Coinage and the Roman Economy in the Antonine Period: the view from Egypt

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The Antonine period and the Antonine period in Egypt in particular have become central to current studies of the Roman economy. There is the debate between Wilson and Scheidel about whether *per capita* Roman economic growth continued throughout the first two centuries AD or stagnated already from the Augustan period.[1] There is also Rathbone's study of Egyptian prices, the only useable series from anywhere in the Empire, which sees the doubling between AD 160 and 190 as the only significant change between AD 45 and AD 274/5.[2] This picture underpins an important paper by Temin on the causes of inflation in the Roman World in general.[3]

The Antonine Plague, the impact of which is measured most securely from Egyptian evidence, potentially assumes great importance here: identified by Rathbone and Temin as the exogenous shock that caused the structural shift in prices and by Wilson as that which ended economic growth. The Plague has loomed large over recent discussions of the economy. It is obvious that thinking has been influenced by the much better documented Black Death. Unfortunately, attempts to substantiate the impact of the Plague in documentary and epigraphic evidence have been shown to be 'Not Proven'.[4] (Note Greenberg's delightfully titled 'Plagued by doubt'.[5]) Modern estimates range from slight to apocalyptic.[6] Even in Egypt, with its unparalleled level of papyrological documentation, attempts to pin quantified socio-economic change on the Plague have proved hard to sustain.[7] At least the severity of the Plague itself in Egypt does seem to command a degree of consensus:

> 'No one disputes that the Antonine Plague, which was carried into Egypt in AD 166/7, caused over the next decade a dramatic aggregate population loss, probably of around 20–30 percent to judge from some attested cases . . .'
>
> Rathbone 2007: 700

It is indeed plausible that Egypt was badly hit by a plague spreading from the East. Alexandria, as a major maritime city, would have been a magnet, the province was heavily urbanized and densely populated, and the Nile would have been an effective

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[1] Wilson 2009; Scheidel 2009; cf. Rathbone 2007 arguing for significant total and *per capita*

[2] Rathbone 1996 and 1997.

[3] Temin *forthcoming*, who proposes an index of political instability to compare with the index of inflation.

[4] Duncan-Jones 1996; with important reassessments of his proxy data by Greenberg 2003; Bruun 2003.

[5] Greenberg 2003.

[6] Duncan-Jones 1996: 115 n. 85.

[7] Scheidel 2002; with an important reassessment of his proxy data by Bagnall 2002.

conduit.[8] The earliest evidence adduced by Duncan-Jones for an impact on Egypt is in AD 167/8.[9]

Whatever the assessment of the Plague, no single explanation will suffice for the major changes taking place within the empire.[10] It is scarcely novel to point out that the reign of Marcus would be seen as transitional in any case owing to the unprecedented military pressures on all sides.[11] Political insecurity becomes a major factor in the third century, although one might question whether the end of the Antonine Period is really the right place to locate a sea change, despite the rhetorically useful strategy of highlighting the auction of the empire in AD 193.[12] Factors affecting the supply of precious metal suggest a turn for the worse.[13] In particular the history of gold and silver mining indicates a marked downturn beginning in the period from the 160s to the Severans, although new awareness of the scale of silver which came on-stream in Dalmatia and Moesia Superior will certainly modify the picture.[14] There is also a longer view, based on the declining silver content of the coinage, which sees the fiscal inadequacy of the empire developing from the time of Nero.[15] This view now receives some support from the observation that the recycling of old denarii to make new coin also seems to begin under Nero, replacing a pattern of sourcing bullion more directly from the mines.[16]

The Antonine period in Egypt is thus central to our understanding of important developments in the Roman economy, and the role of Alexandria as the commercial centre of the eastern Mediterranean is of interest in its own right. Surprisingly, despite intensive work on the coinage of 'Alexandria' in general, there has been little consideration of the coinage of Roman Egypt under the Antonines in particular. Christiansen in his quantitative studies of the coinage chose to focus on the reigns of Nero, Trajan, and Septimius Severus,[17] although in a later book he did devote a short chapter to Commodus.[18] Walker did not analyse the coinage of Alexandria for much of the period.[19]

Our aim is to make a start towards filling this gap by joining up the preliminary results from Butcher and Ponting's new programme of metallurgical analysis with work done in connection with the Roman Provincial Coinage in the Antonine Period Project based at the Ashmolean Museum.[20] The metallurgical analyses of the base silver tetradrachms presented here are entirely new. They supersede earlier results for silver content and add a consideration of the trace elements. They substantially

[8] Duncan-Jones 1996: 135.

[9] Duncan-Jones 1996: 117; 119; 125.

[10] A point made well in this context by Bagnall 2002: 115; Greenberg 2003: 421.

[11] Greenberg 2003: 424. On Marcus as a precursor to the third-century crisis: de Blois 2002: 213 (draining by warfare).

[12] As Temin *forthcoming*.

[13] Howgego 1992.

[14] Wilson 2007; Balkans: Mladenović this volume.

[15] Howgego 1995: 136; 2009: 292.

[16] Butcher and Ponting, this volume.

[17] But brief discussion of Antonine period in Christiansen 1988: 300–301.

[18] Christiansen 2004: ch. VI.

[19] Walker 1976–8.

[20] Howgego 2009: 292.

change the story of the trajectory of the Egyptian tetradrachm under the Antonines. The metrological and historical interpretations are underpinned by the new Roman Provincial Coinage data, which include 11,429 Antonine coins from Egypt, 4,539 of which are tetradrachms.

The nature of coinage

The coinage in use in Roman Egypt is routinely, but misleadingly, described as Alexandrian. It is not in fact a civic coinage of Alexandria. It never bears an 'ethnic', *of the Alexandrians* or similar. Rather, it is a Roman provincial coinage for Egypt, in continuity with Ptolemaic royal coinage. Such coinages, for example the cistophori in Asia or the tetradrachms in Syria, typically do not specify the regional authority behind them. The continuity, direct or indirect, with a tradition of royal coinage (Attalid, Seleucid, Ptolemaic) suggests that the authority behind them is the emperors whose portraits and inscriptions generally occupy the obverse.

In the Antonine period the coinage produced in Egypt consisted of base silver tetradrachms, equivalent in value to one denarius each, and fractional coinages in bronze. It is the silver coinage with which we are concerned here.

Again in continuity with Ptolemaic coinage practice, Roman Egypt operated a closed currency system, with the important proviso that imperial gold may have circulated there too (see below). Quite how the system operated is unclear, but imperial coinage, and perhaps other provincial silver coinages too, must have been exchanged for the Egyptian coinage, presumably through moneychangers at banks or at the Mint itself. There is some evidence for the operation of the system under the Ptolemies, but not under Rome.[21] There is evidence for banks which performed exchange between different elements of the currency within Egypt, that is between silver and bronze, but no evidence that they also exchanged Egyptian currency for imperial.[22] The lack of evidence is not that surprising if the act of exchange did not generate much documentation of the kind which survives (and, of course, the Delta is generally too wet for papyri to survive any way). Presumably it was also possible to exchange Egyptian coinage back into imperial when leaving, and any surplus after internal expenditure was available for repatriation to Rome or for transfer to other provinces.

Archaeometallurgy has yet to shed light on the specific sources of bullion used for coinage in Egypt. The closed currency system implies that a significant source was imported denarii and possibly other provincial silver coinages, but that has yet to be demonstrated by analysis. The episodic nature of metal supplies implied by the metallurgy of some provincial silver coinages might suggest difficulty in finding regular sources of raw materials. As we learn from the work of Katia Schörle and in contrast to the usual assumption, Egypt did have some native sources of silver.[23] Silver mining in the Eastern desert is attested by papyrological evidence from the late

[21] Austin 1981: no. 238; Bogaert 1994.

[22] Bogaert 1994: 8-12; 77-93 on contracted private banks engaged in money changing for the public. Note in particular that there were banks specifically designated as *kollubistikai trapezai*, but exchange was not confined to them. Alexandria is the only place where the number of records of exchange banks exceeds those for other banks, but they are recorded for almost all nomes.

[23] Schörle, this volume.

New Kingdom (1307–1070 BC) and ore samples do yield silver. Nonetheless, archaeological evidence for silver mining in the Roman period remains inconclusive so there is little basis for assuming that it made a significant contribution. Of course, there may well have been transfers of silver, in coin or bullion, from the surplus in other provinces.

From the economic point of view it is crucial to know whether or not Roman imperial gold (aurei) circulated in Egypt too. No finds of individual gold coins appear to have been recorded, but this may simply reflect the inadequacy of recording finds in general.[24] For the East as a whole we lack any useful synthesis of individual finds of gold coins such as is now available for significant areas of the west.[25] Eight gold hoards have been recorded from Egypt prior to the fourth century with terminal dates ranging from AD 156/7 to the 290s.[26] That is not many, and it is possible that such gold was being used as a store of wealth rather than a circulating medium. In any case, gold presumably moved through Egypt to India, where it is found in some quantity (although generally at an earlier date than the hoards recorded from Egypt).[27] But this smacks of special pleading. Gold hoards are not common from any province, despite the fact that it is clear that gold was the major component of the currency *by value*.[28] It is theoretically possible to operate a major monetized economy without gold – as Rome itself had effectively done before 46 BC and Parthia still did – but it is a little hard to imagine Alexandria in particular, as the maritime centre of the eastern Mediterranean, doing so in the context of a wider Roman world where gold was prevalent. Most scholars now tend to think that gold did circulate in Egypt under the principate, as it had earlier under the Ptolemies and was to do again once Egypt was incorporated into the imperial currency system from the time of Diocletian.[29]

Coordination of production

Accounts of other periods have identified a degree of coordination of minting between provinces: the switching of production of silver coinage from one province to another and 'cooperation' between provinces in production.[30] In the Flavio-Trajanic period there was clearly some joined-up thinking about production (production at Rome and other places – Antioch, Alexandria etc. – for distant regions). This justifies a joined-up approach to the subject. What evidence is there of such coordination in the Antonine period?

