PART I

General introduction

1 Roman silver coinage and monetary history

The coinage of the Roman empire was complex for a pre-modern society. An array of denominations was employed, made of different metals and standing in fixed relationships to one another. In the case of Roman imperial coinage there were four metals utilised: gold, silver, brass and copper; and the system of denominations is well understood until the third century, when significant changes to the system make it much less intelligible to us. Most of this imperial coinage was produced at Rome, though other mints operated from time to time. In addition to this imperial coinage there were also provincial coinages produced at various mints, mainly located in the eastern empire. Some of these provincial coinages were of silver, which was normally debased; but the majority were made of copper alloys, and the system (or systems) of denominations are very poorly understood.

The very complexity of the coinage makes further generalisations difficult, and yet generalisations are often what historians need in order to grapple with the 'big picture' of Roman monetary history. Existing accounts of monetary developments in the Roman empire during the first three centuries AD are largely a description of changes to the fineness and weight of the silver coins, with the quality of this coinage being taken for an index of the empire's economic strength or weakness. Unfortunately, existing data on both of these features (fineness and weight) are either inadequate or incorrect, meaning that much of the interpretation is problematic.[1] More robust and reliable evidence for fineness and weight is needed, and that is one of the things we aim to provide here.

The present volume is envisaged as the first in a series, and concentrates on the period from the reforms of Nero (*c.* AD 64) and those of Trajan (AD 100), but ranges back in time to the period of Augustus or sometimes even earlier.[2] Both phases of reform have been seen as significant and

[1] Some historians have sought refuge in the fact that the 'big picture' of overall decline in silver content between Augustus and the mid third century is not in doubt, but by robbing the picture of almost all the details we lose our principal tools for understanding the decline. See the comments in Butcher and Ponting 2012 (on developments in the second century AD).

[2] We originally intended to include in the present study a more comprehensive discussion of imperial and provincial coinages from late Republican times onward, especially the various

disastrous measures leading to the decline of Roman imperial silver coinage and the coinage system as a whole, and a contrast has been drawn between the supposedly stable, high-quality silver coinage of the Republican and early imperial period up to AD 64 and the unstable character of all of the silver coinages that followed. One of the intentions of our project is to outline in detail the changes that occurred by producing reliable estimates of the silver content, and the weight, of as many issues of silver coinage in the Roman empire as it was possible to sample. To do this requires an understanding of the chronology and arrangement of the issues, and considerable space is devoted to this in the chapters that follow. The only significant limitation placed on the project has been access to coins for sampling. In spite of these restrictions we have managed to cover all of the main issues of both imperial and provincial silver coinage from AD 64 to 100, and to include a number of the most important earlier coinages as well.

There are three principal sources of evidence used here. The first of these is the set of compositional analyses which aims to present the quantities of not only the main components of the coinage (always silver and copper) but also minor components, of the presence of which the Romans were probably not aware (gold and lead), and trace elements of which they were certainly unaware (bismuth, tin, iron, zinc, antimony, arsenic, chromium, manganese, cobalt and nickel). The presence of these minor and trace elements was unintentional and they played no part in any deliberate manipulation of the coinage. The quantities of these elements present in the coins can help to tell us about the likely sources of the main components from which the coins were made. The results are surprising, and enable us to say something concrete where previously it was possible only to speculate. They hint at episodes of recycling, or use of freshly mined metal, or transfers of bullion, and can be used to help characterise the products of a particular mint or ore source, allowing unattributed coinages to be assigned to their proper place of production. They overturn some commonly held assumptions about the contribution of certain silver mines to the monetary economy of this period. These compositional analyses are supported by a series of lead isotope analyses. They too can help to suggest the origin of silver used in the coinage and even identify specific sources in certain cases, but more often than not they tell us about the sources of lead used in refining and recycling the silver bullion.

denarius mints of Augustus, but access to relevant coins for sampling was too restricted to make this feasible within the scope of the current project. It is hoped that we will be able to treat Republican coinage, and the early imperial and provincial coinage, more fully in a separate study.

