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aus / from

Chiron

Ausgabe / Issue **41 • 2011**
Seite / Page **1–40**
https://publications.dainst.org/journals/chiron/438/5046 • urn:nbn:de:0048-chiron-2011-41-p1-40-v5046.8

Verantwortliche Redaktion / Publishing editor
Redaktion Chiron | Kommission für Alte Geschichte und Epigraphik des Deutschen Archäologischen Instituts, Amalienstr. 73 b, 80799 München
Weitere Informationen unter / For further information see **https://publications.dainst.org/journals/chiron**
ISSN der Online-Ausgabe / ISSN of the online edition **2510-5396**
Verlag / Publisher **Walter de Gruyter GmbH, Berlin**

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Aurelian's Monetary Reform: Between Debasement and Public Trust

I. Trust

The question of public trust in the monetary system is a central, indeed crucial, factor in monetised economies. A lack of such trust is frequently part of the explanation for financial crises,[1] though measuring it is highly problematic.[2] Neoclassical economics – which for the last three decades has been the dominant economic approach in the English speaking world – is generally concerned with quantifiable commodities and behaviour and as such tends to avoid a direct treatment of questions of trust *per se*.[3] Instead, economists deal with trust mainly through issues of ‹risk› and ‹expectations›.[4]

This paper is the outcome of several years' research which started with my MA thesis written under the studious supervision of Prof. Zeev Rubin†, who carefully guided my first steps into the Roman world. I am most grateful to Prof. Alan K. Bowman for his help and support in various preparation stages of this paper; to Dr. Cathy E. King for very helpful comments; and to the anonymous reader of Chiron. Earlier versions of the paper were presented at a graduate colloquium at Oxford organised by the Oxford Roman Economy Project in November 2007 and at an economic workshop for ancient historians at Columbia University in June 2009, and I am grateful for comments of participants in both events. I have benefited from discussions with Mr. Justin Dombrowski and Profs. Ronald Findlay, William V. Harris, Walter Scheidel, and Peter Temin. By no means should any of them be held responsible for opinions expressed here.

[1] The causal link between monetary crises and the lack of public trust can go in both directions; that is to say, while a crisis may create a decline in public trust, a lack of such trust could result in a crisis.

[2] On measurement of ‹trust› and ‹trustworthiness›, see Glaeser et al. (2000); on measurement of ‹trust in government›, see Chanley et al. (2000) esp. 241–244.

[3] See Dasgupta (1988) 49: «Trust is central to all transactions and yet economists rarely discuss the notion». In Game Theory trust-related issues receive more attention; see, for example, Dasgupta (1988) esp. 54f. n. 4; Camerer (1991), (2003) 83–100; Charness – Dufwenberg (2006).

[4] This is well reflected in standard economics textbooks, which touch upon trust-related topics through questions of either ‹risk› and ‹confidence› [for example Mas-Colell et al. (1995) 167–207; Lepsey – Chrystal (2004) 214–228], or ‹expectations› – as is the case in discussions on inflation, interest-rates and exchange-rates [for example Mankiw – Taylor (2007) 117–119, 368; Dornbusch et al. (2008) 123–128, 423–425, 477–483, 533–538]. Yet, as Arrow (1972) 357, puts it: «Virtually every commercial transaction has within itself an element of trust,

In studies of sociology and psychology of economics, however, the role of trust and its significance for market relations has long been recognised.[5] In this tradition of thought, public trust in the monetary system is perceived as intertwined with the level of confidence in the economic environment, which is, in turn, intricately connected to public trust in the social and political conditions.[6] This line of reasoning has inspired, whether straightforwardly or indirectly, scholars of Roman monetary history to advance trust-based or trust-related explanations for the functioning and dysfunctioning of the Roman empire's monetary system.[7] The current paper offers a contribution to this research approach. It supports the argument that during the second and third centuries CE public trust was closely related to the strength and well-being of the Roman monetary system and that a lack of such trust contributed to its eventual instability. The paper presents an economic model, which stresses the importance of public trust and suggests a mechanism by which its influence on monetary behaviour can be investigated.

Roman monetary crises are seldom defined in terms of public trust alone. Rather, crises are more frequently explained through the evidence of coins, focusing on questions of coin fineness and money supply, usually deduced from evidence for coin supply.[8] Doubtless the importance of these two factors can be overestimated, their

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certainly any transaction conducted over a period of time.» See also Schmölders (1975), (1982); Fukuyama (1995) 7.

[5] Schmölders (1975), (1982). For the role of trust in reducing transaction costs, see Arrow (1972) 357; Fukuyama (1995); Warren (1999) 15; Dyer – Chu (2003); McEvily et al. (2003) 98f.

[6] According to Levi (1998) 78: «Trust is, in fact, a holding word for a variety of phenomena that enable individuals to take risks in dealing with others, solve collective action problems, or act in ways that seem contrary to standard definitions of self-interest.» For the use of the term ‹trust› as part of more complex terms such as ‹social trust›, ‹political trust› and ‹trust in government›, see Arrow (1972); Schmölders (1975), (1982); Levi (1998); Hardin (1998); Warren (1999); Chanley et al. (2000); Newton (2001); Zmerli – Newton (2008). For distinctions between ‹confidence› and ‹trust›, see Luhmann (1988); Dasgupta (1988) 52 n. 3.

[7] Exemplary for such an approach is Strobel (1993), but see also Strobel (1989); Lendon (1990); Drexhage (1991); Lo Cascio (1996); Wolters (1999); Strobel (2002); Wolters (2004); Carrié (2007a) and Carrié (2007b) (I would like to thank Prof. W. Clarysse for bringing this publication by Carrié to my attention).

[8] Scheidel (2010) considers coin quality and coin quantity as the most important factors affecting ancient monetary systems (I would like to thank him for sharing with me this as yet unpublished paper). Howgego (1995) 122–135, counts money supply and coin fineness, together with monetary reform, as the most influential factors on Rome's monetised economy. The term ‹money supply› is frequently used when addressing questions of coin supply, see for example Crawford (1985); Burnett (1987) 106; and Duncan-Jones (1994), whose part 3 entitled ‹Money and Money-Supply› is dedicated almost entirely to various important aspects of the coinage. For a revised approach viewing Roman money as including coinage as well as other forms of money, see Howgego (1992); Harris (2006); Hollander (2007). An example of a crisis which, among other factors, had to do with money supply and mainly with coin supply is provided by the credit crisis of 33 CE; see Tac. Ann. 6.16–17; Dio 58.21; Suet. Tib. 48; as well as

prominence reinforced through abundance of numismatic evidence and consistencies in hoarding patterns.[9] Without undermining the influence of these, however, this paper emphasises the role of public trust in supporting, indeed enabling, the existence and operation of the Roman empire's monetary system. During the first three centuries CE, Roman sovereignty over the Mediterranean world was united under the binding authority of the emperors assisted by imperial administration.[10] A central imperial government enabled Rome gradually to enforce a method of compatibility and of growing coherence between the different currencies used in its territories; slowly though effectively transforming the Roman empire into a jigsaw of compatible and consistent monetary zones.[11] The practical meaning of this was that the Roman government in effect became the main creator of money.[12] For millions of the empire's inhabitants the imperial government came to dictate many components of the monetary system; consequently increasing the potential importance of public trust in the government's management of that system.

The importance of public trust becomes clearer when considering the potential for fiduciary qualities embedded in Roman coinage.[13] To begin with, one might expect some margin to have existed between the coins' intrinsic (metallic) value and their official value, a margin which could theoretically cover at least part of the minting costs.[14] Furthermore, although ancient minting methods seem to have usually been

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Frank (1940) 32–39; Rodewald (1976); Sutherland (1987) 62f.; Wolters (1987); Bellen (1997) 260–276; Andreau (1999) 104–107.

[9] Bolin (1958); Howgego (1992) 18–22. Hoarding patterns usually show a consistency in the hoarders' preference of finer and usually older coins. The scholarly literature pointing to this pattern is vast, but see for example Bolin (1958) 336–357; Schubert (1992); Haupt (2001); Lockyear (2007).

[10] Burnett (1987) 17f., 25–28; Burnett et al. (1992) 52–54; Wolters (1999). On the reforms of Augustus, which concentrated minting authority in the hands of the emperor, see Crawford (1985) 256f., 262, 279; Wolters (1999) 45–48, 115–137. An approach which views the first three centuries CE as a period of relative monetary stability is advocated by Howgego (1992), who includes in his discussion also the second and first centuries BCE; and by Harris (2006), whose chronological frame of discussion begins at 100 BCE and ends with the Severans, though he does not leave out an overview of what is known as ‹the third century monetary crisis›.

[11] Crawford (1985) 267–279; Burnett (1987) 46f.; Sutherland (1987) 30–32; Burnett et al. (1992) 1–6, 36f., 52–54; Howgego (1992) 2. However, as pointed out also by Carrié (2007b) 142f., during the third century regional differences in the distribution of newly minted coins were, more often than not, substantial.

[12] But see Wolters (2004).

[13] This is not to say that Roman money was fiduciary. Roman coins were made out of precious metals and as such were usually valuable objects in themselves, but they were not commodity money. In an economy using commodity money, coins are merely another, although official, form of the valuable good, which is used for money. In the Roman empire, however, coinage was partially fiduciary money in that it enfolded a promise that it could be converted into a valuable good, i.e. into metal, whether precious or base. (Unlike current fiat money where tokens, such as paper money, hold no claim for any specific staple good).

[14] Bolin (1958) 104, 108ff.; Aubert (2003) 246.

aimed at specific standards, the precision in employing these standards was not always consistent. Thus, their results tend not to be as accurate as modern ones;[15] and it is not unusual to find some difference between the theoretical metallic value of coins and the actual one.[16] Not only did different specimens of the same denomination retain different weights when coming out of the mint, they were also subject to different degrees of wear, depending on patterns in and length of circulation.[17] Thus, this all resulted in simultaneous circulation of coins with different metallic values all having one and the same official value.[18] Fiduciary qualities were also embedded in specific coin types or certain monetary conditions. For example, in imperial times, *aes* coins in practice gradually operated as semi-fiduciary: their nominal value, particularly when compared to silver *denarii*, was knowingly overvalued in regard to their metallic value.[19] Another example is the continuing debasement of the Roman silver coinage, which inevitably resulted in its overvaluation, both in relation to its metal content and in relation to gold coinage; in effect turning the so-called «silver» coinage (partially, if not entirely) into a fiduciary coinage.[20]

All of this does not imply that metallic value did not matter, or that Roman coins were fiduciary money *per se*. It merely suggests that Roman coins were likely to have had a fiduciary component determining their value. The influence of this fiduciary element was not necessarily felt at all times; it probably became significant only in certain circumstances.[21] The period for which it was most likely to have been influential,

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[15] That is, ancient methods of coin production did not tend to achieve repetitive identical outcomes; see Schweizer (1972); Cope – King et al. (1997) 70f., 80, who, although arguing that Roman coins were minted to specific fineness standards, are well aware of the high variability within individual issues; ibid. 3f., 77f.; Varoufakis (1998). This, however, was not necessarily the outcome of inability. It could have been a matter of choice; as is argued by Carrié (2007a) 79, in the case of the early electrum coins. What is more, some imprecision in applying standards seems to have been intentional; as may be suggested, for example, by the striking of gold under Claudius II (268–270 CE), probably intended for distribution as *donativa*; see Estiot (1999b) 368 n. 58, 381f. (I would like to thank Dr. C. E. King for discussing this point with me).

[16] For example, the *denarius* of the first century CE, officially struck at 96 coins to a pound of silver, in practice often weighs slightly less.

[17] Condamin – Picon (1972).

[18] See for example, Bolin (1958) 42f.

[19] Under the Roman empire *aes* coinages, both Roman (also called Imperial) and Provincial, were probably issued as near-tokens to begin with; that is, the value of their metal content was significantly lower than their official value. See Crawford (1985) 260, who states that under Augustus new *aes* coins «were no doubt to a certain extent fiduciary»; and Burnett et al. (1992) 30–36.