To answer this requires paying attention to the dog that didn't bark. What is most striking is that there are no cistophori in Asia after a major re-coinage under Hadrian, no tetradrachms in Syria after major issues (probably also to some extent a re-

[24] Christiansen 2002.
[25] Bland and Loriot 2010 with references to other regions therein.
[26] Christiansen 1985: 87; Christiansen 2004: 46–48.
[27] Presumably some gold went by caravan via Palmyra too.
[28] Von Kaenel 1999: 373–4; Duncan-Jones 2003; Kemmers 2006: 144.
[29] Rathbone 1996: 326; Rathbone 1997: 190; Burnett 2005: 264; Andreau 2005: 332.
[30] Butcher 2004: 248-50; Burnett 2005: 271–4; *RPC* vol. 2: 10.

coinage) under Trajan and an early issue for Hadrian (*c*. 119),[31] and no silver from Caesarea from AD 140 until 175, apart from an exceptional issue between 162 and 166. It is highly instructive that this exceptional issue was on a major scale, and despite its Cappadocian form, was probably struck at Rome to finance the wars against Parthia and Armenia.[32] Silver coinage does emerge again in small quantities at the end of the reign of Marcus in Syria and Cappadocia, but never again in Asia.[33]

There are other sporadic minor silver coinages, but this major hiatus in the three prolific provincial silver coinages outside Egypt is a significant phenomenon.[34] There are two obvious explanations. Either earlier coinages were deemed sufficient – certainly the Hadrianic recoinage in Asia and the Trajanic issues in Cappadocia and Syria were substantial. Or a decision was taken not to produce major series of provincial silver. Any such decision to focus on the production of imperial silver might have been motivated by the need to conserve silver for imperial issues or by a (temporary) shift towards a model of imperial-only silver coinage as a matter of principle.

Such an hiatus is not apparent in Egypt, except for AD 170/1–179/80, but the situation in Egypt was different. Egypt operated a closed currency system so it is likely that production was driven in part by merchants and others arriving at Alexandria with silver coinage of other types which they needed to convert.

Coordination needs to be seen as about more than minting. It is about money too. It was a major thesis of Christiansen that the large-scale re-minting of Egyptian silver to a lower standard under Nero was motivated by the need to send huge quantities of silver to Rome to pay for Nero's visionary redevelopment of the city following the Fire. So it is clearly important to view the coinage of Egypt in the context of the finances of the empire as a whole.

Context

The key context is one of sustained external pressures during the reign of Marcus, exacerbated to an unknown extent by the Plague, which presumably resulted in a reduction in the tax base.

161	Parthian invasion of Armenia and Syria
162–6	Verus' Expedition against Parthia
165–	Plague: first attested at Nisibis and Smyrna in 165, in Rome by 166, in Egypt 166/7?
167	Germanic invasions into Pannonia

[31] Walker 1978 (vol. 3): 124; Butcher 2004: 90 suggesting a re-coinage of older coin with a higher silver content; 134 fig. 42; 136 'The hoard evidence suggests that Trajan's tetradrachm coinage was the only significant one during the second century.'; 246; 255 a limited re-coinage connected with debasement.

[32] Metcalf 1996: 78; but see the note of caution by Butcher 2004: 247.

[33] There is no good reason to suppose that the so-called 'Severan cistophori', minted from 198 and ending before 202, are cistophori or that they were minted in Asia, see Metcalf 1988.

[34] For the other silver coinages, see Walker 1976–8.

168–75	First War against the Germans
170	Invasions of Italy (or 171?) by the Marcomanni, of Greece and Balkans by the Costoboci[35]
171	Raids on Spain and N. Africa by the Mauri[36]
171–2	Revolt of the Boukoloi, who advanced on Alexandria: presumably a major revolt across the Delta, the seriousness of which is evident from the need for intervention by Avidius Cassius as governor of Syria[37]
175	'Revolt' of Avidius Cassius
177	Wave of invasions of Spain and North Africa
178–80	Second German expedition

Alongside military pressures we have to reckon with a systemic decline in the supply of gold and silver bullion.[38] Both external trade and subsidies beyond the borders, which increased from Marcus Aurelius onwards, will have resulted in the loss of bullion. There will also have been a significant decline in new bullion from the mines.[39] This seems to be confirmed by data for pollution levels, although the more scrutiny this is put under the more its interpretation looks problematic, and, strictly speaking, it presumably shows a decline in refining in general, including recycling.[40] This kind of evidence would be particularly important if Crawford is substantially right about new imperial coinage coming to a significant degree from new bullion.[41] This is a view which requires testing by analysis of the coins themselves, and it is important to remember that the picture may well be different in different periods. In fact it appears that the recycling of old denarii into new coin begins under Nero.[42]

It is possible that one cause of the decline in bullion was that the putative flooding of mines caused by the failure to operate hydraulic systems during the Plague could not be reversed, although it is worth noting that better documented mortality crises fail to show association between mining activity and epidemic disease.[43] In some cases long-standing mines may simply have become worked out or uneconomic. Of course we should not expect the pattern of decline to be a simple downward trend: we have to reckon with the switching of the focus of extraction to new areas, notably in the Balkans, and the possibility of a change in model from a few large-scale mining

[35] Birley 1987: 163ff, unless Italy was invaded in 171 (p. 168).

[36] Birley 1987: 168.

[37] Alston 1999. Dio LXXII, 12, 4: they came near to capturing Alexandria. Frankfurter 1998: 206–9: depredations already in 166/7, and suggests the key is the distraction of the army (cf. the revolt of the Jews the last time the army had been on the Persian front under Trajan).

[38] Howgego 1992.

[39] Wilson 2007. Note in particular that the hydraulic mines of NW Spain were worked from Augustus to the late second–early third century (Wilson 2007: 113); Rio Tinto collapsed *c*. 160-70; the Dacian mines were prey to the Marcommanic invasion of AD 167: Wilson 2007: 110.

[40] For the problematic interpretation of the data see Friedman, this volume. For the recycling of denarii see Butcher and Ponting, this volume.

[41] Crawford, this volume.

[42] Butcher and Ponting, this volume.

[43] Wilson 2009: 78; Greenberg 2003: 419. Loss of key technical personnel might also have been an issue.

operations to many small-scale enterprises, which might be hard to detect in the archaeological evidence.[44]

One result of declining overall supplies of bullion is likely to have been a redirection of spending from civilian to military priorities,[45] but the combination of a declining supply of silver and the need for military expenditure is a classic context for debasement of the coinage. Walker's work suggests that debasement does indeed tend to correlate with periods of high expenditure, although chronological revisions mean that correspondence is not as neat as it once appeared.[46] An alternative, or possibly supplementary, explanatory model, long advocated by Lo Cascio, is that readjustments of intrinsic or face values were designed to maintain fixed relationships between gold, silver and bronze in the face of fluctuating bullion values.[47] Others flatly deny any validity to this model.[48] It remains hard to test in the absence of reliable series of bullion prices. The fluctuating silver content of both the denarius and provincial coinages (particularly that of Alexandria), with debasements sometimes followed by improvements, lends some weight to the notion that the changing costs or availability of raw materials might have influenced their proportions in the coinage. So the picture may not be a simple one, but some correlation between expenditure and debasement does seem established.

The trajectory of the denarius will presumably have been a significant context for the development of the Egyptian tetradrachm, given their parity of value, the need to exchange one for the other, and the assumed requirement for the mint to produce tetradrachms from denarii. New silver analyses for the second century await publication, but we can assume that the fineness of the denarius remained relatively stable in the Antonine period, with debasements under Pius in 155 and possibly under Commodus, but nothing major until Septimius Severus.[49] The timing of the debasement in 155 is something of a surprise, and raises questions about stresses, particular or systemic, during the reign of Pius.[50] Declines in the weight standard were another way of reducing the silver content of the coins, and so need to be read alongside debasement (Table 1).[51]

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[44] Balkans: Mladenović, this volume; shifts in focus of production and increased prevalence of small-scale units of production: Edmondson 1989.

[45] Wilson 2009: 81.

[46] Walker 1978 (vol. 3): 138. Chronological revisions: debasement under Otho (AD 69) rather than Vespasian (AD 70): Butcher and Ponting 2009; debasement under Trajan in AD 100 rather than AD 107: Woytek 2007; Antonine period: debasement in AD 155 and possibly under Commodus: see below, n. 49.

[47] Lo Cascio 1981: 85: 'It was particularly by … the adjustment of the weight and fineness of an entire issue that the Roman government tried, mostly with success, to counterbalance the negative effects on the coins of a changing ratio between the metals'. Lo Cascio 2007: 629.

[48] Rathbone 1996: 324 n.12.

[49] Silver content based on unpublished analyses by Butcher and Ponting.

[50] Butcher 2004: 39 detects hints of conflict with Parthia under Pius on the basis of coinage in Syria, and the iconography of the Egyptian coinage under Pius is surprisingly warlike (see below).

[51] Weights are based on the data in Woytek et al. 2007: 157 (96 to the pound, that is c. 3.41g, for Trajan); Duncan-Jones 1994: 225; detail 219–23. Contrast the apparent continuity of decline in silver standards pictured by Duncan-Jones 1994: 229 fig. 15.7. The general impression he gives is of a much more smooth and mathematical decline in the number of denarii per pound of silver than is adopted here. He was mostly using Walker's results, and his own data for weights.

Table 1. The denarius in the Antonine period

Fineness	
To 155	80%
155–	70%
180–	67% (probably the 70% standard with poor control)
Weight	
To 180	3.4g
180–	3.2g
187–	2.8g

The silver coinage in Egypt

We turn now to the coinage of Egypt itself. Egyptian tetradrachms from Tiberius onwards were composed mainly of copper with silver added. Under the Julio-Claudian and Flavian emperors their silver contents were fairly close in weight to that of contemporary denarii.[52] However, there was clearly no rigid adherence to a single fineness over time, with minor changes in silver content occurring from one issue to another, or from one year to another. Between Nero and Hadrian the standards varied between about 12% and 20% fine. This means that some years witnessed debasements, and other years saw improvements, with no downward trend in silver content over this period. Given the episodic patterning of trace elements (see below), such annual fluctuations might be connected with problems of supply or production costs.