The second form of evidence comprises the metrological data. In all cases it is the weights of the coins themselves that have been used, and not a theoretical weight based on an estimation of some fraction of the Roman pound. While this approach does not aim to produce an absolutely accurate determination of the standard originally used, it is a better way of estimating weights than its alternative.[3] The weights are crucial in helping to determine the silver contents of the coins, but it is vital to remember that they too constitute standards in themselves, and changes to weight standards were much more apparent to users than changes in fineness. Like the level of silver in the alloy, the weights are a sign of monetary stability or instability.

The third approach investigates the evidence of hoards. Quite a lot will be said about this evidence. While far from perfect, hoards constitute almost our only evidence for the circulation of silver and gold coinage. They also supply most of the specimens on which the metallurgical and metrological studies are based. Hoards are also our chief source of evidence for relative levels of production of issues. In this respect they form a crude tool, but they are not inadequate for simple tasks such as highlighting periods of declining or increasing output, provided we remain alert to potential biases in the data. Hoarding patterns can also inform us about whether the public were aware of changes to the coinage, and about the withdrawal of old issues for recycling or through episodes of demonetisation. Combined with the compositional and metrological evidence, the data from hoards can aid the interpretation of change. Did the public discriminate by hoarding older, finer coins in response to debasement? Did oversupply of one denomination create an imbalance in the relationship between coins made of different metals, leading to changes in weight or fineness? Was debasement sometimes necessary to expand the supply of denarii to keep up with the number of transactions?[4]

More will be said about these approaches, and their associated problems, in Chapter 4.

It might be objected that the story of the silver coinage can form only part of a general account of Roman monetary history. This is true. However, the silver content of the coinage is central in all accounts of Roman monetary history. We cannot cover developments in all denominations and metals here, and we recognise that this is not a complete account of Roman imperial coinage, though we do attempt to address the problem by taking account of the metal most likely to have influenced coinage in silver: that is, gold. This

[3] The method is explained in Chapter 4. [4] Hitchner 2009: 283.

study of the gold coinage is mainly confined to metrology and hoarding patterns. No analyses of gold coins have been undertaken for this project, and it is assumed that Roman gold coinage of the period was essentially made of pure gold bullion.[5] Nor is any detailed account of the copper and copper alloy coinages to be found here, though we recognise that manipulation of these too could form an important part of monetary policy.[6]

Another aspect of this study will no doubt prove more controversial: the interpretation of our findings. It is impossible to avoid the question of the motives for the changes observed, not least because there is a considerable literature on the subject. There are many competing views. Naturally, any work that seeks to outline the composition and metrology of the denarius can hardly escape these fundamental debates over the nature of Roman imperial coinage and the function of debasements, and we will return to them throughout this book. While changes to the fineness and weight of Roman imperial silver coins are commonly interpreted as negative developments, a more neutral position takes them as evidence for the origin of fiduciary money and a shift from a 'metallist' approach to coinage to a 'nominalist' approach, and from a monetary system backed by silver to one in which gold was the ultimate guarantee of value.[7] Generally, however, imperial monetary history is treated as a story of decline, based on the reduction of the silver content of the coinage. The narrative begins with a pure silver coin under Augustus and ends with a coin of less than 5% silver by the later third century.[8] For many historians this is a cautionary tale of debasement of silver for fiscal reasons, prompted by 'the fact that revenues were inadequate to cover expenses, notably on the army'.[9] Emperors needed more coins to cover their expenses but had a finite amount of silver at their disposal or, worse still, found that the output of silver from mines was declining. To increase the money supply they coined more denarii at a lower fineness, and/or reduced the weights of the coins.[10] The expedient was a failure, causing inflation and leading to what is generally termed the

[5] There is general consensus on this point, though there are not many analyses to support it: Burnett 1987: 50; Howgego 1995: 115; Harl 1996: 74–5.

[6] Encouraging the use of token copper alloy coins could potentially help make up for shortfalls in the supply of other metals, and overvalued base metal coinages could help raise revenues. Changes to weight and composition of base metal coins were perhaps less important.

[7] Metallist to nominalist position: Lo Cascio 1996. Silver to gold, or bimetallism to gold: Pankiewicz 1989a: 109; Corbier 2008: 329, 342, 352–3.

[8] The figure often cited is 2% silver under Claudius II Gothicus (AD 268–270), based on the figures for elemental silver in the pioneering study by Cope (1969).