[20] Howgego (1995) 125f., 129–130; Lo Cascio (1996) esp. 274, 280; Carrié (2007b). Carrié takes the introduction under Caracalla of the so-called *antoninianus* (on which, see section II below) to be the starting point of a process increasing the fiduciary component in Roman coins.

[21] More on this in section IV below.

is the two centuries between Nero's coin debasement in 64 CE and Aurelian's monetary reform[22] in 274 CE. During this period the amount of precious metal in newly minted coins continuously declined, while their official value, as far as existing evidence suggest, probably did not.[23] Public trust was (unintentionally) put to the test during the second half of the third century CE, when an accelerated coin debasement – presumably together with significant increase in mint production – brought into question the value and perhaps even the validity of Roman coins.[24] But debasement in itself offers no indication for public trust in the coinage.[25] Trust is an elusive factor, hard to define or to measure. It influences the public's willingness to accept the circulating coinage at its official value and as such, affects the use of coins as a medium of exchange. Trust may be reflected in the coins' purchasing power, i.e. in the level of prices.[26] Price levels serve as indicators for a wide range of economic parameters.

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[22] A comment on the use of the word ‹reform›: In economic discourse the terms ‹monetary-› or ‹currency reform› usually refer to the replacement of one currency by another. In modern times this normally has to do with convenience, after inflation had made the value of an old currency inconveniently small; see Rutherford (1995) 106; Black (2003) 104. But in numismatics and monetary history of antiquity the term ‹reform› is used in a variety of circumstances. An introduction of a new currency, abolition of an old one, re-tariffing of existing denominations, changes in the weight or fineness of coins, alteration in coin decoration – all can be, and often are, referred to as ‹monetary reforms›. Aurelian's 274 reform has traditionally been referred to as such due to the new marks which appear on the coinage, as well as to slight changes in the coins' weight and fineness (on both see section III below). The term ‹reform› is highly relevant in this case also from an economic perspective, due to the re-tariffing of the official value of at least some of the coins in circulation (on which also see section III below).

[23] On coin debasement, see section II below. Evidence for official values of coins in the third century CE is scarce. If Cassius Dio, 55.12.4–5, writing probably under Severus Alexander (222–235), reflects the monetary rations of his own time, than it seems that in the 220s a gold *aureus* was still worth, at least officially, 25 *denarii*. See also, Buttrey (1961); Crawford (1975) 566–568. Carrié (2007b) 139f., thinks that this ratio was valid up until the 250s, and more precisely at least until 258, when «l'effondrement de la monnaie de billon a mis un terme à cette corrélation».

[24] Burnett (1987) 105–115, 122; Howgego (1995); Estiot (2004) 39f.; Carrié (2007b), who talks of an increasing tension between the coins' metallic content and their official tariff, rightly arguing that its implications meant that some fiduciary character of the currency was accepted (ibid. 143).

[25] See Strobel (1989) who rightly stresses the point that debasement by itself is no sufficient indicator for inflation, but rather proof for inflation should be sought in the evidence for prices.

[26] Although economic indicators such as prices are affected, at least to some extent, by public trust in the currency, because of the difficulties in quantifying trust, most traditional economic models of monetary behaviour, and certainly those models that dominate economic thought in the English speaking world, treat the issue of public trust mainly indirectly (see nn. 3–4 above). They relate to questions of trust largely via models for money-demand and rational behaviour (such as predicted by Gresham's Law); see for example Lepsey (1987) 516–567, esp. 516–519, 536–541. On problems of public trust in the government, see Schmölders (1975); Chanley et al. (2000); Newton (2001).

However, existing price evidence for the third century calls for a trust-related explanation for their behaviour.[27] Evidence there is suggests that a potential break in public trust in the Roman monetary system occurred at a specific time – under the reign of the emperor Aurelian (270–275 CE) – and more specifically, it was probably Aurelian's monetary reform of 274 which eventually resulted in the loss of public trust in the currency.[28]

The next section of the paper offers a short survey of Roman coin debasement (II), followed by an account of the known details of Aurelian's reform (III). After that an economic model is suggested (IV), which simplifies the complex reality (as models often do), so as to clarify some aspects of Roman monetary practice, in particular, the manner in which coins were valued. The last section (V) examines the implications of that model for the analysis of Roman monetary history of the second half of the third century CE.

II. Debasement

A well-known phenomenon of Roman monetary history is the third century CE debasement, i.e. the reduction in the quantity of precious metals in newly minted coins.[29] Conventionally, and quite rightly so, Roman coin debasement is explained as a result of increasing imperial expenditure imposed on a limitation of resources.[30] In other words, the empire's expenses grew faster than the amounts of precious metal available to its government. To keep up with rising expenses Roman emperors were compelled to increase mint production and they were able to do so by reducing the quantity of precious metal in newly minted coins.[31] This process is well-known and the pace of debasement has been subject to much numismatic study.[32] Not too long

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[27] On Roman price evidence see discussion at the end of section III below.

[28] That Aurelian's reform should be seen as a turning point in the monetary history of the empire, is receiving growing acknowledgement in the last two decades. See for example Strobel (1993) 266–279; Howgego (1995) 125–127; Rathbone (1996), (1997); and more recently, Carrié (2007b).

[29] This reduction could be through a decrease of either weight or fineness (or both); the latter applied more frequently with silver coinage, see Walker (1976–78); while the former was commoner with gold coinage, see Bolin (1958) 249–264.

[30] Crawford (1975) 561–563; Duncan-Jones (1994) 104–106; Howgego (1995) 117–119; Wolters (1999); Carrié (2007b) 136f. For the view that other factors alongside state expenditure had influenced Roman coin production, see Howgego (1990).

[31] Walker (1978) 138; Howgego (1992); Duncan-Jones (1994) 238f.; Estiot (2004) 39f.; Carrié (2007b) 131f. On the problematic nature of estimating mint production, see also Buttrey (1993), (1994); Howgego (1995) 30–33. But see Carrié (2007b) 138f., in support of an increase in coin quantity in the Roman empire during the second half of the third century.

[32] From the late 1970s up into the 1990s Walker's systematic X-Ray Fluorescence coin analyses provided the standard assessment of the scale and progress of Roman coin debasement (see Walker [1976–78], esp. [1978] 106–148). However, surface analysis techniques are known to

ago a metallurgical analysis method newly employed had shown that Roman minting authorities knew of, and had put into practice, a technique, which allowed the enrichment of a coin's surface at the expense of its core.[33] Thus, they continuously and purposely were able to produce coins which appeared to be of better quality than they actually were,[34] probably deceiving most ancient coin users just as they had until recently deceived many modern scholars.[35]

Traditionally Roman coin debasement is seen as a main cause, whether directly or indirectly, for the collapse of Rome's long-lasting monetary system based on the silver *denarius*.[36] Nero was probably the first emperor to debase the *denarius*, when in 64 CE he introduced a new standard of 80 per cent silver (4 parts silver and 1 part copper).[37] In the decades which followed, his successors used both the new, debased standard and the old, pre-64 standard, striking *denarii* at either 80 per cent silver or *circa* 90 per cent (a silver/copper ratio of either 9 to 1 or 7 to 1),[38] until 100 CE, when Trajan had reintroduced and fully established the debased Neronian standard.[39] The *denarius* was

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produce problematic results, which tend towards inconsistency and suffer from quite high fluctuation levels; see Cope (1967) 112; Condamin – Picon (1972); Walker's own careful reservation, Walker (1976) 1f.; Schmitt-Korte – Cowell (1989); and more recently Woytek et al. (2007a) 153.

[33] Kevin Butcher and Matthew Ponting have shown this to be true in the first century CE and there is no reason to assume that this was not the practice also during the second and third centuries CE; see Butcher – Ponting (1995), (1997), (2005a), (2005b); as well as Woytek et al. (2007a), (2007b), for the coinage of Trajan. While further results are yet to be published, these are not expected to dramatically change the general outline of debasement; see Howgego (1995) 118. Similar results to those of Butcher's and Ponting's were already reached in the past through destructive method analysis; see Cope (1967), (1972); Cope – King et al. (1997). That the Roman minting authorities seem to have implemented such techniques as late as the early fourth century CE was suggested in 1973 by L. H. Cope; see Cope – King et al. (1997) 7.

[34] Butcher – Ponting (2005a) 173f.; Woytek et al. (2007) 148. Over the centuries a natural corrosion process of the base metal in the coins contributed to their surface enhancement. Therefore, Roman coins surviving until modern time are often preserved in a condition far more extreme than that of the original outputs of the Roman mints. See Hall (1961); Condamin – Picon (1972); Cope (1972) 8–13.

[35] Butcher – Ponting (2005a) 173: «Minting authorities in the past were experts at disguising the declining silver content of their coinages; this is only now becoming recognized by numismatists and ancient historians.»

[36] Crawford (1975) esp. 569–571; Hendy (1985) 448; Burnett (1987) 108–114; Howgego (1995); Harl (1996); Wilson (2007).

[37] MacDowall (1979); Sutherland (1987) 95–103; Butcher – Ponting (2005a) esp. 179. It should be noted that while silver coinage under Nero was debased by reduction in metallic fineness, gold coinage seems to be debased by reduction in weight standards.

[38] Butcher – Ponting (1998), (2005a) 179f.

[39] Woytek et al. (2007a), (2007b), show that Trajan's debasement is to be dated to 100 CE. Thus, this debasement should be seen as part of his preparations towards the first campaign against the Dacians (101–102 CE) and not, as Walker (1978) 122 had suggested, as the outcome of the Dacian wars, see Woytek et al. (2007a) 151–153.

then further debased during the second century, especially in the early years of Septimius Severus' reign, whose newly minted coins had only about 50 per cent silver.[40] Debasement continued under Caracalla (211–217), who introduced a new coin, often referred to in scholarly literature as the *antoninianus*, its weight approximately 1.5 times that of a *denarius* and its official value probably a double *denarius*.[41] Debasement reached its peak during Gallienus' sole reign leading to total attrition of the metal content of the once silver coinage of Rome, which by the late 260s contained less than 5 per cent silver.[42]

It is often argued that such drastic debasement must have had implications for the use of Roman coins. While price evidence, fragmentary as it is, provides no definite indication that inflation immediately corresponded to the debasement of the silver coinage,[43] it also offers no decisive proof that debasement did not influence public trust in the coinage, i.e. the willingness of coin users to accept new, debased coins.[44] A well-known papyrus from Oxyrhynchus (P.Oxy. 1411), dated to 260 CE, provides evidence for a decline in such trust. The papyrus contains an announcement by the nome *strategos* concerning the refusal of local bankers to accept the newly minted coins of the

[40] Walker (1978) 59; Butcher – Ponting (1997); Gitler – Ponting (2003) esp. 31–37. Further detailed results for Roman debasement in the second century CE are yet to be published by Butcher – Ponting.

[41] This view is held by most scholars, see Jones (1974) 194–196; Crawford (1975) 565; Burnett (1987) 49; Carson (1990) 67; Schubert (1992) 249; Harl (1996) 128; Carrié (2007b) 137. For a view assessing the new coin's official value to be 1.5 *denarii*, see Mattingly – Sydenham, RIC I (1923) 29; Carson (1965) 227f.

[42] Walker (1978); Carson (1990) 234f. These estimates are based mainly on X-Ray coin analyses and should be handled with caution; though clearly, they have a strong connection with actual very severe levels of debasement. Destructive metal analyses done by L. H. Cope suggest a similar pattern, with the most extreme debasement first occurring during the last years of Gallienus' sole reign, when silver content dropped to 2–3 per cent (with the argentiferous base-metal coinage never really recovering to more than 5 per cent silver); Cope (1972); Cope – King et al. (1997). On the progressive usage of old *sestertii* in the minting of new billon radiates (i.e., *antoniniani*) from the 260s onwards, see Barrandon et al. (1981). On reduction in levels of purity of gold coinage under Valerian and Gallienus, see Callu et al. (1985). For the general process of monetary demise, see also Estiot (2004) 39f.; Verboven (2007).