The pattern for the period from Nero to Hadrian continues under Antoninus Pius and the first years of Marcus, with annual fluctuations between about 14% and 20% fine (with a couple of higher outliers).[53] Then there is then a dramatic debasement to about 4–5%, which appears to have its beginnings in AD 164/5 and to take hold in 167/8.[54] The standard then recovers to about 8–10% from 169/70. The new standards might have been conceived as a quarter and then a half of the old standard (Fig. 1).

[52] Butcher and Ponting 2005.

[53] The higher figures in Verus years 1 and 4 are probably the result of internal corrosion pushing up the silver content.

[54] Milne 1971: 61 no. 2512, the coin of Marcus year 5 (AD 164/5) with the silver bullion reading of 5%, is certainly genuine. It was acquired by Milne and is labelled as from Tell el-Maskhuta (Heroonpolis). It presumably came from one of the hoards purchased by Currelly and Frost from 'native diggers'. Its trace elements are consistent with the other coins analysed, indeed it is a close match for a coin of year 7 (AD 166/7). Weight, die-axis, fabric and style are all fine, and it is certainly struck rather than cast. The coin shares obverse and reverse dies with *BMC Alexandria* 1279. The dies are positioned differently on the flans on both coins and wear differs, so any theoretical possibility of one being cast off the other or from a joint model can be excluded.

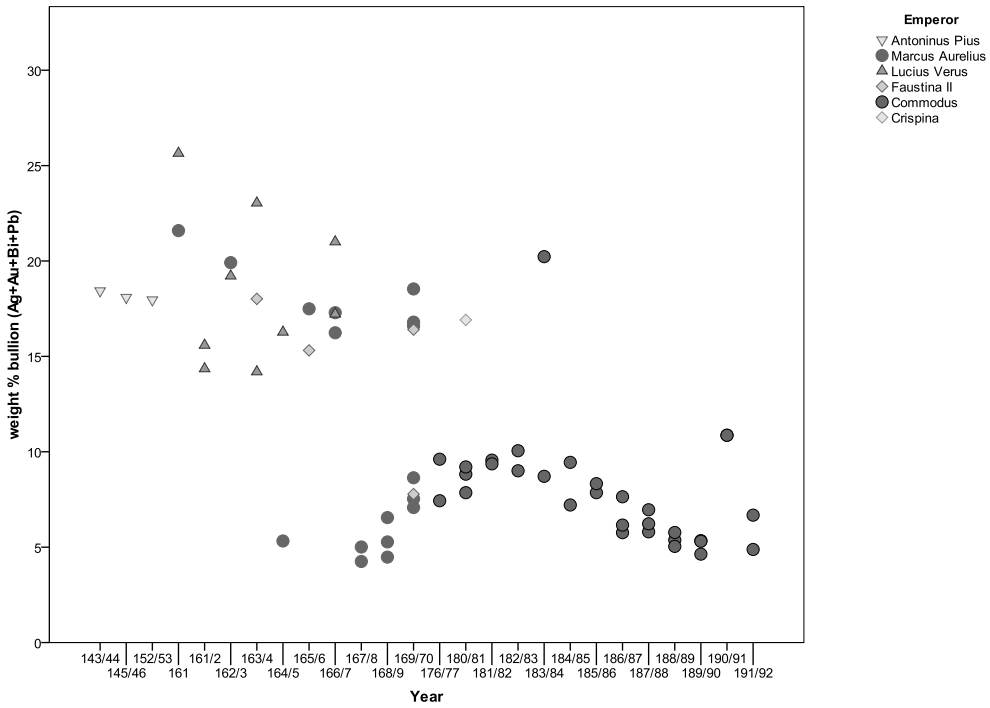

Fig. 1. The percentage of silver bullion in the Egyptian tetradrachm in the Antonine period (note that not all years are represented on the date scale)

What complicates this picture is that from AD 164/5 until 183/4 some coins were apparently still produced on the old, pre-debasement, standard of 14–20% in parallel with the new lower standards. This is not easy to explain. It cannot be the technical result of depletion silvering raising levels of silver right through to core of some coins, as the absolute readings for silver are too low for that and it would be highly implausible than any such a mechanism would consistently produce analytical results matching the old standard.[55] In theory the two parallel standards might reflect two organizational units (workshops or whatever) operating on different standards, but it is not easy to see any such division from the coinage itself.[56] One possibility is that the mint periodically re-coined batches of old tetradrachms resulting in issues of new coins on the old standard. Another possibility is that the mint was experimenting in this period. This is the first time that the Roman World had produced silver coinage debased to such a low level. In theory the mint at Alexandria had been operating close to the practical limits of depletion silvering for some time. The phase diagram for the

[55] For depletion silvering see Ponting 2009; Gitler and Ponting 2003: a silver-enriched surface zone was produced by oxidizing the copper in the alloy and then stripping the oxidized copper out of the alloy by pickling in dilute acid. The silver-enriched surface layer was then consolidated by striking. For what happens if depletion silvering reaches the core of some coins see Woytek 2007.

[56] If the Moneta type with some kind of monument in 162/3 may be taken to suggest a new mint building or organization (see below), there is the possibility that the old mint structure (whatever that was) continued in parallel. So parallel production is worth considering. The coinage does not seem to break into two groups on the basis of reverse iconography. If the groups of coins with high and low silver finenesses displayed a parallel division in trace elements or discrete sets of dies a case could be made. Neither looks very plausible on the basis of the evidence we have, but only more analyses and a full die study are likely to settle the matter.

copper:silver system indicates that an 8% minimum silver content is necessary for successful depletion silvering in binary alloys.[57] The addition of significant traces of lead, tin, or other contaminants may affect this slightly either way, as will the cooling gradient of the moulds used for casting the blanks. There is thus the possibility that the Alexandrian mint, being the first to reduce the silver content below the minimum needed for depletion silvering, needed to move to a different process. This second possibility opens up an interesting prospect for further research, but cannot be pinned down at the moment.[58] It is noteworthy that the Mint succeeded in keeping the coins struck on the lower standard to a more tightly controlled pattern than they had managed with the higher standard for most of the time.

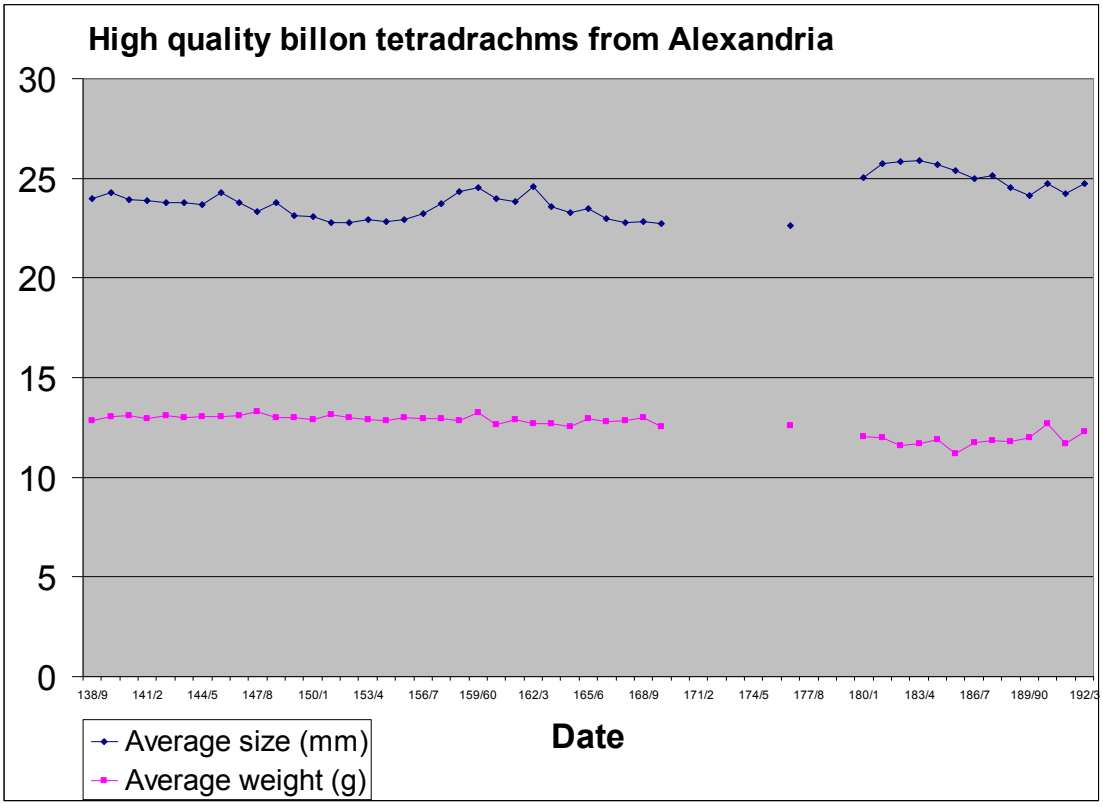

Fig. 2. Weights and diameters of Egyptian tetradrachms in the Antonine period[59]

The standard of about 8–10% remained in use until about AD 185/6 when it begins to drop back down to reach the 4–5% standard again by the end of the reign. This pattern is broken by a, possibly short-lived, improvement in AD 190/1 which looks real but again is not easy to explain. It might possibly be a case of the re-coining of earlier and finer coins. It may well be relevant that this improvement came in the year which saw

[57] For a description of the silver:copper system see Scott 2010: 32–36.

[58] No mercury peak has been detected during the analysis of the surfaces of these coins so far and so it seems unlikely that mercury (fire) silvering was used at this point.