[9] Crawford 1975: 568.

[10] It is generally agreed that the supply of coined money did increase with debasements: Harris 2008b: 200–1; Duncan-Jones 1994: 103–5.

third-century currency 'collapse' of the 260s and 270s. This can be regarded as the main theme or 'big picture' of Roman imperial monetary history: continuous decline, ending in collapse. From this perspective, all that remains is to determine when the slide towards disaster began, and what were the specific causes – lavish donatives and expenditure on an increasingly troublesome military, exhaustion of the mines and inadequate tax revenues being among the favoured explanations.

The silver denarius is generally considered to be the base of the Roman monetary system and a study of this denomination occupies a considerable proportion of the volume.[11] If we are to understand that system and the grand theme of monetary decline more fully, a detailed examination of the fineness, weight and pattern of circulation of the denarius over time would seem to be essential. Indeed, the chronological scope of the volume is largely determined by the history of this denomination. It takes as its starting point what is seen by some as the first stage in the slide towards disaster: the debasement of the denarius by Nero; and ends with another contender for this unenviable accolade: the debasement of the denarius by Trajan.[12] But the denarius did not exist in isolation, and it is also necessary to take account of changes to other aspects of the monetary system, such as provincial silver coinages and the imperial gold coinage, mentioned above. They too underwent important changes, which raises a variety of questions worth exploring. How did these coinages relate to each other, and were those relationships stable? If so, how was long-term stability achieved? Was coinage sometimes adjusted for monetary reasons, to ensure stability, rather than solely to alleviate fiscal inadequacy? Some of these questions require a complete overview of the whole of the Roman denarius coinage, and while they are touched on in this first volume, they will be treated more fully in the final study.

The present work can hardly claim to be the first to attempt to outline the metallurgy and metrology of Roman silver coinage and to provide an overview of Roman imperial monetary history, though such attempts are very few in number. An overview of the history of this subject will be provided in a later chapter, but consideration of the most influential study to date, David Walker's *Metrology of the Roman Silver Coinage*, will be provided here, simply because it is central to the subject and forms the basis for so many recent accounts. At the time of writing it remains the

[11] On the central role of the denarius: Bolin 1958; Jones 1974: 191; Mrozek 1975: 5; Corbier 1978: 275; 2008: 333; Harl 1996: 6, 75. Recent emphasis on gold: Duncan-Jones 1994: 70–2; 2003: 165–6; Howgego 1995: 10–11; Jongman 2003: 185; Verboven 2007: 248; Lo Cascio 2008.

[12] Nero's debasement the beginning: Harl 1996: 91; Trajan's debasement: Bolin 1958: 209.

standard interpretation, and no study of metrology and composition can be undertaken without reference to it. Indeed, despite repeated warnings since the 1980s about the unreliability of these analyses and a series of papers presenting more reliable data, recent sketches of Roman monetary history have continued to rely on Walker's analytical results to create a somewhat misleading impression of almost continuous decline following Nero's initial debasement.[13]

DAVID WALKER'S *METROLOGY*

It must surely come as no surprise to read that the present project was inspired by the pioneering work of the late David Walker. His *Metrology of the Roman Silver Coinage* was the first attempt to provide a large-scale overview of the finenesses and weights of the denarius and other contemporary silver denominations circulating in the Roman world. Between 1976 and 1978 Walker published analyses of 5,451 Roman silver coins from Augustus (27 BC – AD 14) to Uranius Antoninus (usurper, *c.* AD 253–254).[14] The three volumes he published were remarkable not only for providing an overview of the Roman imperial denarius and its fraction, the quinarius, but also for their thorough coverage of provincial silver issued by eastern mints. In these studies Walker laid out his extraordinarily detailed knowledge of issues, and his profound understanding of the imperial and provincial coins makes his work essential reading for anyone embarking on their study. In the final chapter he exhorts the reader not to judge Roman monetary policy in modern economic terms. His insistence that 'Roman economic ideas were quite inseparable from moral ideas'[15] is a wise dictum, and one that we have sought to apply in the present work, though without necessarily drawing the same conclusions.