[43] As convincingly argued by Strobel (1989) esp. 20–22. See also Drexhage (1991); Wassink (1991); Lo Cascio (1996); Rathbone (1996), (1997); and discussion at the end of section III below.

[44] For analysis of hoard evidence in search for the preferences of contemporary coin users in dealing with the new, debased *antoniniani*, see Schubert (1992), who argues that although new coins were commonly used in every day transactions (represented in hoards which he calls «verborgene Geldbeträge»), older coins were clearly preferred for saving purposes (represented in hoards which he calls «frühere Vermögen» and «gesparte Gelder»). Still, one may wonder how common older, less debased coins actually were in circulation during Schubert's second period (hoards sealed after 238 and before 254) and certainly during his third period (hoards sealed after 253 and before 269).

emperors.[45] Though bankers' behaviour may be seen as a signal for more general monetary trends, the papyrus provides certain evidence only for the behaviour of the Oxyrhynchite bankers. It indicates their hesitations and low level of trust in newly minted coins, but does not necessarily point to a general loss in public trust.[46] It could be evidence for the bankers' reaction to local political conditions in Egypt in 260,[47] rather than evidence for the general public's behaviour in the face of monetary change. However, the *strategos*' reference to previous cases of coin refusal, suggests that the specific Egyptian political conditions of 260 were not the only reason for the refusal.[48] Something else, more perpetual, initiated the bankers' mistrust in the new coins.

But trust in the currency, though in decline due to the steep debasement, was by no means lost. Even though debasement had already reached its lowest ebb by the 250s and 260s, the old monetary system seems to have continued in operation up until Diocletian's coinage reform of 294/96, or even as late as his 301 reform.[49] In other

[45] In P.Oxy. 1411, the *strategos* of Oxyrhynchus demands that local bankers (τραπεζῖται) reopen their banks (κολλυβιστικαὶ τράπεζαι) and accept «the sacred coinage of the Augusti» (τὸ θεῖον τῶν Σεβαστῶν νόμισμα). The papyrus does not specify the coin type in question (*denarii*, *tetradrachms* or other), nor whether the coins were local or imperial (though one may assume that the coins in questions were Roman-Egyptian rather than Roman-imperial). The only coins which the *strategos* allows bankers (and others) to refuse are the «absolutely spurious and counterfeit» ones (μάλιστα παρατύτου καὶ κιβδήλου). See Heinrichs (2007), for an analysis of this papyrus in the wider context of Roman coin prohibition.

[46] However, while the *strategos* of Oxyrhynchus was probably able to order local bankers to reopen their banks, he was unable to enforce official value in all or even most monetary transactions.

[47] The Augusti, whose newly minted coins the bankers were reluctant to accept, are Macrianus and Quietus. The two were the sons of the Roman commander at Samosata, who had managed to reorganise Roman troops in the East following the Romans' defeat by the Persians and Valerian's capture by king Shapur. Macrianus and Quietus were proclaimed emperors by the troops in Syria sometime after June 260, but eventually were defeated by Gallienus' troops in Thrace in 261. If the bankers' refusal to accept the coinage of these emperors was indeed due to political instability, their hesitations were soon proved to have been justified. See Grenfell – Hunt (1916) 23–25; Callu (1969) 186; De Blois (1976) 1–8. Rathbone (1996) 335f., also prefers a political explanation of the bankers refusal, since there seems to have been no metallurgical difference between new coins of Macrianus and Quietus and the previously existing coins of Valerian and Gallienus.

[48] Bogaert (1983) 46–50 [= Bogaert (1994) 109–112]; Heinrichs (2007) 92.

[49] For a description of Diocletian's reform of 294/96, see Hendy (1985) 449–462; Carson (1990) 142–149, 237f.; King (1993a); Aubert (2003); Corbier (2005) 335f. (though her analogy to «the monetary system of Nero» should not necessarily be seen as correct); Carrié (2007b) 146f. For Diocletian's 301 monetary reform, see also Roueché – Reynolds (1989) 252–318, esp. 262–265. It was only at the end of the third century or the beginning of the fourth that the Roman monetary system traditionally linked with the *denarius* came to its end (though until late in the fifth century the *denarius* was still referred to as a unit of account). Under the reigns of Diocletian and Constantine a new monetary system eventually emerged which consisted of the gold *solidus* (and other gold denominations related to it), a new silver denomination with a high silver content but with low circulation known by the name *argenteus*, and small-

words, despite extreme debasement, the Roman monetary system remained in force and debased coins of similar-looking types and denominations were minted more or less continuously for at least another generation.[50] How can this time gap be explained? Theoretically it could be that the public's reaction to the new and extremely low standards was so slow that its effects were only seen in the long term, thirty years after the lowest standards were first introduced. However, such an explanation assumes that the Roman public was to a large extent quite naïve; it either did not realise that new coins were so heavily debased or it did not grasp the potential implications of that debasement. Given that metallic content of coins did matter – as hoarding patterns, imperial minting habits and many ancient references to adulterated coins seem to suggest – such long lasting naïveté on the public's behalf is hardly convincing. Probably only a few years of repeated minting in the lowest metallic values would have been sufficient for the public to have realised the new reality and to turn its back on the coinage.[51] One could expect this to have been the case had the metallic content been the only or by far the most influential factor in determining the value and validity of Roman coins. In such a case, the dramatic debasement of the so-called «silver» coinage alone would have been enough to deprive Roman coins of their former value and to initiate an irreversible process of change, in which one monetary system declined and was eventually replaced by another.

The fact that coin production in low metallic content clearly did continue between the 260s and the 290s raises a need to find a different explanation of the system's collapse; an explanation which would not attribute the entire cause to coin quality alone, but would consider additional factors. Although the lowest metallic values probably affected the use of Roman coinage, it may not have been enough by itself to initiate the collapse of the system. Less quantifiable elements, such as inertia and trust,[52] also

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change base-metal coinage; see Hendy (1985) 284, 449–467; Harl (1996) 148–169; Corbier (2005) 352f.; Carrié (2007b). The use of the name *solidus* for the new gold coin is first attested in the Aezani copy of Diocletian's Prices Edict, see Crawford – Reynolds (1979) (first published by R. and F. Naumann, Der Rundbau in Aezani, 1973). On denominations circulating in the fourth century CE, see King (1993a); Cope – King et al. (1997) 7–9.

[50] On the volume of coin minting during the period 260–290 see Callu (1969) 330–355; Howgego (1995) 127; Harl (1996) 130–136; Carrié (2007b) 138f. (and 147–150, 163, where he stresses the continuation into the fourth century of Roman minting in billon).

[51] Hoarding patterns suggest that by the 260s the majority of coins available for hoarding were coins minted from the Severan period onwards, and usually even after the Severans; see Callu (1969) 260–287; Schubert (1992). In Britain hoards dated to 260–280 tend to contain mainly coins minted from the 240s, and by the 270s they usually hold a majority of post-253 coins; see Bland – Besly (1983) esp. 15–18; Bland – Burnett (1988); Bland (1992). In Gaul and the German provinces the majority of coins available by the 260s seem to have been minted after 249; see Haupt (2001).

[52] Scheidel (2010) considers inertia and trust as being one and the same type of factor and does not attribute to either much importance, but instead considers coin quality and quantity as the most influential factors on the system's stability.

played a role in creating the conditions for change. It has rightly been argued that public trust in the government and in the monetary order it promoted influenced monetary behaviour, thereby affecting the functioning of the monetary system and consequently, (and circularly, one may add) the decisions made by the minting authorities.[53] But it was not the grave military conditions of the mid third century, nor the political instability of that time, by themselves which caused public trust in the monetary order to decline.[54] Rather, as the following section argues, it was the monetary actions of Aurelian's administration, and specifically his 274 monetary reform, which unintentionally placed public trust under severe, destructive pressure.[55]

III. Aurelian's monetary reform, 274 CE

It is generally agreed that by the time Aurelian obtained imperial power the empire was in a grave condition. In the west, Gaul and the German provinces were ruled by a different line of emperors separated from Rome since 260.[56] In the east, following Valerian's capture by the Persians in 260, Roman provinces from Galatia in Asia Minor as far as Egypt were in practice ruled by Palmyrene leaders, first by Odaenathus and then by his wife Zenobia and son Vaballathus.[57] Not only was the empire torn apart by different rulers, it was also exposed to repeated raids by barbarian tribes.[58] Aurelian, who rose to power from the ranks of the army commanders, faced the military challenges with much success. In 270/71 he defeated the Vandals who invaded the Danube provinces and the Juthungi and Alamanni who invaded northern Italy;[59] in 272 he

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[53] For studies which put forward the importance of trust in the coinage, especially during the first three quarters of the third century CE, see Strobel (1993), (2002); Wolters (1999), (2004); Carrié (2007b).

[54] As is argued, for example, by Strobel (1993).

[55] It has already been argued that Aurelian's reform was a watershed in the monetary history of the empire, see Strobel (1993) 277f.; Howgego (1995) 125–127; Rathbone (1996), (1997); Carrié (2007b).

[56] HA, trig. tyr. 3.2–7, 5.1–3, 6.1–3, 8.1, 24.1; Zos. 1.38.2; Eutr. 9.9–10; Aur.Vict. Caes. 33.8–14.

[57] The military and political disorder in the eastern provinces, which followed the Romans' defeat of 260, was poorly coped with by Gallienus (Zos. 1.36; Eutr. 9.7), who eventually was compelled to acknowledge the legitimacy of the Palmyrene rulers (Zos. 1.39.1), in effect the defenders of the eastern provinces (HA, trig. tyr.15.1–5, 27–28, 30.2–3, 30.7–8; Zos. 1.39, 1.44.1, 1.50.1; Eutr. 9.10). See also, Watson (1999) 57–69; Drinkwater (2005) 44–47.

[58] For invasions under Gallienus, see HA, Gall. 13.6–9; Zos. 1.37.2–3, 1.39.1; Eutr. 9.8; Aur.Vict. Caes. 33.3. For those under Claudius, see HA, Claud. 6.2–3, 7.6; Zos. 1.42–43; Eutr. 9.11.2; Aur.Vict. Caes. 34.3–5.

[59] Zos. 1.48.1–1.49.2, speaks of Scythians in the Danube area and Alamanni in Italy; Aur.Vict. Caes. 35.2, tells of the Alamanni invading Italy; HA, Aurel. 18.2–3, 21.1–4, reports Suebi and Marcomanni invading Italy and Sarmatians invading Pannonia; Dexippos, FGrHist IIA 460 F6–7, and FHG III 682–86, knows of Iuthungi in Italy and of a war against the Vandals (and see discussion in Janiszewski [2006] 111f.). See also Watson (1999) 48–52; Estiot (2004) 10–13.

fought against the Goths;[60] in 272–273 he fought and finally defeated Zenobia and her Palmyrene forces;[61] and in 274 he defeated Tetricus of the Gallic provinces,[62] reuniting the empire and taking on the imperial title of *Restitutor Orbis*.[63]

The grave circumstances of the time had also had their impact on Roman coins. Since the 240s minting of *denarii* was practically replaced by that of radiate billon coins (the so-called *antoniniani*) while minting of any smaller denominations was significantly reduced. By the 260s debasement reached unprecedented levels, in effect turning most of the empire's coinage into base-metal coinage. Even gold coins did not escape reduction, certainly in weight but also in fineness.[64] But it was not only the ‹legal› («imperially authorised», one may call it) debasement that Aurelian's administration had to deal with. In 271, shortly after he gained the imperial throne, the mint-workers (*monetarii*) at Rome had revolted led by the mint's *rationalis*, Felicissimus.[65] The precise details of the revolt – brutally suppressed by Aurelian[66] – are uncertain,[67] but it appears that prior to it the *monetarii* were in fact producing counterfeits of some sort, presumably skimming off some of the precious metal initially intended for the

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[60] HA, Aurel. 22.2; Amm. 31.5.17; Eutr. 9.13.1. See also Watson (1999) 54–56.