[59] Source: Roman Provincial Coinage in the Antonine Period database. Only specimens for which both the diameter and weight are known have been included. All coins with an uncertain date have been excluded. In all about 200 coins have been excluded from a sample of about 4500. All the coins in the database are graded from 1 (best preserved) to 6 (most worn). In order to avoid average weights being lowered by significantly worn coins we have included only coins graded 1–3 in the calculation of weights.

the start of a dramatic and prolonged decrease in output after a decade of high production.[60] We simply do not know enough about how the mint operated to understand quite what is going on. It would certainly be important to obtain new analytical data for the following years before trying to come to a view.

The silver content of the coinage was a function of fineness and weight (Fig. 2). In general the Egyptian tetradrachm drifted down slightly in weight, perhaps to match the circulating medium which was slowly succumbing to the effects of wear. There was a reduction in weight in AD 169/70 (from 12.9 to 12.5 g) and a more significant one on the resumption of minting in 180/1 (down to 11.9 g). Both will have had an impact, as 169/70 was a year of high output, as were the years of Commodus' sole reign in general (see below).

We adopt the following approximate assumptions in order to make broad-brush comparisons with the denarius (Table 2):

Table 2. The Egyptian tetradrachm in the Antonine period (simplified)

Fineness	
To 167	18%
167/8–168/9	5% (earliest evidence 164/5)
169/70–	10%
185/6–	declining to 5% by end of reign
Weight	
To 169	12.9g
169/170	12.5g
180/1	11.9g

We are now in a position to compare the silver content of the tetradrachm with that of the denarius (Table 3).

Table 3. Comparison of the silver (g) in the Egyptian tetradrachm and the denarius in the Antonine period (simplified)

	Tetradrachm			Denarius		
To 155	18%	12.9g	2.3g	3.4g	80%	2.7g
155–	18%	12.9g	2.3g	3.4g	70%	2.4g
To 167	18%	12.9g	2.3g	3.4g	70%	2.4g
164/5, 167/8–168/9	5%	12.9g	0.6g	3.4g	70%	2.4g
169/70–	10%	12.5g	1.3g	3.4g	70%	2.4g
180/1	10%	11.9g	1.2g	3.2g	67%	2.1g
185/6– decline to:	5%	11.9g	0.6g	2.8g	67%	1.9g

The key feature is that the Egyptian tetradrachm had less silver in it than the denarius throughout, although between AD 155 and the debasement in Egypt they may be regarded as broadly equivalent given the quality of the data. The significant change

[60] For the clear hoard evidence for a decrease in output from 190/1 see the table at the end of Milne 1971. Compare the way in which an increase in silver content of the denarius in AD 82–85 was matched by a decrease in output: Carradice 1983.

came in 155, when Antoninus Pius lowered the silver content of the denarius from 80% down to about 70%, abandoning the old Neronian standard of fineness which had been in use for 90 years and which seems to have been the point of reference for Egyptian tetradrachms ever since Nero. This meant that the two coinages now had very similar silver contents. One implication is that the debasement of the Alexandrian tetradrachm would have been forced, sooner or later, by any further debasements of the denarius after AD 155. One could argue that since no further changes to the denarius are detectable until AD 180/1, we should perhaps search for something else that triggered the debasement of the tetradrachm, which began in 164/5 and took hold in 167/8. On the other hand it is possible that the additional costs of re-minting meant that the denarius and tetradrachm were already too close from 155 onwards. This will have been all too obvious if denarii were being turned into tetradrachms at the Mint.

So there was a monetary reason for a modest reform at Alexandria, but in the event the debasement was radical. It initially dropped the tetradrachm to a quarter of the silver of the denarius, and left it with only half as much silver as the denarius even after the recovery in 169/170 to 10% fine. A further decline took place from 185/6 onwards which took the tetradrachm back to the level of the nadir seen in 167/8–168/9.

Fig. 3. Comparison of the Egyptian tetradrachm flans for Nero (left), Commodus under Marcus (AD 177) (centre), and Commodus sole reign (right). The three images are to the same scale.

There was also an obvious change to the fabric of the coinage (Figs. 2; 3). From AD 180/1 onwards the flans are more spread but thinner. This strikes anyone looking at the material immediately. This may have been an attempt to return to the fabric of Nero. It is likely that substantial numbers of old coins were re-minted under Commodus to profit from the lower fineness (see below). It is possible that the change of fabric was intended to ease that process by making the new coins superficially the same size as the earlier coins for which they were being exchanged, although they are so base that the visual differences were probably all too apparent any way.

It would help to understand all these developments if we could learn more about how the mint obtained its bullion. Elemental analysis rarely permits the identification of specific sources of metal, particularly in cases where metals from different sources have been mixed, but it is possible to identify changes. Analysis of trace and minor

components suggests that the Alexandrian mint had not normally relied on any regular source for its copper and silver. Each successive issue tends to exhibit unique characteristics, although sometimes these characteristics are spread over two or three years.

The episodic nature of this procurement strategy is rather surprising given the apparently regular production of coinage at Alexandria, and stands in stark contrast with the mint at Rome, where patterns of supply tended to be much more homogenous. However, similar patterns of episodic procurement are apparent among other provincial silver coinages such as Syrian tetradrachms. This raises questions about the degree to which provincial silver coinages can be treated as 'imperial'. In their sourcing of raw materials they were quite different, indicating that supply and the mechanisms of supply at provincial mints, and perhaps production costs, were constantly changing. This suggests one way to describe where Roman provincial silver sat in the range between centralized and devolved. Direct imperial involvement by the centre may have been episodic.

Within the Antonine period there are complex changes to the concentrations of the various trace elements associated with both the silver and copper portions of the alloy. It is of considerable interest that some of these indicate a shift in the supplies of both copper and silver which correlates reasonably well with the debasement of the 160s.

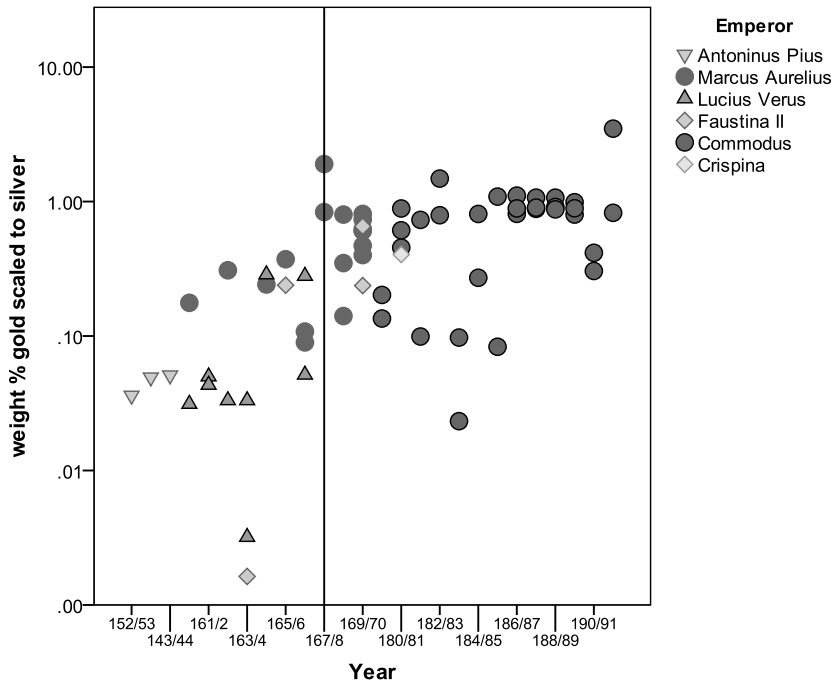

Fig. 4. Gold content scaled to silver in Egyptian tetradrachms in the Antonine period.

Timing is hard to pin down as there is some overlap between the old and new patterns. For the copper supply AD165/6 appears to be the crucial year in terms of transition from the old to the new source, although a few coins with the signature of the new compositional group are earlier (AD 161), and coins with the earlier composition are found later. For the silver supply, AD 167/8 appears to be the crucial year. From this year onwards the coins show an increase in levels of gold, matched by

a broadly contemporary increase in bismuth, which is probably best interpreted as the result of a significant change in silver source (Fig. 4).

The following period saw an increasing dependence on copper sources from the Near East and an increased recycling of base metal. The tetradrachms clearly show a gradual increase in the levels of arsenic and cobalt in the later issues (Fig. 5). Larger amounts of arsenic and cobalt are characteristic of copper from Near-Eastern in contrast to western sources.[61] A similar pattern is seen with nickel, antimony, and iron. So it is reasonable to infer a change to the use of Near-Eastern stocks, whether fresh or recycled.

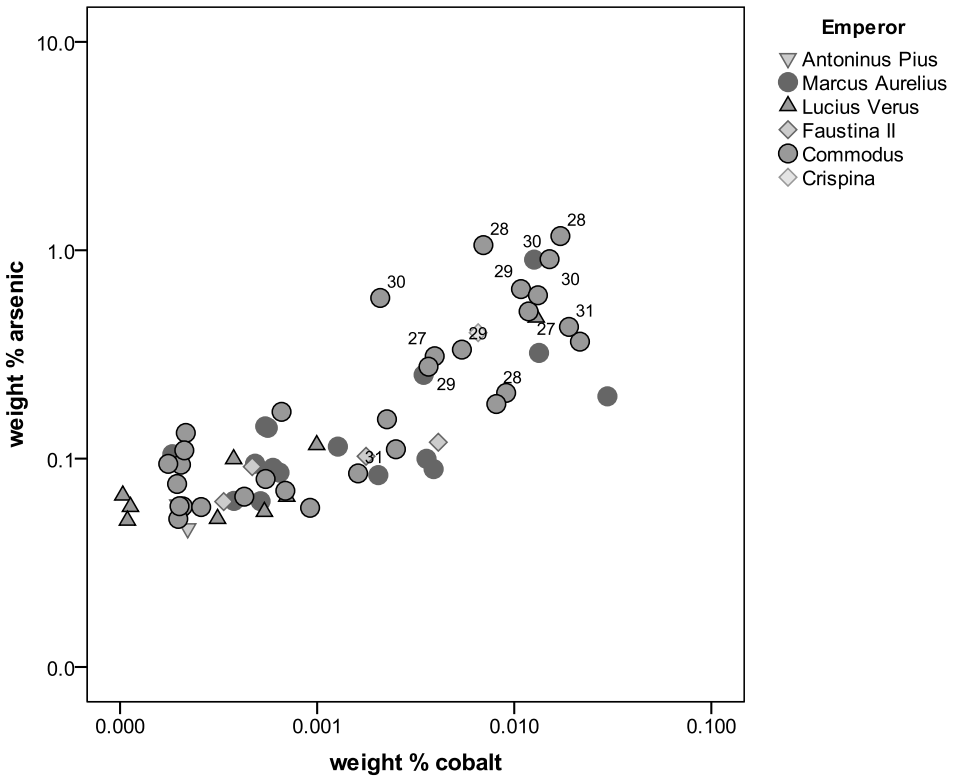

Fig. 5. Arsenic and cobalt in Egyptian tetradrachms in the Antonine period. The numbers on the plot are the regnal years of Commodus.