The *Metrology of the Roman Silver Coinage* also lays out a powerful vision of the relationship between the Roman state and the coinage, one that was no doubt a product of the scholarly currents of its time, but which has proved influential in subsequent accounts of Roman monetary history. What emerges most clearly is the connection between fineness and state

[13] E.g. Harl 1996: 73–96, 125–57; Wolters 1999a: 341–3; Verboven 2007: 246; Hitchner 2009: 282; Scheidel 2009b: 173; von Reden 2010: 54; Katsari 2011: 78. This reliance on Walker's data is not surprising, given that it is the only work to present an overview; and it is indication of just how important the subject matter is to historians of the Roman economy.

[14] A volume on later silver coinages was promised (Walker 1976: 1) but never materialised; his analyses of Republican coins were published in 1980.

[15] Walker 1978: 106.

expenditure. The idea was hardly new, and occurs in some of the earliest numismatic writings,[16] but Walker's work was the first to provide plenty of quantitative evidence in support of the generally accepted narrative where the Roman state's revenues could not match its expenditure. Every Roman emperor had to find ways to cover state expenses: on the army; on donatives; on building projects. Fearful that tax increases would invite criticism, emperors in financial difficulty turned to debasement of the silver coinage as a way to alleviate those pressures.[17] The profits from debasement helped cover state deficits. Therefore the fineness of the silver coinage reflected its degree of overvaluation, which in turn reflected the economic health of the empire, and significant debasements occurred when the balance sheets looked particularly bad. This manipulation fell hardest on eastern provincial silver coinages, which were often greatly debased and overvalued against the denarius. According to this scheme, the denarius was to be maintained as a 'preferred' currency and the inferior eastern silver would be confined to those areas where its value could be enforced (presumably meaning that some kind of legal tender laws operated). Outside these areas debased provincial silver would not circulate.

Most of the state expenditure was seen as military in nature. This conclusion chimed well with the prevailing scholarship of the 1970s, which saw Roman coinage more as a means of payment than as a medium of exchange.[18] It was an instrument of the state, produced for the state's convenience, and not intended for the convenience of economic agents; consequently its role as a medium of exchange was simply incidental to its function as a way of paying soldiers.[19] Provincial coinage in particular was directly linked with periods of 'abnormal expenditure' on military campaigns.[20] Thus coinage was shaped by mainly fiscal needs.

While the debasements themselves went unnoticed in ancient sources, the military and other expenditures could be identified in the texts and, when arranged by date, could often be matched with a debasement. This seemed to offer the necessary proof that debasements were essentially a response to fiscal hardship rather than other factors. It was considered significant that two debasements noted by Pliny under the Republic had both been 'done under

[16] E.g. Patin 1667: 87–8. [17] Jones 1974: 189–90; Walker 1978: 109.
[18] The key argument is set out in Crawford 1970; see also Jones 1974: 219.
[19] 'There is no evidence that the government ever viewed coinage as anything more than an instrument for the convenience of the state' (Walker 1978: 121). For a critique, see De Cecco 1985. Walker himself clearly thought otherwise when he concluded that the reformed coinage of the third-century usurper Uranius Antoninus was produced for foreign trade (1978: 137).
[20] Walker 1978: 120–1. See comments by Howgego 1995: 118–19.

financial pressure'.[21] In the imperial age, debasements were noted at the beginnings of certain reigns, at a time when emperors were expected to make large cash donatives. This explicit 'demonstration' of a link between expenditure and debasement is one of the most enduring aspects of Walker's work.[22]

The moral characters of emperors emerge as a significant factor in this link. The decision whether to debase or not resided with the emperor, and an emperor's personal tendency to frugality or extravagance often determined whether he would face the kind of financial difficulties that would precipitate debasement. The parade of vices and virtues in the *Metrology* might not be to every historian's taste, but it does serve to remind us of the potential close connections between the emperor and his coinage. Emperors both 'good' and 'bad' were not immune from financial difficulties, but those who were forced to debase by circumstances beyond their control are presented more positively, as persons who might have been expected to improve things after a temporary debasement, even if they did not (e.g. Vespasian and Marcus Aurelius).[23] The problems began with the spendthrift Nero, who sought to alleviate his financial problems by reducing the weights of the gold and silver coins and debasing the silver.[24] Galba's *severitas* saw the denarius remaining at the Neronian fineness despite the financial difficulties of the age; and Walker noted how remarkable it was for the profligate Otho not to have debased the silver.[25] Vitellius' extravagance likewise did little to harm the coinage, and it was left to the frugal Vespasian to restore public finances after the disasters of AD 69. A debasement was detected at the very beginning of Vespasian's reign, which Walker attributed to the activities of Vespasian's lieutenant, Mucianus, rather than the emperor himself.[26] The fact that Vespasian did not raise the fineness in later years suggested a continued financial crisis.[27]