[61] HA, Aurel. 22–31; Zos. 1.50.2–1.61.1. The first major battle took place at Antioch (HA, Aurel. 22.1, 25.1; Zos. 1.50.3–4; Eutr. 9.13.2), then one at Daphne (HA, Aurel. 22.1, 25.1; Zos. 1.52.1–2), another at Emesa (HA, Aurel. 22.2–5, 25.2–4; Zos. 1.52.3–1.53.3), until at last Palmyra itself was captured (HA, Aurel. 26.1, 28.1–3; Zos. 1.54.2–1.56.2) and Zenobia was led in triumph at Rome (HA, Aurel. 30.3, trig. tyr. 30.3, 30.24–26). See also Watson (1999) 70–84; Estiot (2004) 14–20.

[62] HA, Aurel. 32.3; trig. tyr. 24.2–5.; Zos. 1.61.2; Eutr. 9.13.1; Aur.Vict. Caes. 35.3–5. See also Watson (1999) 92–98; Estiot (2004) 22f.

[63] For an account of these events see Drinkwater (2005) 51–53. The title appears on many of Aurelian's coins, Göbl (1995); Watson (1999) 98–100; Estiot (2004).

[64] King (1993b) esp. 444f.; Bland (1996); Estiot (1999a) 52–54.

[65] HA, Aurel. 38.2–4; Aur.Vict. Caes. 35.6; epit. Caes. 35.4; Eutr. 9.14.1; Zos. 1.49.2, reports an uprising in Rome but does not mention the *monetarii*; Joh. Malalas 12.30, reports a revolt of the mint-workers though this, according to Malalas took place in Antioch rather than in Rome. On Felicissimus, see Jones et al. (1971) 331; MacMillan Conway (2006) 10f. On the role of the *rationalis*, see Jones (1964) 50, 435 esp. n. 62; Sutherland (1973) 88f.; Peachin (1986) 103f.; Pack (1992) 267–270 esp. n. 47.

[66] According to Aur. Vict. Caes. 35.6, the number of deaths at the main battle on the Caelian Hill reached 7,000 (though see Pack [1992] 274 n. 70); Zos. 1.49.2, reports that after the revolt was suppressed senators (τινῶν ἀπὸ τῆς γερουσίας) were trailed to death; Eutrop. 9.14.1, tells of the executions of «many noblemen» (*Plurimos nobiles capite damnauit*); and the anonymous writer of the epit. 35.4, simply mentions that Aurelian defeated the rebels with *ultima crudelitate*.

[67] Most scholars attribute Malalas' report of a revolt at Antioch to his misunderstanding of the events and agree that the revolt took place in the city of Rome. For a different view, see Peachin (1983), though his is generally a minority view; and MacMillan Conway (2006), who thinks two revolts took place, one at Antioch and the other at Rome. However, both underrate Malalas' dubious credibility on this matter and fail to account for his lack of mention of a revolt (of any sort) at Rome. On the *monetarii* in Antioch, see also Pack (1992).

imperial coinage;[68] and that this malpractice was somehow connected with their decision to revolt.[69]

How important in the eyes of imperial government the state of the coinage was, is clearly demonstrated by Aurelian's 274 monetary reform. The specific political motivation in initiating the reform is basically uncertain. It seems that prior to the year 274 Aurelian was likely to have been busy establishing his new rule, fighting rivals and invaders, and reuniting imperial power under his authority. He might not have had an opportunity to dedicate his full attention to domestic matters less urgent to his political survival, such as rearranging the currency. However, given that at least since Gallienus' sole reign different mints throughout the empire minted billon to different fineness standards, the reunification of all imperial mints under one emperor could in itself have been sufficient to instigate some sort of coin reform, even if only to apply a unified standard at all mints.[70] Be that as it may, the few available sources offer no clear evidence for imperial motivation; hence, any explanation provided is hardly anything more than speculative.

The following paragraphs present the evidence for the 274 reform – the abundant though not unproblematic numismatic evidence,[71] the scarce literary evidence (mainly, Zosimus) and the documentary evidence (i.e. prices).

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[68] Eutrop. 9.14.1, reports a «coinage corrupted» (*uitiatis pecuniis*); Aur. Vict. Caes. 35.6, writes that the mint-workers «gnawed the money marks» (*nummariam notam corrosissent*). Turcan (1969) reads Victor's obscure phrasing to indicate that the mint-workers were notching the coins and keeping the metal grains to themselves.

[69] Göbl (1995) 71–79, argues that coins minted by the mint of Mediolanum during the end of Gallienus' reign and that of Claudius were of better fineness compared to coins struck by other mints. This, according to him, was due to the fact that the mint was under the jurisdiction of the strict commander Aurelian who later, on becoming emperor, tried to enforce the same level of control also at the mint of Rome, consequently leading to the revolt. Estiot (2004) 13, 40, too ascribes the beginning of this malpractice to the reign of Gallienus. For a different view see Palmer (1980) esp. 219f., who suggests that the accusations against the moneyers are merely echoes of imperial propaganda, whose aim was to justify the cruelty with which the revolt was suppressed and to hide (as much as possible) the real motivation leading to its outbreak; namely, the broad discontent created by Aurelian's intention to build new walls around Rome, thus enabling stricter reinforcement of customs on goods imported into the city. (I would like to thank Prof. A. K. Bowman for drawing my attention to this publication).

[70] That different fineness standards were applied to billon coins in different imperial mints during the mid third century, especially when Eastern and Western mints are compared, was shown by Tyler (1972), (1975). (I would like to thank Dr. C. E. King for bringing these publications to my attention). What is more, King and Northover's metal analyses results show that after Aurelian gained control of the East, the silver fineness of his coins from Antioch and Tripolis dropped to the levels of that in the West; see Cope – King et al. (1997) 80, 89–92. Support for this notion can also be found in the reorganisation of mints and *officinae* which occurred as part of Aurelian's 274 reform, see Estiot (2004) 41.

[71] Estiot (2004) now serves as the best starting point for these.

During the third century the weights of gold coins had become more and more scattered around slowly decreasing mean standards, until eventually under the sole reign of Gallienus (260–268) clear steady standards can hardly be detected anymore.[72] By the 270s the Roman gold coinage suffered reduction not only in weight but also in fineness.[73] Under Aurelian from 270 onwards gold was struck at roughly 60 coins to a pound with an average weight of about 5.45 grams. Starting from 274, the weight of gold coins was increased to about 50 coins to a pound and some of these new coins were now struck on their reverse with IL or I.L.[74] As the letter L stands for the Latin numeral 50, it seems only reasonable that the new mark indicated, in fact publicised, the improvement in the coins' weight.[75] This view is reinforced by the evidence of Diocletian's coinage: his early gold coins struck at 70 coins to a pound sometimes bear on their reverse the Greek letter O (standing for the numeral 70); his post-286 gold coins struck at 60 coins to a pound sometimes bear on their reverse the Greek letter Ξ (standing for the numeral 60); and his post-294 silver coin struck at 96 coins to a pound sometimes bear on their reverse the letters XCVI (standing for the numeral 96).[76] One may assume that the numerical marks on Diocletian's coins, which correspond with the coins' weight, were in line with an already existing minting habit; a minting habit which can be traced back to Aurelian's introduction of the L mark on his new and improved gold coins. The improvement in Aurelian's gold coins must have had implications for the value of these coins; otherwise, what incentive there was to publicise it?

The question of which factors determined the value of Roman gold coins in the second half of the third century is a much debated one, for which there is no decisive evidence. It is not clear whether by the 270s the value of gold coins was officially fluctuating according to their metallic value or was based on fixed exchange rates.[77] If Cassius Dio's testimony is representative of his own days, then under Alexander Severus one *aureus* was still officially tariffed at 25 *denarii*.[78] But after this date evidence becomes awfully scarce, mainly documentary, and usually indicative rather than definite. The

[72] Bolin (1958) 252–254; Crawford (1975) 570; Burnett (1987) 112f.; King (1993b) 439f.; Bland (1996); Estiot (1999a) esp. 53f. For a summary of the process, see Estiot (2004) 40f.; Verboven (2007).

[73] King (1993b) esp. 445–447; Estiot (1999a), (1999b) esp. 381–387.

[74] Webb (1927) 267, 286; Carson (1990) 116f., 235f.; Göbl (1995) 84–97, esp. 95f.; Estiot (1999b) esp. 378f.; Estiot (2004) 48.

[75] Webb (1927) 267, 286; Carson (1990) 117, 236; Estiot (1999b) esp. 378f.; Watson (1999) 131; Estiot (2004) 48.

[76] Bolin (1958) 292–296; Sutherland (1967) 93f.; Crawford (1975) 578; Carson (1990) 132–135, 143–147.

[77] According to Estiot (1999a) 53f., the latter possibility should be applied for the period 250–275.

[78] Dio 55.12.4–5. For dating the validity of this statement to Dio's own time rather than that of Augustus see Buttrey (1961); Bland (1996).

evidence there is suggests that a 1:25 ratio between *aurei* and *denarii* was not kept at all times, and at least on several occasions gold coins were in fact tariffed at a higher value.[79] Even so, this is no decisive proof for a change in official values. It represents only some private transactions, thus merely indicating that official values (perhaps still at the Augustan 1:25 ratio?) were not kept in all transactions.[80]

Unlike debasement in the so-called «silver» coinage – which, at least at the beginning of the process, could be hidden from the untrained eyes of less professional money users – the government's adulteration of gold coinage was performed mainly through weight reductions, which could easily be detected even by an inexperienced coin user. Hence, one could assume that the mid third century weight reductions of gold coins had a destructive impact on the stability of their value.[81] What is clear though is that by 301, when Diocletian published his Prices Edict, the value of gold coins fluctuated according to their weights; meaning that gold coins were treated more like bullion than like a stable measurement of value.[82] As there is no indication that this was a novelty of Diocletian in 301, it seems reasonable to assume that flexible

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[79] The evidence includes two inscriptions from Nubia dated to the time of Philip the Arab (244–249) (CIG 5008 and 5010), on the basis of which Bolin (1958) 278–281, concluded that under Philip's reign the value of gold coins fluctuated according to their metallic content. But see Carson (1965) 227, for criticism reducing the decisiveness of Bolin's statement to a mere suggestion. An inscription from Italy dated probably to the third century CE, see CIL VI 29700, records payments to administrators with the higher ranked receiving one gold coin while those ranking just beneath them received 25 *denarii*. This suggests there was a difference between the two payment groups, with gold coin categorised superior to 25 *denarii*, either because it was more prestigious or because it was in effect worth more; see also, Mrozek (1978) 84f. An inscription from Thorigny in Gaul dated c. 220 CE (CIL XIII 3162) tells of a military officer who was granted his salary *in auro*, implying this was a special tribute which probably concealed advantages other than mere honour; see Pflaum (1948) 9, 11, 26f.; and more recently, Vipard (2008) 59f., 100f.; see also, Howgego (1995) 142; Verboven (2007) 249f. Two legal texts, one by Gaius (Inst. 4.46) the other by Ulpian (Dig. 2.4.24), mention a penalty for what appears to have been the same offence – the earlier specifies a sum of 10,000 *sestertii* while the later a sum of 50 *aurei*. These texts have been seen as proof that a 1:25 ratio between *aurei* and *denarii* was no longer in force by the late Severan period; see Heichelheim (1933) 104; Carson (1965) 227. But see Buttrey (1961) 40f. (who refers to L. West, Gold and Silver Standards in the Roman Empire, 1941, 132f. [non vidi]), for why this is not sufficient evidence for the *aureus*' value (namely, it could be that the fine was changed between the days of Gaius and those of Ulpian). See also, Verboven (2007) esp. 252–255, who suggests that official values were fixed but that bank commissions added to them could in fact vary.

[80] Howgego (1995) 126.

[81] Estiot (1999a). Crawford (1975) 569, suggests that these reductions had made the 1:25 ratio between *aurei* and *denarii* invalid as early as the 240s.