Tin and zinc show a general increase in their concentration in the issues struck after AD 166 (Fig. 6). These elements are strongly correlated with each other, which suggests that they were coming into the coinage together as part of an alloy. Zinc and tin were commonly alloyed with copper for both base-metal coins and other artefacts. The levels measured in the coins suggest the recycling of gunmetals rather than bronze or brass, and so from general metalwork rather than coinage.[62] What we are seeing is presumably a shift towards the use of increasing amounts of recycled metalwork from 166. The use of re-cycled base-metal represents a significant change

[61] There are a number of reports and publications that demonstrate the link between high cobalt/arsenic and Near Eastern sources; see Ponting 2002 for a discussion of some of these.

[62] 'Gunmetal' is a term used to describe a whole array of ternary and quaternary alloys of copper that contain varying amounts of tin and zinc – and in the case of quaternary alloys, lead as well.

in minting practice compared to earlier periods, where freshly smelted copper (presumably from Imperial mines) was usual.

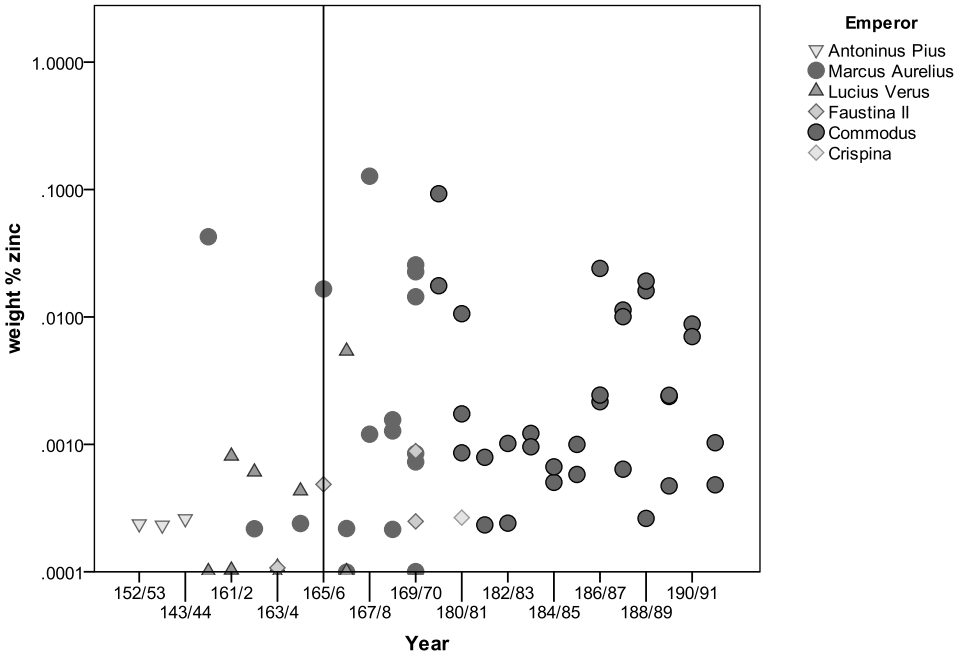

Fig. 6. Zinc in Egyptian tetradrachms in the Antonine period. The same picture is apparent for tin.

The general impression is of major changes to the composition of the coinage in the years following AD 166, with further changes in the 170s and 180s. Some of these changes may indicate a break-down in the normal processes of metal procurement, and their correlation with the debasement in the 160s is surely significant.

Production

Of course we need to look not only at what the mint was producing but also at how much it was producing. In default of die-studies we have two available approaches to estimating changes in relative levels of production: frequencies in the RPC database and in hoards. Unfortunately both data sets are subject to distortions, but to some extent they can be used as a control on each other.

The RPC database is based largely on the contents of ten major collections (Fig. 7). These data are likely to be heavily skewed towards years in which a larger number of types were produced as there will have been a tendency for each collection to obtain one of each type but to minimize duplication. The data are therefore potentially misleading as a guide to original production, especially as the number of types does not correlate well with output (in fact an inverse correlation has been suggested!).

Taken at face value the RPC data show a first spike in AD 163/4 at the time of the Armenian campaign – which may, or may not, be relevant – and a second spike for Commodus' sole reign in AD 189/90, which might reflect the re-minting of earlier tetradrachms. The hiatus from 170/1 to 179/80 is obvious, and is scarcely broken by the minor issue of silver in 176/7.

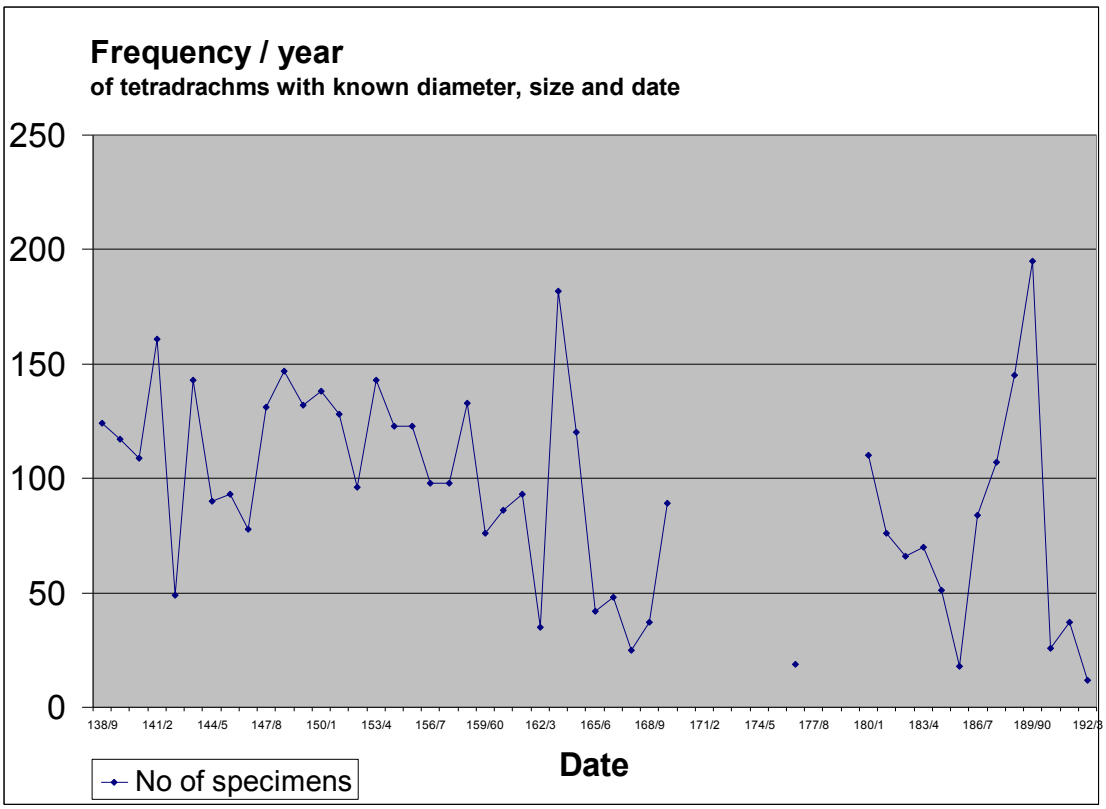

Fig. 7. Frequency of Antonine Egyptian tetradrachms by year in the RPC database

A generally more useful way of measuring relative output is occurrence in fully recorded hoards. The evidence for hoards was gathered by Christiansen in 1985. He subsequently published selective quantitative studies and a general treatment.[63] The analysis of frequency by Milne remains useful, as does his table of the contents of 21 hoards listed by year on which his analysis was based.[64] In theory hoard evidence should be adjusted for wastage rates. The longer before the burial date of any given hoard an issue was struck the longer that issue has had to be reduced by loss. No estimate is available for the wastage rates of Egyptian silver, although a normative figure of the order of 2% per annum looks realistic for denarii under the Roman Republic on the basis of hoard evidence.[65] No such adjustment has been made here, as it rather pales into insignificance in the face of a substantial distortion to the data in the middle of our period.

The combined evidence from hoards does give some idea of relative output but is heavily skewed by the predominance of large late hoards.[66] The effect of skewing can be seen by comparing the figures from all hoards (including Karanis) with those from the comparatively late group of hoards from Karanis alone (hoards ending from AD 257/8 to 295/5, with only one statistically-negligible small hoard ending with Nero)

[63] Christiansen 1985; 1988 also with a list of hoards vol. 2: 92–3, table II; 2004.

[64] Milne 1971: xix–xxv based on 21 hoards listed in his table at the end.

[65] Lockyear 2007.

[66] Christiansen 1985: 81 table 1A list the representation of emperors in the 68 complete hoards from Egypt. Christiansen 2004: 176–7 presents similar information from the late vantage point of the hoards from Karanis.

(Table 4). The Karanis hoards effectively exclude the finer coins before the debasement under Marcus, as they had been taken out of circulation by then. This is easiest to see from the change in the relative percentages for Nero and Commodus between the two sets of data. The all-hoards data set has 12.2 times more coins of Nero than of Commodus, but the Karanis data set reverses this with 3.9 times more coins of Commodus than of Nero.