[21] Walker 1978: 109. The comparison is not altogether apt, since the Republican debasements were temporary and followed by a return to higher standards (a feature typical of medieval fiscal debasements: see p. 42). The claim that debasements can always be connected with financial difficulties is disputed by Lo Cascio 1981: 79.

[22] Duncan-Jones 1994: 238–9. The key debasements supporting Walker's argument for a link between donatives and debasement are phantoms, and in reality never took place. See Butcher and Ponting 2012.

[23] Walker 1978: 117, 126. It should be noted that the account of debasements which follows is Walker's, not ours.

[24] Walker 1978: 110–14.

[25] Walker 1978: 114–15. In reality, Otho did lower the silver content of the denarius (Chapter 10).

[26] Walker 1978: 115; followed by Duncan-Jones 1994: 100; Harl 1996: 92 (the latter followed by von Reden 2010: 54). There is no evidence that Vespasian debased the denarius, though he may have lowered the weight very slightly (p. 326).

[27] Walker 1978: 117.

An important discovery was Domitian's restoration of full fineness in AD 82, which returned the denarius and quinarius to pre-Neronian levels. That Domitian had improved the fineness of the denarius from the level employed by Vespasian and Titus had been known since the nineteenth century,[28] but no one had suspected that Domitian had achieved an essentially pure silver coinage, albeit for a short period between AD 82 and 85. The weight of the aureus also increased to a pre-Neronian-debasement level. These improvements were plausibly attributed to Domitian's conservatism.[29] However, high expenditure eventually forced the emperor to reduce the silver content again, although he managed to maintain it at the standard established by Nero in 64 rather than the lower fineness set by his father Vespasian in 70. Walker detected a corresponding improvement in the quality of provincial silver to match the developments at Rome, particularly in the coinage of Caesarea in Cappadocia.[30] This was one of several features of provincial silver suggesting centralised control or supervision.[31]

Nerva had been short of money and from the outset of his reign Trajan was forced to introduce a programme of austerity.[32] The weight of the aureus was reduced. The emperor's Dacian war strained finances further. Walker was sceptical of the claim of Mickwitz and Heichelheim that an influx of Dacian gold depressed the price of that metal relative to silver, forcing a debasement of the denarius in 107; instead the debasement was a sign of over-expenditure.[33] The debasement apparent during the reign of Antoninus Pius was more difficult to explain in terms of excessive expenditure, given that emperor's allegedly frugal nature,[34] but subsequent debasements under Marcus Aurelius, Commodus and Septimius Severus could be identified as the consequence of state spending, although an apparent, temporary reversal of the debasement under Marcus was explained as corollary of that ruler's 'moral uprightness', as was a similar reversal detected under Pertinax.[35] Caracalla is painted in particularly negative colours: his 'reckless'

[28] See below, Chapter 3.
[29] Walker 1978: 118; Carradice 1983: 160–1; Howgego 1995: 119.
[30] Walker 1978: 119.
[31] Walker 1978: 120–1. In reality there were no improvements in the quality of provincial coinages under Domitian.
[32] Walker 1978: 121.
[33] Walker 1978: 122. Further scepticism, which may well have influenced Walker, was provided by A. H. M. Jones (1974: 191). On Heichelheim's ideas, see p. 71.
[34] Walker 1978: 124–5. Explained by Harl 1996: 94 as a consequence of expenditure on the millenarian celebrations of AD 148.
[35] Moral qualities of Marcus: Walker 1978: 126; Pertinax: Walker 1978: 127–9; Burnett 1987: 48; Howgego 1995: 119; Harl 1996: 126. We have detected no clear evidence of significant debasements under Marcus Aurelius or Commodus, and no improvement under Pertinax: Butcher and Ponting 2012.