[82] As the Aezani Copy of the Prices Edict indicates, a pound of gold was tariffed at 72,000 *denarii* whether in coins (*solidi*) or in bullion: *[De aur]o … [Aur]i obruzae in regulis sive / [in] solidis pondum unum — LXXII / [Au]ri neti pondum unum — LXXII*. See Crawford – Reynolds (1979) 164, 176f. This means that gold coins practically functioned as goods (*merx*) rather than a stable unit of measurement; and see also Lo Cascio (1996) 285.

values of gold coins were the monetary reality, both officially and in practice, before his 301 reform and maybe even before his 294/96 reform. It could be that gold coins were already treated as bullion during the 270s and perhaps even as early as the 250s.[83] Had this been the case, the new marks on Aurelian's post-274 gold coins publicising the improvement in their weight could potentially be seen as part of a more profound change in policy, which made such an improvement even more significant. Now, the following is only a suggestion for which there is currently no conclusive evidence. However, hypothetically it could be that by the 260s the common monetary practice was to exchange gold coins according to their individual weight (and perhaps also fineness);[84] this contra to official tariff which was perhaps still 25 *denarii* to an *aureus*. It could be that as part of his reform Aurelian legalised the existing monetary practice by making the official value of gold coins equal their metallic value. In other words, in 274 Aurelian formally acknowledged the flexible nature of the value of gold coinage, officially detaching it from a fixed exchange rate in terms of *denarii* (or any other non-gold denomination, for that matter).[85] If indeed the reform promoted such fundamental change in the nature of gold coinage and its relation to the rest of the currency, that would have altered the working assumptions of the Roman monetary system as a whole and disturbed the base for public trust in it. A detachment of gold coins from an official exchange rate stated in *denarii* made pressing the need to attest the superiority of Aurelian's own newly minted gold coins. This was achieved by publicising the improvement in weight on the coins themselves using the IL mark. Although this is a speculative explanation, I believe it fits well with all available evidence to produce a reasonable working hypothesis.

Let us turn back to the so-called «silver» coinage of Aurelian. In early 274 Aurelian issued two series of newly minted billon coins – the mid third century successors of the once silver coins of Rome – which were of a somewhat improved quality compared to his previous coins and the coins of his immediate predecessors. Current estimates suggest that the weights and fineness of these new coin types were slightly increased, their silver content improved from probably around 2 or 3 per cent to almost 5 per cent.[86] The smaller billon coins with laureate imperial portraits, usually considered in research to be *denarii*, were now sometimes marked with the letters

[83] See n. 79 above.

[84] King (1993b) 446, suggests that consequently due to «the multiplicity of denominations and the wide range of weights within them», in the 260s «it may have been necessary to weigh the gold coins of the period in order to effect a transaction».

[85] See also Howgego (1995) 125f., who suggested that Aurelian's reform officially detached the monetary system from a fixed rate to gold.

[86] Cope – King et al. (1997) 5, 71, 77–80, 91f., 148f. Prior to Aurelian's reform radiate billon coins (i.e. *antoniniani*) were minted at varying weights, between 86 and 98 coins to a (Roman) pound. After the 274 reform their weight varies between 80 and 90 coins to a pound. See Carson (1990) 116f.; Watson (1999) 12; Estiot (2004) 41.

VSV.[87] The abundance of larger billon coins with radiate imperial portrait, often referred to in research as *antoniniani*, were now marked with XXI, or the similar looking XX.I or XX, or its equivalent Greek version KA.[88] The meanings of both these mark types have been subject to long scholarly debates. Yet a few assertions can be stated with some certainty. The difference between the marks on laureate and radiate coins must have assisted the distinction between the two types. But more significantly, new marks appearing at the same time on similar-looking coins produced in different imperial mints throughout the empire can only be evidence for a centralized imperial decision. Additionally, since the new marks are clearly visible they probably indicated, in fact publicised, some sort of change in the coinage, either in its value, its quality, or in both.[89]

The exact meaning of the new XXI marks has been subject to great scholarly controversy. Generally, opinions tend to divide into two groups: one explaining XXI as a face-value mark, which determined the official value of one coin in terms of another (thus, ‹twenty equals one›);[90] the other explaining XXI as a ratio mark, which indicated the relation between two metal components (thus, each coin potentially holding

[87] For a summary of the possible meanings of VSV, see Cubelli (1992) 77f. The more accepted view in research sees VSV as an abbreviation of the Latin *usualis*; in this context meaning ‹usual›, ‹normal› or ‹common›, and it probably stood for the expression *denarius communis* known also from Diocletian's Prices Edict of 301 CE. See Jones (1974) 196; Crawford (1975) 576, esp. n. 69; Carson (1990) 117, 237; Watson (1999) 235; Estiot (2004) 41. Webb, on the other hand, thought VSV stands for the Latin phrase *Vota Soluta Quinquennalia* celebrating the beginning of Aurelian's fifth regnal year; see Webb (1927) 14. (It should be noted though that H. Mattingly in editing this volume of RIC differed from Webb and preferred the *usualis* interpretation; see ibid. n. 1).

[88] Starting from 274, imperial mints in Rome, Cyzicus and Antioch minted radiate billon coins usually marked with XXI; in Siscia these were marked with either XXI or XX.I; in Ticinum with XX; in Serdica with XXI or occasionally with the equivalent Greek KA; in Tripolis with Greek KA; and only in Lugdunum were radiate billon coins minted without any of the new marks. See Webb (1927) 265–318; Carson (1990) 118–121; Watson (1999) 129; Estiot (2004).

[89] Assuming that the marks referred to the metallic composition of the coins does not imply that the metallic value necessarily coincided with the official value. Rather, the marks could have been struck in order to reaffirm public trust in the coinage; see Lo Cascio (1996) 281f. This becomes even more probable, if one assumes that minting authorities had reason to suspect that public trust in the currency might be questioned (and the following passages argue that such reasons existed).

[90] Webb (1927) 9–13, argued XXI should be understood as standing for ‹20 coins of this sort equal 1 *aureus*›; Mattingly (1961) 307, was in favour of understanding the mark as standing for ‹1 new coin equals 20 *libellae*›; Jones (1974) 196, thought it stood for ‹1 new coin equals 20 *sestertii*›; and Crawford (1975) 575–577, esp. n. 69, reads the mark as ‹1 new coin equals 20 *asses*›. The claim put forth by Estiot (2004) 40–44, that 20 of the new billon coins were worth one pure silver coin of the same weight, which she refers to as *argenteus*, is not unproblematic, since such a silver coin dating to Aurelian's reign has never yet been found. For a summary of the debate supporting a value mark interpretation, see Cubelli (1992) 68–75.

a 20:1 ratio of some sort).[91] Today, the latter view is generally preferred. What militates in favour of a ratio-of-metals explanation, are the Latin XI mark and its equivalent Greek IA struck on some of Tacitus' (275–276) and Carus' (282–283) radiate coins (with a few coins depicting Carus' portrait doubly-radiate). These coins seem to hold about 10 per cent silver content, suggesting that the marks on them should be understood as representing a 10:1 ratio between the two dominant metals of the coins (in a similar manner to the XXI mark and a 20:1 ratio).[92] Accepting a ratio-of-metals explanation does not contradict a possibility that Aurelian's reform also re-tariffed the coins in addition to openly improving their metallic content. In any case, a general agreement exists that there is a difference between billon coins minted prior to and following the 274 reform and that this difference includes two elements: a slight improvement in the coins' fineness and the introduction of new marks on their reverse. While the meaning of the new marks remains debateable, their purpose was clearly declarative. Thus their precise meaning should not matter for their role in emphasising the distinction between the new, reformed coins and the old ones.

Our only literary evidence for Aurelian's 274 monetary reform is the late fifth century historian Zosimus, who reports it after describing Aurelian's victories in the east over Zenobia and in the west over Tetricus.[93] His account reads as follows: «Then he [Aurelian] publicly distributed a new silver-coin, after providing [that] the people sell the counterfeit coin, and thus releasing contracts from confusion.»[94] Zosimus reports some sort of a coin exchange, in the course of which a new silver coin (τὸ ἀργύριον νέον) was accepted in return for an existing counterfeit one (τὸ κίβδηλον). The precise details of this exchange – to whom exactly did τοὺς ἀπὸ τοῦ δήμου refer and what was the procedure applied for «selling» (ἀποδόσθαι) the coins – are not clear;[95] and it is

[91] Cope (1968) 117f., suggested XXI signified that the coin's alloy held ‹20 obols of silver to one Roman pound of bronze›; Bolin (1958) 291f., followed by Hendy (1985) 454–456, supports an explanation of the mark as saying ‹in this coin, for every 20 fractions there is 1 fraction of silver›; Callu et al. (1979), whose view is generally accepted today, interpret XXI as standing for ‹1 part of silver to 20 parts of bronze›. For a summary of the debate supporting a metallic ratio mark interpretation, see Cubelli (1992) 75f.

[92] The enlightening metallurgical results were first published by Callu et al. (1979). See also, Burnett (1987) 124; Carson (1990) 124–131, 235–237; Estiot (2004) 40–42; Corbier (2005) 332. Additionally, the IL mark on Aurelian's gold, and the O and later Ξ marks on Diocletian's gold and the XCVI mark on his silver, all suggest that a metal related interpretation for XXI is the most probable one (see nn. 74–76 above).

[93] Zos. 1.61.1–2.

[94] Zos. 1.61.3: Ἤδη δὲ καὶ ἀργύριον νέον δημοσίᾳ διέδωκεν, τὸ κίβδηλον ἀποδόσθαι τοὺς ἀπὸ τοῦ δήμου παρασκευάσας, τούτῳ τε τὰ συμβόλαια συγχύσεως ἀπαλλάξας. See Paschoud (2000).

[95] Paschoud's (2000) translation reads «non sans avoir prévu que la plèbe restitue en échange les pièces de mauvais aloi». Thus, τοὺς ἀπὸ τοῦ δήμου is translated as ‹*plebs*› and ἀποδόσθαι as ‹to give back in exchange›. However, the verb ἀποδίδωμι, though generally meaning ‹to give back› or ‹to render›, is here conjugated in the middle voice, thus meaning ‹to give away of one's own will› or ‹to sell›. Ridley's (1982) translation reads «after arranging for the

doubtful whether they were clear to Zosimus himself, writing more than two-hundred years after Aurelian's reform.[96] How did such an imperially initiated coin exchange effectively take place, assuming it did occur, is not known. It is unlikely that Roman authorities had the necessary resources, or probably even the incentive, to successfully impose an extensive exchange of all or most relevant coins in the empire.[97] And although some exchange could potentially be enforced via tax collection, it is more likely that any substantial coin exchange, if such had occurred, was carried out as a voluntary act. Moreover, such an initiative, if indeed it took place, was probably a symbolic gesture; carried out mainly in big urban centres or perhaps only in the location near to that of the emperor himself, which at the time was probably in the city of

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state to buy in the debased coinage»; while τοὺς ἀπὸ τοῦ δήμου could perhaps be understood as ‹the officials›, and hence as the reason for Ridley's ‹the state›, the reasons for translating ἀποδόσθαι as ‹to buy› are unclear to me.

