happened in Rome, documents Trajan’s third and perhaps also his second congiarium. The Fasti are complete from January 112 to mid-May 113, suggesting that a distribution did not occur during this period; this potentially rules out one possible occasion for a congiarium, Trajan’s assumption of his 6th consulship and the dedication of his new Forum complex. The last event recorded in the Fasti Ostienses before they break off in 113 is the dedication of the Column of Trajan on May 12. If a congiarium was distributed, perhaps this was the occasion. The main objection to this is that such an event was not recorded on Trajan’s coinage.

**Functions Beyond Distribution**

It is probable that the restored coinage of Trajan, or part of it at least, had intended functions beyond its use for a specific distribution. This is suggested by some remarkable differences between the restored denarii and aurei.

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[22] For Trajan’s reign, three congiaria are recorded on Trajan’s bronze coinage: one early in his reign, a second in 103, and a third in 107/108 (mir Traianus 64, 160, 312). The date of the third congiarium (AD 107) is given by the Fasti Ostienses (tablet Hc η, 1-2; Vidman 1982, pp. 47 and 102).

[23] Fasti Ostienses tablet Hc η, 1-2 for the congiarium of 107 and Gd η, 10-11 for the possible record of the congiarium of 103; Vidman 1982, p. 46-47. The preserved portion of the Fasti breaks off in May 113 and only resumes again in 115.

[24] Strack (1931, p. 41) suggested that the restored coins could be connected to the 10th anniversary of Trajan’s first Dacian triumph and the dedication of his new Forum, though he did not connect them directly to a congiarium; Komnick (2001, p. 178) supports a connection between the coins and the dedication of the Forum.

The first involves value of the coins produced. Duncan-Jones has estimated the total yearly budget of the Roman empire at between 600 and 800 million sesterces, of which only a portion would be paid in new coin, with the bulk being made up of old coin collected as taxes.\[^{26}\] Compared to this the restored denarii, even at their highest value estimate (about 8 million sesterces) were a tiny fraction. The aurei on the other hand may have made a much more substantial contribution, especially if the higher estimates (about 170 million sesterces) are correct.

But we do not need to rely on these value calculations to demonstrate the remarkable discrepancy between the two metals of the restored coinage. It is possible to observe the same dramatic difference in the die estimates, a much more reliable calculation. Duncan-Jones has used die study and statistical formulae to calculate that about 2,000 obverse dies were used per year in the reign of Hadrian to strike denarii and between 25 and 50 obverse dies per year to strike gold.\[^{27}\] Die study of the gold coinage of Trajan by the present author has yielded raw die counts that are at the top end of Duncan-Jones’s estimates of about 50 obverse dies each per year for aurei, and slightly higher totals have resulted from studies of the reign of Antoninus Pius.\[^{28}\]

We may compare the die estimates for the restored coinage to these yearly estimates of die use:

<table>
<thead>
<tr>
<th>Trajan’s Coinage</th>
<th>Obverse dies, denarii</th>
<th>Obverse dies, aurei</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>2000/year</td>
<td>50/year</td>
</tr>
<tr>
<td>Restored</td>
<td>44–57</td>
<td>36–49</td>
</tr>
</tbody>
</table>

*Table 5 – Comparison of normal yearly die use in the Roman mint and estimated dies used to strike the restored coinage*

The difference in die counts of the restored coinage relative to the normal coinage is striking. These estimates show that the volume of the restored silver coinage would have been minute in comparison to the regular denarius issues, accounting for only about 3% of the normal total of dies used per year for denarius production. The situation with the gold is dramatically different. Its 36–49 obverse dies would have been equivalent to 72–98% of the average yearly total obverse dies normally used in the mint to strike the regular gold coinage. The much greater intrinsic value of the aurei would accentuate these differences. This comparison is valid regardless of the total number of coins struck by each aureus die.

Finally there is a clear difference in die use between the two metals in the restored series.

\[^{26}\] Duncan-Jones 1994, p. 46.
\[^{27}\] Ibid., p. 150–162.
\[^{28}\] On die use in this period, see Beckmann 2007, esp. p. 89. For Antoninus Pius see Beckmann 2012, p. 96.
The following tables presents a synopsis of die use \((A_v = \text{obverse die} - R_v = \text{reverse die})\) based on the number of dies used to strike each type:\[^{29}\]

<table>
<thead>
<tr>
<th>Number of dies</th>
<th>Number of types</th>
<th>Expressed as a % of all types</th>
<th>Expressed as a % of all dies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (A_v + 1 R_v)</td>
<td>38</td>
<td>81%</td>
<td>70%</td>
</tr>
<tr>
<td>1 (A_v + 2 R_v)</td>
<td>5</td>
<td>11%</td>
<td>14%</td>
</tr>
<tr>
<td>2 (A_v + 2 R_v)</td>
<td>2</td>
<td>4%</td>
<td>7%</td>
</tr>
<tr>
<td>2 (A_v + 3 R_v)</td>
<td>2</td>
<td>4%</td>
<td>9%</td>
</tr>
</tbody>
</table>

*Table 6 – Restorations of Republican denarii – number of dies attested for individual types*