Table 4. Frequency of Egyptian tetradrachms by emperor in hoards

	All hoards (%)	Karanis (%)
Nero, for comparison	15.10	0.14
Trajan	0.35	0
Hadrian	2.89	0.06
Antoninus Pius	0.95	0.08
Marcus Aurelius	0.36	0.05
Commodus	1.24	0.55

The difficulty of tracing relative productivity from hoards across the debasement within the Antonine period can be seen more clearly from marked contrasts in the proportions of Antonine emperors in two individual hoards, Milne Hoard VI which closes in 190/1 and Milne Hoard XI which closes in 259/60 (Table 5):[67]

Table 5. Antonine Egyptian tetradrachms in Milne Hoards VI and XI

	Hoard VI (number)	Hoard XI (number)	Hoard VI (% of Antonine)	Hoard XI (% of Antonine)
Antoninus Pius	139	89	81	16
Marcus and Verus	11	92	6	16
Marcus sole reign	5	66	3	12
Commodus sole reign	17	316	10	56

The effective withdrawal of the earlier and finer coins has resulted in the later hoard (XI) under-representing the coins of Pius and over-representing the coins of Commodus in relation to original production, but the earlier hoard does not unproblematically convey an idea of production either. Again some more limited withdrawal of the earlier, finer, coins is likely to have taken place before it was deposited. On the other hand, since it closes before the end of the reign of Commodus his coins may be under-represented as well, both because some had not been struck and because it takes time for coins of any given issue to become fully integrated into circulation.

[67] A graph comparing Hoard XI with Hoards VI and XVII suggests that Hoard XI may be reasonably typical: Duncan-Jones 1996: 133 using Milne 1971: table at end Hoards VI (to AD 190/1, n (Marcus only) = 16); XI (to AD 259/60, n (Marcus only) = 158); and XVII (to AD 276/7, n (Marcus only) = 19).

The major cause of withdrawals is likely to have been re-minting, although the finer coins might also have been differentially hoarded earlier and lost if the hoards were not recovered. Withdrawals of coin can be very precise, as was the case with the early removal from circulation of the finer denarii of Domitian produced between AD 82 and 85,[68] but in other situations they might have been less technical and mapped onto actual silver contents less well, for example by removing all coins which 'looked silver' or all coins of certain emperors. It is not easy to see how to adjust hoard figures for such episodes to obtain an accurate estimate of original relative production. It would help to be able to compare the number of dies used, but no die-studies have been performed.

That said, there is no particular reason to doubt the picture derived from hoards for sequences within reigns where there has been no change in silver contents, especially when the frequencies in the RPC database and the hoards are in broad agreement and so can act as a control on each other (Table 6). So a low output in AD 162/3 followed by a high output in 163/4 and 164/5 seems assured, as does low output from 165/6 followed by higher output in 169/70. The data sets disagree for 168/9. The debasement, beginning in 164/5 and taking hold in 167/8, means that it is difficult, and possibly unwise, to draw conclusions from hoard data about relative outputs either side of that date. So the RPC data suggests the peak in 163/4 was higher than that in 169/70, whereas the late hoard has it the other way around.

Table 6. Frequency of Egyptian tetradrachms of the 160s in the RPC database and Milne Hoard XI

	RPC	Hoard XI
Marcus Aurelius and Lucius Verus, year 1 = 161 (part year)	86	2
Marcus Aurelius and Lucius Verus, year 2 = 161/2	93	4
Marcus Aurelius and Lucius Verus, year 3 = 162/3	35	0
Marcus Aurelius and Lucius Verus, year 4 = 163/4	182	30
Marcus Aurelius and Lucius Verus, year 5 = 164/5	120	16
Marcus Aurelius and Lucius Verus, year 6 = 165/6	42	3
Marcus Aurelius and Lucius Verus, year 7 = 166/7	48	5
Marcus Aurelius and Lucius Verus, year 8 = 167/8	25	4
Marcus Aurelius and Lucius Verus, year 9 = 168/9	37	28
Marcus Aurelius, year 10 = 169/70	89	60

A straightforward reading would see the peaks as reflecting the influence of the war in the East and then of higher production a year or so after the debasement had taken hold. Such readings may be substantially true, but are not beyond question. For example, the earlier peak might equally reflect a reorganisation of the Mint in AD 162/3 (see below).

From hoard evidence it is clear that the output of silver was high under Commodus. Again comparisons across the debasement are problematic owing to skewing. Milne – presumably basing his view on the raw annual figures in his hoard tables – stated that the issue of tetradrachms under Commodus soon developed to a larger output than had been made at Alexandria for over a century.[69] It does seem clear that annual output was larger than it had been at least since Hadrian or was to be again until at

[68] Carradice 1983: 59; 68–70; Carradice and Buttrey 2007: 258–60.

[69] Milne 1971: xxii.

least the reign of Severus Alexander.[70] It is likely that production was underpinned by a re-coinage of earlier, finer, coins to the new lower standards. It has already been suggested that the increase in diameter of the coins may have been intended to facilitate the exchange of old for new.

Such re-coinage as there was under Commodus was not complete and did not succeed in replacing the bulk of earlier coinage. The hoard evidence is very unsatisfactory from 170 until 260, so that our picture might be overturned by new evidence, but it appears that tetradrachms of Nero continued to be substantially represented in hoards until about 260. It is only after the more effective withdrawal of the earlier and finer coins around 260 that coins of Nero mostly disappeared.[71] The same withdrawal affected the coins of Antoninus Pius.

The impact of re-coinage under Commodus will have been limited by its incompleteness. Christiansen speculates that some of the silver gained from exchanging old for new was used for the production of denarii by Pescennius Niger and Septimius Severus during the ensuing conflict in the East.[72] It is worth bearing in mind that denarii were indeed struck at Alexandria under Commodus, Pertinax, and Septimius Severus.[73]

Hiatus

The hiatus in the production of billon from Marcus year 11 to 20 inclusive (AD 170/1 – 179/80) requires consideration. It was broken only by relatively small issues for both Marcus and Commodus in year 17, which marked the promotion of Commodus to be joint emperor in 177.[74] The break was not forced by an inability of the mint to operate. The production of bronze continues in each year.

It is notable that the hiatus in the silver was so strong that key events were not marked on the silver. So the imperial visit to Egypt by Marcus, Commodus and (possibly) Faustina in the winter of AD 175/6 was reflected in Egypt only in the bronze issues of 174/5 (in anticipation) and 175/6, but not on the silver.[75] The key point here is that the hiatus was so marked that even an imperial visit failed to bring forth a silver coinage. The same point applies in respect of the promotion of Commodus as Caesar. He appears on imperial coins in 175 and on Alexandrian bronze (in connection with the visit) already in 175/6 as *Princeps Iuventutis*, but not on Alexandrian silver until already Augustus in 177.

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[70] Christiansen 2004: 108 discusses the representation of coins of Commodus in hoards.

[71] Christiansen 1985: 82 table I B for the duration of coins of Nero in circulation. So a hoard from Alexandria ending in AD 260–1 (n = c. 1300) goes back only to Vespasian and has 20% Commodus (Christiansen 1985: 111 Hoard A92). Karanis Hoard 1 ending in AD 268/9 (n = 860) is 5.28% Commodus but has no coins before Marcus Aurelius. Hoards ending 20 years after that still have a similar percentage: Karanis Hoard 30 AD 288/9 (n = 659) has 6.6% Commodus. See Christiansen 2004: 169-78 on the Karanis hoards.

[72] Christiansen 1985: 301.

[73] Bickford Smith 1994/5: 54.

[74] For the small scale see Milne 1971: table at end.

[75] The significance of the important evidence for the visit will be assessed by Howgego elsewhere.

The question is: How serious was the hiatus from 170/1 – 179/80? Silver had been produced in every year since the start of Hadrian's reign so the break is notable. On the other hand, in the longer view the hiatus looks less exceptional. An earlier pattern of sporadic production was replaced by one of continuous production only from the reign of Trajan, as Burnett has described.[76] Both the Flavian period (after an initial burst at the start of Vespasian's reign) and the Severan period are notable for very low output and/or significant breaks.[77] It is presumably relevant that both these periods followed bouts of exceptionally high output. By contrast the hiatus under Marcus did not follow exceptionally high production. It also followed a debasement after which one might expect a high output to gain from the re-coinage of older finer tetradrachms. So the hiatus may be a sign of distress, but one cannot put too much weight on it.

Such an hiatus might in principle cause disruption if insufficient coins were available for exchange. It is tempting to compare the distress caused when the system broke down in the Ptolemaic period (although this is about gold).

> 'The foreigners who come here by sea, the merchants, the forwarding agents and others bring their own fine local coins…to get them back as new coins, in accordance with the ordinance which instructs us to take and mint them…. The men are furious since we refuse (the coins) at the banks…and they cannot send (their agents) into the country to purchase merchandise, but they say their gold lies idle and that they are suffering a great loss, since they brought it from abroad and cannot easily dispose of it to others even at a low price…'
>
> Austin 1981: no. 238; 258 BC

But on the assumption that merchants and others arriving in Egypt could still exchange their denarii (or whatever) for older tetradrachms, lack of new production might not have been problematic. It may reflect a decision to do something else with the imperial coinage which was arriving, for example sending it to finance military activity elsewhere.

It is possibly significant that the hiatus is matched by an almost total cessation of the minting of civic bronze in Palestine and Transjordan from c. AD 166/7 to 175/6, where cities started striking, or resumed minting, following the imperial visit.[78] Likewise no coins seem to have been struck in northern Syria between 169 and 177.[79] This has been interpreted as evidence for effects of the Plague. It is not an exact parallel, however, as in Egypt the production of bronze continued throughout.

Iconography and Inscriptions

It is perhaps worth looking briefly at what the coinage has to say in a more literal sense about some of the key themes with which we are concerned here: war, plague, revolt, and the mint itself.

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[76] Burnett, this volume.

[77] Flavians: *RPC* vol. 2 p. 320; Severans: Christiansen 1988.