[96] For a summary of the debate on Zosimus' sources, see Paschoud (2000) XXXVI–LXXI. In writing his first book Zosimus had most likely made use of the now-lost works of Dexippus and Eunapius (see, Blockley [1980]; Paschoud [2000] XL-XLVI). But it is not clear which sources he had used for writing the history of Aurelian's reign. More specifically, from where could Zosimus have learnt about Aurelian's monetary reform? Dexippus' Chronicle could not have been the source for this information, as it seems to have ended with the reign of Claudius II and in any case did not report events after September 270 (see Janiszewski [2006] 42–44). Eunapius' History seems to have begun from where Dexippus' Chronicle had ended, i.e. circa 270. However, its first book, reporting the events up until the reign of Julian, is presumed to have been a historical introduction which provided information in a condensed manner, further abbreviated by Zosimus (see Blockley [1981] 1–8, 97f.; Paschoud [2000] XLIV). Eunapius was writing in the late fourth or early fifth century and his sources of information for Aurelian's reign are not entirely clear (on the preservation of historical information in the fourth century, see Bleckmann [1992] 396–415, esp. 404–406; Paschoud [2000] XLIII–XLIV; Janiszewski [2006] 3–24, 431–464; on different literary traditions in portraying Aurelian's character, see Bleckmann [1992] 300–304). Dexippus on the other hand, was a contemporary of Aurelian, writing his Chronicle probably under this emperor (see Millar [1969]; Janiszewski [2006] 51f.), and his Scythica – an account of the Romans' wars against several Barbarian peoples in the region called Scythia, starting probably from 238 and continuing into Aurelian's reign (see Bleckmann [1992] 205–219; Janiszewski [2006] 109–113) – probably under his successor Probus (276–282) (see Millar [1969] 24–29; Janiszewski [2006] 109–113; for Dexippus' fragments, see Müller FHG [1849] 666–687, esp. 682–686 [F24, taken from his Scythica and mentioning Aurelian]). It is the latter work, Dexippus' Scythica, which had been suggested as Zosimus' source for (at least some of) the events of Aurelian's reign (see Blockley [1980]; Paschoud [2000] XLI–XLII, though Paschoud himself rejects this view, ibid. XLIII). But even if Zosimus' source for Aurelian's monetary reform had been a contemporary one, Zosimus' understanding of the reform's details may rightfully be questioned. The monetary reforms, which followed that of Aurelian's, had altered the monetary reality in such a way that made it very difficult for Zosimus to reconstruct correctly the monetary conditions of the 270s (for a similar line of argument concerning the enduring effects of monetary changes, see Heinrichs [2007] 87f.). (I would like to thank Mr. Renan Baker for discussing these points with me.)

[97] See Heinrichs (2007) esp. 85–87 and 92f., on the ineffectiveness (and lack of motivation) of the Roman government in intentionally withdrawing coins from circulation.

Rome.[98] It might be interpreted as an act of goodwill, publicly performed on a ceremonial occasion and corresponding to imperial propaganda. If so, the number of coins actually exchanged on this occasion must have been of a relatively limited scale.[99]

Regardless of the question of scale, a voluntary exchange of coins, even if a minor one, could only take place when people believe such exchange to be profitable; otherwise they would prefer to hold on to their old coins and avoid changing them whenever possible. Thus, if the government was interested in promoting such an exchange, its new coins should have had some sort of an advantage to encourage this. There are two possible scenarios in which this could have happened: either the new coins contained more precious metal or, they enjoyed higher official value, enlarging their purchasing power if only in the short term. That the first scenario is correct has been shown through metal analyses of the coins. But was an addition of approximately 3 per cent silver (and in no case more than 5 per cent) really sufficient to promote a voluntary coin exchange significant enough to be echoed in a historical report written almost two centuries afterwards? This question cannot be answered with any precision, but it does imply that an improvement in quality does not by itself preclude the possibility that the official value was increased as well.[100]

According to Zosimus the aim of the exchange was to avoid confusion, apparently between two very similar types of coin. These are most likely to have been the billon coins minted before and after 274. An imperial desire to initiate such an exchange demonstrates that the government wished the new coin type to be regarded as equiv-

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[98] To be concluded from the closing sentence in Zos. 1.61.3.; see also, Göbl (1995) 28f. Zosimus' report of the coin exchange is followed by an account of another imperial gesture – that of the distribution of bread to the Roman people, initiated by Aurelian before leaving the city in 274. If the distribution of bread was confined to the city of Rome alone, so can the coin exchange be understood as a measure performed solely in Rome, where a departing emperor wished to bestow benefactions on his capital. Paschoud (2000) 177f. n. 90, supports this suggestion (and refers to E. Condurachi, La réforme monétaire de l'empereur Aurélien et l'ἀργύριον νέον de Zosime, Rev. hist. du sud-est europ. 22, 1945, 138–146 [non vidi]). According to C. Gatti, Aurelian's aim in initiating the reform was to bestow benefactions on the less-fortunate sectors of society by increasing the coins' purchasing power, even if only for the short-term; see Gatti (1961) 102–106. However, one may doubt whether the needs of the less-fortunate could truly have been an incentive for imperial monetary policies.

[99] As far as I am aware of, none of the evidence which might indicate circulation patterns (namely, hoard evidence) presents clear cut evidence for recollection or withdrawing coins from circulation at any specific time during the 270s; see Callu (1969) 260–287; Bland (1992). However, see Estiot (2004) 43–53.

[100] In opposition to Estiot (2004) 41–44, who argues that as part of Aurelian's reform the official value of old pre-274 radiates (the so-called *antoniniani*) was actually decreased to only one *denarius* – the same value she ascribes to the new laureate VSV pieces – while the new reformed radiates marked with XXI (referred to as *aurelianii*) were officially tariffed at 2 *denarii*. However, this does not account for the government's motivation in initiating an exchange of the old coins for the new ones, nor does it account for the need «to avoid confusion», given by Zosimus as the reason for promoting a coin exchange (more about this in the following paragraph).

alent to the existing one. Since we know the two types differ in fineness, the practical meaning of such equivalence is that both types were probably issued under one and the same official value.[101] As the new type was metallically improved compared to its pre-reform counterpart,[102] such an improvement would have resulted in an additional financial burden on the imperial treasury. Hence, it is unlikely that the official value of both old and new coins was decreased or even maintained, for this would have offered no gain to imperial government. Rather, a new and increased official value was probably applied to both new and old coins.[103] How high this new value was cannot be determined from literary and numismatic evidence alone. But in theory, once intervention had occurred and the tool of arbitrary increase in official values had been applied, any value could be imposed.

Helpful for the discussion is the evidence for prices, as these reflect the purchasing power of the coinage. Pioneering work in this field was carried out during the 1990s for prices from Roman Egypt, showing, where an adequate chronology is possible, a relative consistency in price level from the last decades of the second century until the reign of Aurelian, when suddenly a tenfold rise in prices is observed.[104] Generally, various factors might account for a consistent rise in prices, not all of which are monetary.[105]

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[101] Contra Estiot (2004). The extent, to which such equivalence was effectively imposed in all circumstances, is a different matter. Egyptian papyri imply this might not have been the case, as might be suggested by the not uncommon use of expressions such as «new coins» and «old coins» (as well as «Ptolemaic coins») in Egyptian papyri from the years 267–291 CE; see Callu (1969) 186f.; Crawford (1975) 563 n. 12; Rathbone (1996).

[102] As available metallurgical studies suggest, and assuming that future research using Butcher – Ponting's analysis technique would not prove this assumption wrong.

[103] This claim, although not supported by a ratio-of-metals explanation of the XXI mark, is neither contradicted by it. It could be that the improvement in fineness, openly declared by the new mark, was intended to support the government's policy of re-tariffing. Hoping to avoid possible resistance, the government slightly improved the new coins, publicising this act with an observable feature struck on the coins themselves, with the aim of persuading the public to accept the new tariff. According to this line of argument, Aurelian's administration foresaw potential opposition to the re-tariffing and hence, advanced the declared metallic improvement as a precocious act, to support public trust in the coinage.

[104] Drexhage (1991), for example, 16f., 24f.; Wassink (1991), who observed a significant rise in prices between the 250s and the 270s; Strobel (1993) 274f.; Rathbone (1996), (1997). See also Crawford (1975) 567, 571, who had previously suggested a relative stability of prices more or less up until Aurelian's reign. Their approach is to be contrasted with a research tradition which saw the third century coin debasement as conclusive evidence for inflation, see for example, Jones (1974). On the need to support the claim for inflation with evidence for prices rather than coin debasement, see Strobel (1989) 20f., (1993) 276f.; as well as Callu (1969) 187, who suggested that inflation was not a necessary outcome of coin debasement but rather of its implications for coin quantity.

[105] Scheidel (2002), for example, explains the increase in prices during the end of the second century as a long-term outcome of the Antonine Plague. However, for the view that the price increase of the 180s was due to purely monetary reasons, see Carrié (2007b) 137.

It has been suggested that the significant price increase, attested as starting from the 270s onward, was due to a loss of public trust in the Roman government abilities in general; hence, also in its capacity to verify the validity of its currency.[106] While public trust in the government during the second half of the third century probably had declined, this by itself is no explanation for why the breaking point in trust occurred after 270 and not earlier; for example, during the early 250s, or immediately after Valerian's colossal defeat in 260, which left the empire's eastern provinces practically defenceless. What is more, the specific circumstances of the 270s suggest that what sparked the rise in prices was not the general political or military instability but rather, Aurelian's monetary reform.[107] The fact that prices did not re-stabilise in the decades which followed the reform, could be attributed to further governmental monetary interventions.[108] Diocletian (284–305) introduced several monetary reforms,[109] the first possibly in 286, only twelve years after that of Aurelian, then definitely in 294/96 and again in 301.[110] Their final outcome, whose details are debatable, was again superseded under Constantine by yet another new monetary order. The accumulated affect of all these governmental interventions prevented the opportunity of re-estab-

[106] Strobel (1989) 20–22; Drexhage (1991); Strobel (1993) 270–279, (2002).

[107] See Howgego (1995) 133: «… the timing of price rises suggests that Aurelian's reform was in some way responsible for the inflation from c. 274/5»; as well as the much more decisive statement of Carrié (2007b) 144f. On the reform of Egyptian tetradrachms simultaneously taking place in 274/75, see Callu (1969) 184–190; Metcalf (1987); Strobel (1993) 272f.; Howgego (1995) 132; Rathbone (1996) 336–338. For the view that the reform of the Egyptian coinage slightly pre-dated that of the imperial coinage, see Estiot (2004) 20f., 42. For metal analyses of Roman-Egyptian tetradrachms of the 260–280 and especially the slight increase in their silver content in 274, see Cope – King et al. (1997) 6f., 12. On coherencies between Roman coinage and Roman Egyptian coinage, as well as co-operation of the mint of Alexandria with other mints in the empire, see Burnett (2005).

[108] The price increase, which provoked Diocletian's famous Prices Edict of 301, is not likely to have been a continuation of the reaction to Aurelian's monetary reform, 25 years earlier. Had this been the case, one would have expected such an edict to be published sooner in Diocletian's reign rather than later. The price increase provoking this edict could have been an immediate reaction to the monetary reform of the same year, which seems slightly to pre-date the Prices Edict (on the dating of the two edicts, see Roueché – Reynolds [1989] 262f., 268; Corcoran [1996] 206). But, taking into account the duration of transport and communication in the Roman empire (on which, see Duncan-Jones [1990]), the proximity in time between the two edicts of 301 poses an obstacle for accepting this explanation. Hence, we are left with the possibility that the price increase, which provoked the Prices Edict in 301, was probably the unexpected and undesired consequences of Diocletian's own 294/96 reform; see Howgego (1995) 133; Corcoran (1996) 214f., 228; Rathbone (1996) 338.

[109] Rather than being a series of reforms, which were all part of a large-scale monetary plan, Diocletian's reforms are more likely to have been individual acts, each independently applied in order to deal with an unforeseen and unwanted monetary and/or fiscal situation.

[110] The first, in 286, concerned the standards of gold coins. The latter, in 301, is known from a fragmentary inscription found at Aphrodisias; see Erim et al. (1971).

lishing stability as well as public trust and thus, contributed to the continuing rise in prices.

The next part of the paper offers an economic model to help analyse Aurelian's monetary reform. Economic modelling is usually used as a predictive tool to portray common behaviour and project its outcome. When dealing with a historical case, economic modelling does not offer a forecast but rather, provides an explanation. Hence, the modelling process is applied the other way around. Given the final outcome of the historical economic process – namely, the sharp increase in prices dated to Aurelian's reign and presumably to his monetary reform – the model tries to construct a simplified version of reality. Starting from a schematic, abstract presentation, the model is developed in order to account for as many factors as the evidence allow, gradually adding more components to the discussion. The final outcome is a model which offers an explanation for both the nature of Aurelian's reform and its implications, indicating that it had much to do with the issue of public trust.