<table>
<thead>
<tr>
<th>Number of dies</th>
<th>Number of types</th>
<th>Expressed as a % of all types</th>
<th>Expressed as a % of all dies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (A_v + 1 R_v)</td>
<td>10</td>
<td>53%</td>
<td>31%</td>
</tr>
<tr>
<td>1 (A_v + 2 R_v)</td>
<td>1</td>
<td>5%</td>
<td>9%</td>
</tr>
<tr>
<td>2 (A_v + 2 R_v)</td>
<td>3</td>
<td>16%</td>
<td>18%</td>
</tr>
<tr>
<td>2 (A_v + 3 R_v)</td>
<td>1</td>
<td>5%</td>
<td>7%</td>
</tr>
<tr>
<td>3 (A_v + 3 R_v)</td>
<td>2</td>
<td>11%</td>
<td>18%</td>
</tr>
<tr>
<td>4 (A_v + 5 R_v)</td>
<td>1</td>
<td>5%</td>
<td>13%</td>
</tr>
<tr>
<td>5 (A_v + 5 R_v)</td>
<td>1</td>
<td>5%</td>
<td>14%</td>
</tr>
</tbody>
</table>

*Table 7 – Restorations of Imperial aurei – number of dies attested for individual types*

The number of dies for each type varies, and the silver and gold issues follow different patterns. The fact that most of the *denarius* types (81\%) have only one obverse and one reverse die suggests that the series was designed to produce a mass of coinage with a very high typologically diversity. A few types have one obverse and two reverse dies; the opposite ratio does not

[^{29}]: The definition of “type” in the Imperial series is somewhat problematic, with different scholars arriving at different interpretations of what constitutes a distinct type, but in general a type in this series means a unique obverse combined with a unique reverse. There are no known hybrid types in the Republican series, but four are known in the Imperial series, suggesting some flexibility (or confusion) in die use; since each of these are documented by only one coin, they are omitted from the list below. For the hybrids, see Woytek 2010, p. 532.
exist. This may have been caused by the reverse die failing (breaking or being irreparably damaged) early in the minting process, before what was judged to be a sufficient quantity of coin of that type had been produced (the reverse die, being free-moving and directly subject to blows of the hammer, was more susceptible to damage than the obverse). There are four instances of denarius types with two obverse and two or three reverse dies; these numbers may be the result of chance (a random decision to cut more dies of these types in order to produce more coins in the overall series) or they may be an indication that these particular types (Jupiter, Juno, Sol, Regulus) had been designated for a higher level of production.

The gold coins on the other hand have many more types with multiple obverse and reverse dies. Only half the types have only one obverse and one reverse die; when measured by overall dies used to produce the restored aurei, these types only account for a third of the total. On the other hand, four types have three or more obverse dies: types of Caesar and Divus Julius have three obverse and three reverse dies each, while Divus Vespasianus has five and five and Divus Titus has four and five (plus shares three of the same dies used to strike the same type for Divus Vespasianus). These four types employ 45% of the total dies used for restored aurei. This shows that in the gold series there was not as strong an emphasis on variety as in the silver, and that some types were singled out for very substantial production; this is more similar to die use in the regular coinage. [30]

These dramatically different ratios suggest that the restored silver coinage was intended to be a small, special issue that would have contributed little to the overall volume of the normal denarius coinage, but the restored gold coinage was intended to produce a very large number of coins that may have been nearly as large as the normal yearly aureus production. This suggests that the gold coinage may have had two intended functions: first to make up part of a special distribution, together with the denarii (which alone could not have made up a distribution of standard value) and second, to constitute a substantial portion of the normal circulating gold coinage of that year. The presence of the Trajan’s restored aurei in circulation in a ratio very similar to that suggested by die estimates supports this theory. [31]

[31] The evidence of the presence of restorations in circulation comes from hoards. The large aureus hoard from Trier contains 125 aurei of Trajan, representing about 6.5 aurei per reign year; the hoard contains 5 restored aurei (one of Galba, two Vespasian, one Titus and one Nerva; Gilles 2013, p. 24). The smaller aureus hoard from Liberchies contains 66 aurei of Trajan, or about 3 per year; the hoard contains 3 restored aurei (of Galba, Vespasian, and Titus; Thirion 1972, p. 169-170). For other finds of aurei, including other hoards with similar proportions of restored coins, see Komnick 2001, p. 284-290. The Arquennes hoard (dispersed on the antiquities market after its discovery in 1985) had the highest ratio of restored to normal coinage of any hoard, with about 80-90 aurei of Trajan, of which about 10 were restorations.
Conclusions

A number of important conclusions can be drawn from these calculations. The first is that the restored coinage of Trajan would have sufficed to make up a distribution to the urban populace according to the standard model of the congiarium. The second comes from the calculations of original numbers of dies used to produce the restored coinage. These show that the restored *denarii* differed markedly from the *aurei* when their die totals are compared to the estimated number of dies used per year for the normal coinage. It is clear that the restored *denarii* were a very small issue relative to the normal coinage but the restored *aurei* were quite a large issue, equivalent to more than two-thirds of the normal yearly production. When these factors are considered together they suggest the possibility of a dual function for Trajan’s restored coinage: first a special issue in the form of a public distribution composed of both *denarii* and *aurei*, perhaps connected to an important event in Rome; then the continued production of *aurei* as a substantial component of the normal coinage, focussed especially on types of Caesar and the Flavians. This implies a difference in the intended audience for each series.
Bibliography


Gilles 2013 = K-J. Gilles, Der römische Goldmünzschatz aus der Feldstraße in Trier. Trier, Rheinisches Landesmuseum Trier.