[78] Gitler 1990–1.

[79] Butcher 2004: 40.

War

War is certainly an important feature of the iconography, but few of the issues specify the location in words. Victory titles were not used on the coinage of Egypt in the Antonine period, although there had been instances earlier (for example, Domitian was – rarely – styled *Germanicus*). Only two regions are identified by name, both on the reverses: Armenia in AD 164/5 and, remarkably, Britain under Commodus in 185/6 (Fig. 8).

Fig. 8. Tetradrachms of AD164/5 celebrating victory over Armenia (above) and of 185/6 (below, from plaster cast) celebrating victory over Britain.

The British War was the most serious of Commodus' reign according to Dio.[80] It had been provoked by tribes crossing the wall and killing the governor. The title *Britannicus* had in fact been taken in AD 184.[81] A scatter of references to Britain on coinage in Egypt may betray a fascination with the other end of the world.[82] It may, or may not, be relevant that 185/6, the year in which the victory over Britain was commemorated, saw the start of a decline in the silver standard of the Egyptian tetradrachm which took it back to the nadir of the 160s. How financially draining was this war and its aftermath? It was followed by a mutiny of the troops in Britain, which led to the downfall of the praetorian prefect in Rome and to the appointment of

[80] Dio LXXIII, 8.
[81] Birley 2000: 187–9.
[82] Burnett 1991: 29–30; Bland 1996: 126–7.

Pertinax, the future emperor, as the governor of Britain.[83] There was also a revolt in Germania Superior in AD 185 – 6.[84]

More generic warlike types on the coinage of Egypt in the Antonine period include scenes with trophies, emperors with foes or captives, emperors in triumphal quadrigas, Nike crowning the emperor, Ares with Nike, Eagle between vexilla or aquilae. There is a reasonable presumption that generic types of Nike (standing, advancing, flying, and busts) need not reflect specific victories claimed, whereas unusual types are more likely to do so.[85] The coins may be a year or so later than the events to which they allude. As we have seen, the title *Britannicus* was taken by Commodus in AD 184, whereas reference to Britain on Egyptian coinage is found in 185/6.

In many cases warlike types do seem to reflect actual wars and victories claimed, rather than generic triumphalism, so that unexplained instances deserve further thought. In this context it is perhaps worth remarking that there are a surprising number of warlike types under Pius,[86] given the general impression of the absence of warfare during his reign.[87] His acclamation as IMP II in 142 was the only such title he took, but this may be in part due to a conscious decision to present the reign as peaceful.[88] Greater than acknowledged levels of warfare might possibly suggest a way to understand the debasement of the imperial silver coinage under Pius.

Looking at the period as a whole, one cannot help but be struck by the sheer variety, novelty, and emphasis of types reflecting successes in the war against the Parthians (AD 162–6) on coinages in Egypt from 164/5 to 167/8.[89] The Parthian invasion of Syria must have been a cause for real concern. It is also worth remembering that the triumph on 12 October 166 was the first for nearly fifty years.

Plague

By contrast with glorious war, there is no obvious reflection of the Plague on the coinage. Hygieia is found, in company with Asklepios, only in AD 141/2. Asklepios is

[83] Birley 2000: 187–9; Hekster 2002: 62–4; for possible effects within Britain see Fulford 2000: 566 (destruction of forts); 570 (construction of town defences).

[84] Hekster 2002: 65–7.

[85] Compare the discussion by Burnett 1991: 29.

[86] Warlike types under Pius in AD 143/4, 144/5, 146/7, 147/8, 154/5, 156/7, 157/8?, 158/9, and 160/1.

[87] Birley 2000: 149 'The very absence of warfare and the prolonged calm of Antoninus' reign . . .'.

[88] Apart from Britain, we hear of trouble in Dacia, kings assigned to the Armenians and the Quadi (on the middle Danube), both on coins of 140–4, and a Moorish uprising, which peaked in 145. *SHA Antoninus Pius* 10, 4–5 lists wars and rebellions; cf Birley 1987: 61; 86 notes that Aelius Aristides may imply a minor revolt in Egypt; 113 that there was trouble in Britain in the second half of the 150s: IMP II was used again on the coinage, possibly masking a withdrawal as Hadrian's Wall was reoccupied.

[89] Verus was the commander-in-chief of the Roman armies. In 164, REX ARMENIIS DATVS. Verus adopted the military titles of *armeniacus* (163, Artaxata captured), *parthicus maximus* (165, Ctesiphon and Seleuceia captured) and *medicus* (166, advance across Tigris into Media). Marcus Aurelius adopted the titles with some delay: *armeniacus* (164), *parthicus maximus* (166) and *medicus* (166). IMP II (163), III (165), IIII (166). Triumph on 12 October 166, the first for nearly fifty years: Birley 2000: 165; Birley 1987: 149.

a fairly frequent type under Pius, but is not found under Marcus except for a rare issue for Lucilla in 168–169 which cannot carry any weight.[90]

Revolt

Nor does there appear to be any numismatic sign of rebellion in Egypt. This is not surprising in relation to the uprising of the Boukoloi, probably a major revolt across the Delta, but the silence is deafening in relation to Avidius Cassius and demands explanation.

'The rebellion is puzzling' (Birley).[91] Indeed it is. Although the motives and organization of the 'revolt' are obscure, it does seem to be agreed that Avidius Cassius proclaimed himself emperor and took control of all the region south of the Taurus. A document in Egypt of 3 May (175) is dated by his first regnal year. A letter written before 23 April, by a writer convincingly identified as Cassius by Bowman,[92] announces his impending arrival in Egypt. We do not know if the visit actually took place. The writer describes Alexandria as his native city. Cassius may have been born there. His father was governor of Egypt,[93] and his daughter was named Alexandria.[94] An edict of the prefect of Egypt instructed people to rejoice at his accession. Avidius Cassius was killed by a centurion, probably sometime in July. His 'dream of empire' is said to have lasted three months and six days.

Why, then, is there no numismatic trace of Avidius Cassius in Egypt (or anywhere else)?[95] Were coinages, if any, fully withdrawn? Surely not plausible. It is true that there is no coinage for Antonius Saturninus, who revolted at Mainz in AD 89 under Domitian. But that was a brief and ineffectual affair of uncertain intent.[96] One would certainly have expected a coinage for Avidius Cassius if he really had been intent on claiming rule for himself against Marcus and in effective control of the East for three months. Most of all one would have expected a coinage at Alexandria. Minting there was a priority: it was the only mint apart from Rome to strike for Galba, Otho and Vitellius, and it continued to strike for short-lived emperors into the third century (as for Gordian I and II, and Balbinus and Pupienus).[97] More than that, Avidius Cassius had been active there and had a special connection with the place.[98]

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[90] RPC Online Temp №: 14515 with Asklepios standing, facing, head, l., holding patera over lighted altar and serpent-staff . On Asklepios see Heuchert 2005: 49 table 3.3; Heuchert 1997: 169–72.

[91] Birley 2000: 176–8.

[92] Bowman 1970; Sijpesteijn 1971: 186-192.

[93] Dio LXXII, 22, 2.

[94] *PIR* 2nd edn A512.

[95] Cf. Vogt 1924: 144.

[96] Syme 1978.

[97] Bland 1996: 116–18.

[98] On Avidius Cassius see also Hekster 2002: 31-2; 34-7; Birley 1987: 184-9.

Fig. 9. Representations of Moneta and the Mint on Egyptian bronze, AD 162/3

Presumably the position of Avidius Cassius was not quite as presented by others, then or now. He is said to have believed Marcus dead, but then to have learned the truth.[99] The surmise of Syme looks apposite given the lack of the coinage:[100] as much cock-up as conspiracy. Syme's insinuation is that Faustina, expecting Marcus to die, sought a new partner in Avidius Cassius to protect her own position and that of the 13-year old Commodus. But Marcus recovered. 'Revolt' then seems an inappropriate word, although obviously the position of Avidius Cassius would be untenable. The burning of his correspondence by the legate of Cappadocia, who took control of Syria, is seen in a new light. We cannot know what actually transpired in circumstances like these, but some such situation would explain why there is no coinage in his name.

The Mint

Let us turn from someone we expected to see on the coinage and didn't to something we didn't expect to see on the coinage and do: The Mint (Fig. 9). Representations of Aequitas / Dikaiosyne are hard to differentiate from Moneta. The same ambiguity is found on Roman imperial coins, where Wallace-Hadrill concluded that Aequitas too must be interpreted with more or less strict reference to the Mint (meaning 'the coin they issue is value for money').[101] Representations of Dikaiosyne are fairly routine at Alexandria, but in AD 162–3 there is an iconographic emphasis on 'Moneta' which is quite unparalleled.[102] In this one year the figure is specifically labelled 'Moneta', a

[99] Dio LXXII, 22, 2; *SHA Marcus* 24, 7 states that he called Marcus 'Divus' (cf. *SHA Avidius* 7, 3).

[100] Syme, 1988: 700.

[101] Wallace-Hadrill 1981.

[102] Vogt 1924: 136. Moneta occurs with a monument on the drachms of Marcus and Verus, and without a monument on tetradrachms of Marcus.

loan word from Latin meaning 'the Mint'. Uniquely Moneta is associated with a monumental structure. It is hard to resist the conclusion that the monument is the Mint itself or somehow representative of it.[103] As no such structure occurs on the coinage at Rome, from which it might have been copied, it is almost certain that it represents the mint at Alexandria. Its appearance on the coinage may reflect some kind of reorganization, rebuilding, or relocation of the Mint. In a possibly comparable way the imperial coins of Domitian specify *Moneta Aug* in AD 84 shortly after a reorganization of the mint at Rome.[104] The novelty of the type at Alexandria suggests that the building may well have been new. The emphasis on the Mint in AD 162/3 raises the further intriguing possibility that the dip in production of tetradrachms in 162/3, followed by increased production in163/4–164/5, might have been the result of reorganisation within the Mint itself. Might this putative reorganization also be connected with the tentative start to the debasement in 164/5?