IV. Suggestion of an economic model

When thinking of how Roman coins operated as an accepted exchange procedure, the issue of their value is fundamental. How can their value in the eyes of their contemporaries be determined? Did it simply equal the value of the metal from which a coin was struck? Although the metallic content of specific coins was subject to variations,[111] Roman denominations were usually minted according to a defined metallic standard. This could have, and initially had, provided the base for the value of the coinage. However, had this still been the case at the beginning of the third century, one would have expected debasement to wear out the value of Roman coins, that is, to be manifested in the coinage's purchasing power. But, as already stated above, existing price evidence does not indicate such a process. Rather, it shows a relative stability in price level up until the 270s.[112] How can this be explained? What factors, other than metallic content, affected, indeed determined, the contemporary value of Roman coins in the period between the Antonines and Aurelian's reign?

To answer this question, the approach advanced here schematically categorises three distinct types of values: Metallic Value (V^M), Official Value (V^O) and Value of Exchange (V^E); all of which simultaneously co-existed in Roman coins. One may think of the value of Roman coins as a function of these three factors. Metallic value is simply the value of the metal from which a coin is made. Official value is the value which the authorities declare a coin to be worth, that is, the value at which a coin is issued; what today is called face value, although Roman minting authorities did not habitually

[111] Callu (1969) 237–249; Condamin – Picon (1972); Varoufakis (1998); Corbier (2005) 331.

[112] As convincingly discussed in Strobel (1989) 22f. For prices see n. 104 above.

strike value marks on the face of their coins.[113] Nonetheless, they certainly did issue coins under a specific, declared value. At the turn of the third century the official value, certainly of base metal coinage and probably also of silver coinage, was overvalued in relation to metallic value. Regrettably, for the period between Caracalla's introduction of the so-called *antoninianus* and Diocletian's Currency Edict of 301, official values of Roman coins are not known with certainty.[114] The value of exchange reflects a coin's purchasing power. It may fluctuate over time or alter in accordance with specific circumstance of local transaction. Even so, a range of exchange values could theoretically be converged to its probable value. The exchange value may differ from metallic value, as is the case with tokens and semi-tokens, but only by exceeding it. It cannot be lower than metallic value, since in such a hypothetical case, coin holders would prefer trading coins as ingots for their metallic value, rather than for their exchange value. Additionally, in the Roman case, exchange value probably did not exceeded official value. It would have produced no gain, nor serve any purpose, for the Roman authorities – the main creator of coined-money as well as the decider of its official value – to set an official value lower than what the public was willing to render for the coins, i.e. the exchange value. Thus, to generalise, exchange value was never lower than metallic value, neither higher than official value; and presented mathematically: $V^M \leq V^E \leq V^O$.

Excluding Caracalla's introduction of a new radiate silver coin in 214, there is no solid evidence for a large-scale monetary reform in the third century previous to that of Aurelian. That is, no evidence for any officially declared change in available denominations, in the way they related to one another, or in their official values.[115] Furthermore, Aurelian's reform is probably the only known reform to declare new official values for existing coins.[116] If this claim is accepted, as I believe it should be, then there is no reason to assume that official values of Roman coins were altered before 274.[117] Thus, in the two centuries preceding Aurelian, the behaviour of official value was constant. Under this assumption, and taking into account the debasement known from the numismatic evidence, the nominal tendencies of official and metallic values can be illustrated as suggested in figure (1):

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[113] During the period between Augustus' reign and Aurelian's reform value marks rarely appear on imperial coinage; though such marks can be found on some provincial coins, usually bronze ones, for example on some Alexandrian bronze, see Burnett et al. (1992) 30f.; Burnett (2005) 266.

[114] Burnett (1987) 122–129; Howgego (1995) 128f.; Corbier (2005) 330–332.

[115] See nn. 22–23 above.

[116] Caracalla's reform added a new denomination without altering the official values of existing ones.

[117] Carrié (2007b) 145, also argues for an arbitrary change in official values as part of Aurelian's 274 reform. It makes no practical difference to the model suggested here, whether such alteration affected all previously existing official values, arbitrarily changing the purchasing power of the currency in real terms, or altered the fundamental relation between the gold coinage and the rest of the currency (assuming that in 274 Aurelian had indeed acknowledged the flexible nature of the value of gold coins).

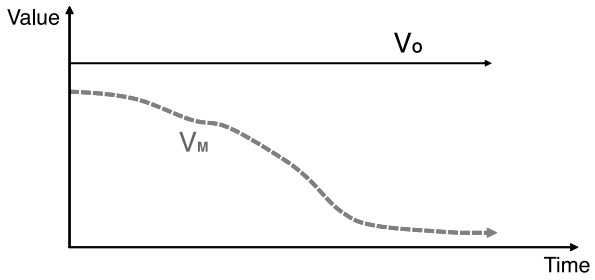

Figure 1

The upper constant line marked with V^O stands for official value, and the lower decreasing line marked with V^M stands for metallic value. Theoretically the exchange value (V^E) could be anywhere either on or between the two graphs of official and metallic values. In order to rethink its behaviour, the model presented here suggests a serious consideration of the effects of public trust. For convenience of discussion public trust is defined as an unknown function, $f(x)$, and some basic assumptions are made regarding this function:

(1) $f(x)$ is defined as following: $0 \leq f(x) \leq 1$

(2) The existence of public trust means a coin is accepted and therefore holds some exchange value (V^E) which could in theory vary from the metallic value (V^M).

(3) Public trust is secured to some extent – nevertheless it could be lost.

(4) Total public trust in a coin means it is accepted at its official value (V^O), thus:

if $f(x) = 1$

then $V^E = V^O$

(5) A total lack of trust means official value has no real effect on exchange value (V^E), thus:

if $f(x) = 0$

then $V^E = V^M$

Two possible ways to approach the issue of exchange value (V^E) and its relation to public trust are suggested; one stressing the role of official value (V^O) and the other stressing that of metallic value (V^M), and I start by observing the latter.

Now, all Roman coins have some metallic value, and in some cases a rather high one. Thus, metallic value could potentially assume a role of guarantee for hedging purposes; and most hoarding patterns strongly suggest this was so.[118] A coin could be melted down and its metallic content extracted. Therefore a coin's metallic value functions as a real asset to be realised in a case of severe financial crisis. When profound attrition of metallic content occurs, users may decide it can no longer provide them with satisfactory guarantees and thus refuse to receive it either at its official value or its previous exchange

[118] Bolin (1958) 336–357; Callu (1969); Bland – Besly (1983); Bland – Burnett (1988); Bland (1992); Schubert (1992); Haupt (2001); Lockyear (2007).

value. In other words, when metallic value declines severely – under a certain value defined in figure (2) below as V(α) – it might stop fulfilling its hedging role, leaving coin-users with no trustworthy security. This scenario could trigger a decline in public trust which, if severe enough, would generate a monetary crisis. The effect that a loss of public trust might have on the behaviour of exchange value is presented in figure (2):

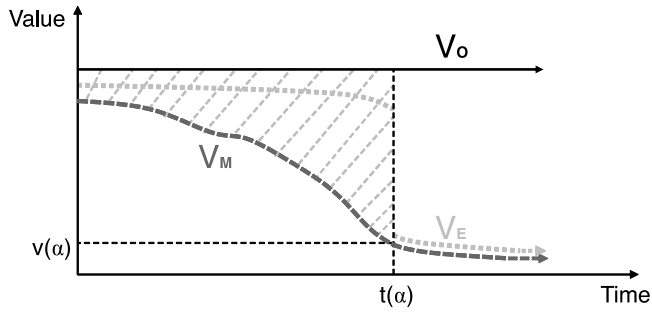

Figure 2

As figure (2) shows, when metallic value (V^M) declines beyond a certain value, defined as V(α), public trust is lost to such an extent that exchange value (V^E) declines until it equals the level of metallic value. It should be noticed that exactly the same graph can be applied to a loss of public trust due to severe instability of political conditions occurring at a certain point in time, t(α).[119] In the period previous to t(α) we have an unclear situation for exchange value, which theoretically could be anywhere between or on the two graphs. Thus:

In period 1:		$V^M \leq V^E \leq V^O$	
In period 2:	when	$V^M \leq V(\alpha)$	[or, alternatively, when political instability reaches a some sort of level at a certain point in time t(α)]
	then	$f(x) = 0$	[trust is lost]
	and	$V^E \downarrow$	[exchange value declines]
	until	$V^E = V^M$	[it equals metallic value]

This analysis however does not offer a full solution to the problem of exchange value. Not only does it not indicate the behaviour of exchange value during the first period, when trust prevails, it does not contain any indication of when the first period ends and the second untrustworthy period begins. In other words, the model tells us nothing about the coordinating event which generates a change in the behaviour of coin-users; nor does it indicate which V(α) is needed to initiate the change, that is, under which metallic value trust could no longer be maintained. Why should 90, 80, 50, 30, 10 or even 5 per cent silver all be sufficient to maintain the public trust in the coinage,

[119] For a politically oriented explanation for the decline in public trust, see Drexhage (1991); Strobel (1993), (2002).

but 2 per cent should not? The model in its current form does not offer an answer to this question. Perhaps a different approach, stressing the influence of official value rather than of metallic value, can assist the analysis.

Existing evidence suggests that the significant increase in prices started from the 270s onwards. However, the lowest metallic values are already attested a decade beforehand. What is more, price increase began after or simultaneously with Aurelian's 274 reform, which slightly improved the coinage. All these lead to the unavoidable question – were public trust and metallic value really so closely correlated?[120] A chronological gap between lowest metallic values and the rise in prices could perhaps be explained by a slow adaptation of price level to the new conditions of lack in trust, especially in a non-modern monetised economy. However, as mentioned above,[121] such an explanation assumes an unlikely naïveté from the Roman coin-using public. Moreover, it fails to define a precise mechanism for the coordinate event; why should «a slow adaptation period» be approximately 15 years (from lowest metallic values under Gallienus's reign until the price increase under Aurelian's) and not, for example, 30 years or, alternatively, only 5 years? Nothing in the model as it is described so far can assist in answering such a question. Hence, I would like to offer a different approach, one which is based on the same model but stresses the influence of official value and public trust (rather than of metallic value) on the behaviour of exchange value.

This approach assumes that exchange value did not always correspond in an exact manner to metallic value, and in fact in many cases it clearly did not.[122] Under this as-

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[120] Lendon (1990) thinks not; though his trust-related explanation does not consider so much the economic conditions as the political ones (namely, whether or not the minting emperor was still alive). Strobel (1989) 20f., (1993), and (2002) argues that changes in metallic content had no immediate influence on prices. His analysis ascribes the rise in prices to a loss of public trust due mainly to political and military instability. Clearly the political and military conditions of the time contributed to a reduction in public trust in the currency. However, this explanation does not provide a tool which sufficiently defines the coordinating event that triggered the decline in public trust. If the loss of trust was principally due to the political and military conditions, why, then, did it not occur in the 240s, following the terminal end of the Severan dynasty, or the 250s, after the murder of the Philippi? Were the conditions created by the barbaric invasions of the late 260s severer than those of the early 260s, following Shapur's victory over Valerian and the chaos it created in the eastern provinces? If political instability was indeed the main catalyst for the decline in trust, one would perhaps expect prices to rise at least a decade before the time they did. Be that as it may, the correlation between loss of public trust (in the currency) and a rise in price levels is certainly justified. Carrié (2007b) 141–143, too, stresses the significance of price stability as a manifestation of public trust, as he puts to it, «l'acceptation par le public du caractère fiduciaire de la monnaie».

[121] See p. 10 above.