Conclusion

Rathbone has argued that the effective halving of the silver content of the Egyptian tetradrachm was not the direct cause of the broadly contemporary doubling of prices within Egypt on the grounds that it did not affect the majority of coin in circulation until well into the third century, and that a model of prices following debasement does not work for the third century, although he does allow that the government's monetary and fiscal responses may have had a role.[105] The precise drivers of price change remain debatable and are likely to have been complex. Whether one can generalize from Egyptian prices to the rest of the Empire is also a matter for debate.[106] But a plausible story emerges for the trajectory of coinage in Egypt at this critical time.

The context for the debasement of the silver coinage in Egypt was set by the debasement of the denarius in 155. The Egyptian tetradrachm had drifted down slightly in weight to match the circulating medium, which was slowly succumbing to the effects of wear, but had not reacted and was arguably out of line. The silver content of the tetradrachm had become so close to the denarius that there was perhaps insufficient margin to cover the costs of re-minting denarii into tetradrachms. There were other problems at the Mint too: the inscriptions on the late coinage of Pius were garbled and illegible.

Iconographic emphasis on the Mint at Alexandria on the coinage in 162/3 may reflect a start to sorting things out. Indeed Rome may have been taking a particular interest in provincial silver at this time. 162 marked the start of renewed production of a provincial-style silver coinage for Cappadocia after a break of several decades, probably at the mint of Rome itself, breaking an unparalleled gap in the three major

[103] Building not noted by McKenzie 2007. Howgego and McKenzie intend to publish a detailed discussion of the monument on the coins.

[104] Wallace-Hadrill 1981: 31; Carradice 1983: 143; 160–1.

[105] Rathbone 1997: 215-16.

[106] Taking Egyptian prices as proxy data for the empire as a whole is a default strategy in Roman economic history but requires further consideration. The broad structure of wheat prices from around the empire has been used to argue for a single price regime within the empire (Kessler and Temin 2008), but the opposing view remains tenable (von Reden 2010: 125).

eastern silver coinages outside Egypt. In Egypt the significant change in the sources of the copper and silver for the coinage between 166 and 168 might reflect a new regime, although it might also mark a breakdown in the metal supplies used earlier. Neither explanation is conclusive, as variations in bullion sources were not untypical for provincial coinages.

The timing and severity of the major debasement, beginning in AD 164/5, before the arrival of the Plague, and taking hold in 167/8, may well have been forced by the financial pressures of the Parthian campaign, exacerbated to an unknowable degree by the Plague. The otherwise unwarranted scale of the immediate debasement to 4–5% is an indication of the severity of these pressures. In the event, the tetradrachm settled at 8–10%, but that did not bring it back to anywhere near its old relationship to the denarius in terms of silver content. Continuing military pressures and shortage of bullion may well be the relevant context.

There followed an effective hiatus in the production of silver coinage from AD 170/1 – 179/80. How should we explain the lack of silver going to the Mint? Transfers of imperial silver to Egypt, if such there were, are most unlikely in these years, given the military pressures first to the East, then to the North and to the West. It has been argued that the import by merchants to Alexandria of imperial coinage, and perhaps other provincial silver coinages too, was a significant driver of coin production. In just these years merchants may well have been discouraged from coming to Egypt by the prevalence of the Plague or by the major revolt in the Delta, which is said to have threatened Alexandria, or by the uncertainties caused by the position of Avidius Cassius. Such discouragement may in itself have led to the suspension of new minting of silver. Perhaps stocks of silver coin sufficed for a more predominantly local need? This may have been the case, but the parallels of other periods of low or no output of silver coinage in Egypt under the Flavians and the Severans, when trade between Egypt and the rest of the empire should have been in full flow, show that alternative explanations are possible. It may simply reflect a decision to do something else with the imperial coinage which was arriving, for example sending it to finance military activity elsewhere.

Marcus responded to the death of Avidius Cassius by raising the profile and status of Commodus, and by setting off for the East himself. A small silver issue was produced in Egypt to mark the elevation of Commodus to co-emperor the following year, but a serious resumption of production of silver had to await his sole rule. That renewed production is likely to have been underwritten by the partial recall and re-minting of circulating coin, the majority of which was now 130 years old. The need to facilitate the return of old coin to the mint may lie behind the increase in the diameter of the coins (but not their weight or silver content) so that the new coins at least looked the same size as those being withdrawn. Further debasement began in AD 185/6 following the most serious war of Commodus' reign.

The timing and scale of the debasement under Marcus is possibly important in that they were not closely co-ordinated with, or in proportion to, changes to the imperial coinage. Significant integration of the Roman economy is characteristic of the early empire, and disintegration a key feature of the third-century 'crisis'.[107] A degree of

[107] Howgego 1994.

co-ordination of monetary reform around the empire was first witnessed under Nero,[108] and is seen in the withdrawal of earlier coin between then and the reign of Trajan (or Hadrian).[109] It is seen again from the time of Aurelian and Diocletian. So a lack of co-ordination under Marcus may herald the difficulties of the third century. On the other hand, neither the improvements in fineness of the denarius under Domitian nor the debasement under Trajan in AD 100 have been shown to be paralleled in quite the same way in the provinces.[110] So perhaps it is the occasional episodes of coordination which are exceptional and more in need of explanation.

The role of the Plague in this story must remain ill-defined, possibly significant, possibly not. In this regard it reflects the position of the Plague in economic change in general. Whatever the case, the 160s emerges as a critical period of transition, and the roles of military exigency and fiscal inadequacy as major drivers of change surely remain indisputable.

So something like a plausible story emerges, but it is hard to handle from an economic point of view as it is shot through with competing factors which are hard to quantify. This is true of patterns of production, as Andrew Burnett has so eloquently explored for the preceding period. Motivations for coining, and hence the patterns of coining, were complex.[111] We have noticed here the need to exchange denarii, the need to make expenditure, profit from re-coinage to lower standards, and the desire to advertise political change (for example, the promotion of Commodus to be joint emperor). What was actually coined within Egypt might be affected by organisational factors, such as restructuring within the Mint or the building of a new one, and by the requirements to send silver elsewhere. We cannot even be sure quite what we are trying to explain, if it is right to see Roman provincial silver coinages as effectively devolved with only episodic direct imperial involvement from the centre.

Multiple explanatory factors bedevil the interpretation of the standards of the coinage too. A degree of flexibility is implicit in the fact that coins were struck *al marco* (so many to a given weight) rather than *al pezzo* (with the weights of each coin controlled). This meant that the silver content of individual coins within an issue might vary significantly. Analyses show that when some kind of notional standard was established, the coinage might fluctuate back and forth around this standard over a long period. Coins on markedly different standards might also circulate together (so tetradrachms of Nero were not fully withdrawn until the 260s). All this shows that there was a fiduciary aspect to the coinage in circulation.

On the other hand, there were standards, and they did not decline consistently. So we should not put too much emphasis on the 'slippery slope' model of inevitable and incremental debasement over time. Oscillations around a standard obviously include improvements as well as declines. Such patterns imply that fiscal inadequacy was not

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[108] Nero: *RPC* vol. 1, ch. 6; Burnett 2005: 274. Also a key theme in Butcher 2004: 254–5 and Butcher and Ponting 2005.

[109] Butcher 2004: 183.

[110] As pointed out by Burnett, this volume. The debasement of the Syrian tetradrachm AD 108–110 might be connected with the debasement of the denarius in AD 100. The debasement of the Syrian silver may, or may not, have been accompanied by a change in face value, which makes it harder to assess its economic significance: Butcher 2004: 199; 201; 256; 258–9.

[111] Howgego 1990.

the only driver of change, and perhaps not even the main one at any given time. Among other things consideration must be given to production costs, the relation of prices of gold to silver bullion, and the variable availability of metals. A break-down in the former processes of metal procurement *c*. AD 165–8 does indeed seem to be associated with the dramatic debasement.

From another perspective, however, a failure in the metal supply to the mint may be seen as a particular expression of underlying fiscal problems arising from declining metal supplies and increasing demands for expenditure. If the currency of Egypt was used a bit like a piggy bank to raid at times of need that might explain why distant events, such as the Fire under Nero, or the Armenian Campaign under Lucius Verus, or perhaps even the British War under Commodus, may be correlated with declines in standards and re-striking within Egypt. Such possibilities had a suggestive Ptolemaic precedent in the marked debasement in 53/52 BC under Ptolemy Auletes, which has been plausibly associated with Roman attempts to extract the 10,000 talents which he had promised to pay for his restoration the throne.[112] If one puts emphasis on the long-term trend, fiscal inadequacy looks the dominant explanation. For example, the scale of the contrast between the decline of imperial silver from near pure to 2% by 260 and the relative stability of the gold coinage cannot primarily reflect variations in the relative prices of gold and silver bullion. The same consideration applies to the story of the Alexandrian tetradrachm.

Perhaps a way forward might be to make a distinction between micro- and macro-economic trends and explanations? To be sure there were oscillations, but the salient point is that improvements could not be sustained. Our comparatively close reading of the complexities of the evidence and possible explanations, within a critical context for Roman economic history, makes for a cautionary tale. But there is still a big picture to be seen.

[112] Walker 1976–8 Part 1: 150–1.

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Abbreviations

BMC Alexandria	*Catalogue of the Greek Coins in the British Museum*: R. S. Poole, *Catalogue of the Coins of Alexandria and the Nomes,* London, 1892.
RPC	Burnett, A. and Amandry, M. (eds.) (1992–). *Roman Provincial Coinage*. London and Paris: British Museum Press and Bibliothèque Nationale. Vol. I (1992): *From the death of Caesar to the death of Vitellius (44 BC–AD 69)* by A. Burnett, M. Amandry, and P. P. Ripollès. *Supplement* I (1998) by A. Burnett, M. Amandry, and P. P. Ripollès. Vol. II: *From Vespasian to Domitian (AD 69–96)* by A. Burnett, M. Amandry, and I. Carradice; vol. VII. *De Gordien Ier à Gordien III (238-244 après J.C.).* 1 Province d'Asie, by M. Spoerri Butcher.