[122] Strobel (1989) 20–22; Lo Cascio (1996), who rejects the assumption that metallic value and face value of Roman coins coincided with one another, especially in the third century CE; and Carrié (2007b). Lendon (1990), unconvincingly argues that the fact that the issuing emperor was still alive, or that he was succeeded by a legal heir (preferably a family member), added a premium to the value of that emperor's coins.

sumption, debasement meant that Roman coins were progressively operating as semi-tokens; their official value was having less and less to do with their metallic value and their fiduciary component slowly becoming more substantial.[123] Once the role of a fiduciary component is realised, the following reasoning should be acknowledged: As long as official value stayed stable and the government stayed loyal to its previous monetary commitments, there should have been no reason for a decline in public trust. In other words, as long as the government, in its transactions with private individuals, did not reject its own coinage and did not refuse to receive it in the value under which it was officially issued to begin with, there should have been no reason for the public to expect a change in this policy. Only when the government acted consistently, could the public's expectations of it be that it would continue doing so in the future. Problems began when the government ceased to obey its own monetary rules, whether by violating its previous monetary commitments, or by arbitrarily changing existing monetary values. This was the case under Aurelian, who in 274 changed the official values of the circulating coinage,[124] I believe, for the first time since the days of Augustus. This arbitrary violation of the so-called «rules of the monetary game» resulted in a sudden fall in public trust, which sent exchange value down to the level of metallic value, as is clearly shown in figure (3):

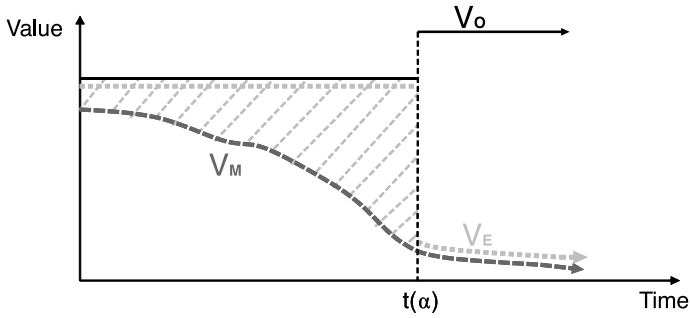

Figure 3

This model implies the following:

Through the course of time	$V^{M}\downarrow$, $V^{O}\rightarrow$	[metallic value declines, official value stays constant]
therefore	$f(x) = 1$	[trust maintained]
and	$V^{E} = V^{O}$	[exchange value equalled official value]
when suddenly	$V^{O}\uparrow$	[official value increased]
this resulted in	$f(x) = 0$	[loss of trust]

[123] Strobel (1989), (1993); Lo Cascio (1996) esp. 274, 284; Carrié (2007b).

[124] Whether this was done as an arbitrary act imposed on all denominations, or via a change in the fixed official ratio between gold coinage and the rest of the currency in circulation.

therefore	$V^E \downarrow$	[exchange value declined]
(meaning,	Prices↑)	
until	$V^E = V^M$	[exchange value equalled metallic value]

As figure (3) shows, through the course of time metallic value declined but official value, i.e. the value at which the government issued the coins, stayed constant. Since official value was kept at the same level and the government continued to accept its own coinage at the nominal value it was issued, there should have been no reason for a loss of public trust in the currency. As long as the public's expectations for consistency in official value were compatible with government actions, trust was maintained and exchange value more or less equalled official value.[125] When official value was suddenly increased, the public had no longer reason to assume that government promises for future stability of official values would be kept. In other words, once the government arbitrarily changed official values, thus deviating from its long continued policy, the public's expectations changed accordingly. The assumption that the government would now resume consistency had no sustainable grounds. Instead, public expectations were that it would re-tariff official value whenever it saw fit. This resulted in the loss of public trust in the official value of the currency and the decline of exchange value down to the levels of metallic value. As a consequence, the accumulated effect of debasement suddenly became visible and the practical result was a significant rise in prices.

Thus, the model offers an explanation why from the end of Aurelian's reign onwards a considerable rise in prices is observed. As debasement became graver, the tension between official and metallic values grew. According to this model, the coordinating event, which initiated a change in the general behaviour of exchange value, was the loss of public trust, provoked by the government arbitrarily altering official value.[126] In the following decade Aurelian's successors seem to have followed the policy set by his monetary reform. Tacitus (275–276), Probus (276–282), Carus (282–283) and his sons Carinus (283–285) and Numerian (283–284), all struck radiate billon coins with the characteristics of Aurelian's reform, including the XXI or an equivalent mark.[127] But this did not generate stability and prices did not return to

[125] Though obviously, not in all transactions. Private monetary affairs cannot be supervised by the authorities at all times.

[126] The loss of trust occurred whether the arbitrary change in official value affected only radiate billon coins, changing their official value in respect to all other denominations, all coins in circulation, collectively changing their value in real terms, or all but gold coins, changing their value in respect to gold coinage (if an official detachment of gold coins from a fixed exchange rate was indeed explicit as part of the 274 reform).

[127] Under Tacitus (275–276) and his brother Florian (276) the mints of Rome and Cyzicus minted radiate billon coins usually marked with XXI, and some of the coins from Antioch also carried this mark; while Serdica and Tripolis often minted them with the equivalent Greek KA. (See Webb [1927] 319–360; Carson [1990] 122–125; Estiot [2004]). Under Probus (276–282) XXI marks appeared on many radiates from Cyzicus, Siscia and Rome; in Ticinum these were

former levels. Thus, it is with such lack of trust in mind, and the monetary instability which accompanied it, that one should approach Diocletian's repeated attempts to stabilise the currency: first the change in gold standard in 286, then his 294/96 monetary reform and finally his 301 Currency Edict;[128] all seem to have been insufficient to attain stability. It is not unlikely that the reuse of the tool of monetary reform by itself generated mistrust, fulfilling public expectations for further inconsistencies in government monetary actions. It was only under Constantine, more than a generation after Aurelian's reform, that a new stable monetary order was established, which remained in force for centuries.

Two well-known rudiments of monetary theory have not been mentioned explicitly as part of the model; these are ‹Gresham's Law› and the ‹Quantitative Theory of Money› (known also as the ‹Equation of Exchange› or ‹Fisher's Quantity Equation›).[129] The first of the two is often summarised in the sentence «bad money drives out good money», which stands for the following claim: When similar types of coins, which hold the same nominal value but differ in their metallic value, circulate simultaneously, in the long term, the metallically improved coins are bound to disappear from circulation, either into hoards or into the melting-pot.[130] Numismatic evidence on the whole indicates this statement to have been generally valid for Roman times. Gresham's Law, however, does not directly assist in explaining the behaviour of prices, nor the value under which coins were exchanged. As its logic does not exclude the possibility of a fiduciary component embedded in the coinage, it does not interfere with the suggested model. The second economic rudiment, known as the ‹Quantity Theory of Money›, is summarised in the following equation: $M^*V=Q^*P$; in which, M represents the total quantity of money in an economy, V represents the velocity of its circulation,[131] Q is the total volume of goods and services transacted for money, and P is the average level of prices.[132] Now, my aim here is not to reject nor to support the theory expressed in this equation, but merely to demonstrate that it does not contradict the model suggested here. Let us assume the equation is in force. We know that prices rose (P increased). Since there seems to be no convincing evidence in favour of a significant decline in the economic activity from 274 onwards – i.e., Q did not severely decrease –

minted with either XXI or XX; in Serdica with KA; and in Tripolis with either KA or XXI. (See Webb [1933] 1–121; Carson [1990] 126–128). Under Carus and sons (282–285) XXI was struck on radiate billon from the mints of Cyzicus, Siscia, Antioch and Tripolis; in Ticinum these were minted with either XXI or XX. Lugdunum struck radiates with no marks of the reform also in the days of Aurelian. (See Webb [1933] 122–203; Carson [1990] 129–131). For coins struck with XI or the Greek equivalent IA, see n. 92 above.

[128] See nn. 49, 76, 108 above.

[129] Prodromídis (2006).

[130] Harris (1987).

[131] That is, the average number of times a unit of currency is exchanged in economic transactions in a specific time period.

[132] Fisher (1922); Bordo (1987).

according to the equation the increase in P should be complemented by an increase in MV.[133] If indeed official values were arbitrarily increased in 274, as the interpretation advanced in this paper argues, this would mean that the nominal amount of money in circulation was enlarged (M increased). Thus this equation, although not being part of the arguments supporting the model, seems to be compatible with it.[134] To conclude, the model offered here is not contradicted by these two milestones of monetary theory, neither by ‹Gresham's Law› nor by the ‹Quantity Theory of Money›.

V. Conclusion

The model presented in this paper deals with the possible implications of Aurelian's 274 monetary reform for the use and value of Roman coins. It promotes an approach which sees the value of Roman coins as simultaneously consisting three types of value: metallic, official, and exchange. The behaviour of metallic value is known from the numismatic evidence and had largely declined through time. The behaviour of official value can logically be deduced from the sources and seems to have followed a constant and stable pattern until Aurelian's reform, when it was arbitrarily increased. The behaviour of exchange value is the undetermined variable of the three which the proposed model aims to explain. Exchange value, though subject to alterations in specific circumstances of transaction, can be conceptualised as a function of metallic value, official value, public expectations from the government's monetary actions, and public trust in the currency. Prices are the economic indicator of exchange value and can fluctuate due to various reasons, not all of them monetary. However, they may serve as a proxy for public trust. The considerable price increase in about the same time as Aurelian's monetary reform suggests a loss in that trust. Political and military instability probably contributed to this loss,[135] but it was Aurelian's 274 reform which provided the coordinating event that sparked the decline. The reform's nature, namely, the arbitrary change in official value of the coins in circulation,[136] was the primary reason which generated the swift diminution of trust in the currency. Not underrating the importance of coin fineness, weight and quantity for every-day economic use of Roman coinage, this paper joins previous works[137] in stressing the role of

[133] It is customary in economic theory to assume V is constant in the short-term (except in cases of hyperinflation). But in this case it is not only a convention of economics that supports the claim for no considerable increase in V. Stability (more or less) in the behaviour of Q would, in fact, mean that the total volume of transactions carried out in money did not increase. Since M surely did not decrease from 274 onwards, assuming the equation stayed in force, V could not have increased, i.e., the velocity of money in circulation did not amplify.

[134] I would like to thank Prof. R. Findlay for discussing these points with me.

[135] Strobel (1989), (1993); Drexhage (1991).

[136] Be that by decreasing official value of already existing coin types, as is argued for example by Estiot (2004) 42 f.; or by arbitrarily increasing their official value, as is argued in this paper.

[137] Such as Strobel (1989), (1993); Lendon (1990); Lo Cascio (1996); Carrié (2007b).

public trust and its relevance to the functioning and stability of the Roman monetary system.

The model offered here simplifies a complex monetary reality, which was by no means unified throughout the empire. It aims to stress the consistencies which existed in monetary behaviour, by suggesting a long term mechanism to determine the value of Roman coins. Two approaches have been presented, one stressing the role of metallic value and the other that of official value. In both, public trust is seen as a significant factor, though in the latter its role is crucial. It is this approach which best defines the coordinating event that initiated the collapse of the empire's long existing monetary system. While metallic value decreased during the first half of the third century, official value remained stable (and relatively high), allowing the continuity of public trust in the currency and therefore, the stability of exchange value. The coordinating event – the turning point which initiated decline in exchange value, probably down to the level of metallic value – is subject to the existence of public trust, and occurred only when the latter was lost. Loss of trust was influenced by the severe attrition in metallic value, as well as the political and military instability of the era. However, although their accumulated effect was probably necessary for undermining public trust in the currency, these factors by themselves do not provide a clearly defined mechanism to investigate the loss in trust. The model advanced here offers precisely such a mechanism, taking Aurelian's monetary reform as the event which triggered it.

According to the model, the official value was a critical element in determining the stability of the empire's monetary system. Only when consistency in official value was maintained, could public trust be preserved. The interpretation of the evidence promoted here argues in favour of an arbitrary increase in official value in 274, when billon coins were given a new nominal value, higher than their previous one as well as their metallic value. It is possible that at the same time gold coinage also went through an official change; namely, recognising the flexibility in its value, already evident in some private transactions from the 260s and 270s. If indeed Aurelian detached gold coins from a fixed nominal rate and officially allowed their value to fluctuate according to their weight and fineness, this contributed to a loss in trust in the monetary system. But even if the 274 reform did not officially recognise the fluctuating nature of gold coinage, an unpredictable change in the official value of billon coinage was by itself sufficient to undercut public trust in the currency. Aurelian's monetary reform should not and cannot be underestimated. It had significant implications on the use of Roman coins and on the Roman monetary system as a whole. When Aurelian arbitrarily altered official values, probably for the first time since the reign of Augustus, he acted against public expectations, thus violating public trust and sending exchange value down towards the rate of metallic value; as a result debasement immediately became apparent and prices rose accordingly.

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