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The Economic History Review, New Series, Vol. 5, No. 3. (1953), pp. 293-318.

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The Economic History Review is currently published by Economic History Society.

THE
ECONOMIC HISTORY
REVIEW

SECOND SERIES, VOL. V, NO. 3 1953

INFLATION UNDER THE ROMAN EMPIRE[1]

BY A. H. M. JONES

FOR the benefit of readers not familiar with the ancient world it may be as well to state such basic facts about the economic structure of the Roman Empire as are relevant to a discussion of the currency. By and large the Empire formed a closed economy. External trade was mainly in luxury articles and cannot have been of significant proportions. There was some export of gold and silver coin by way of subsidies to neighbouring barbarian tribes, especially in northern Europe, and owing to an unfavourable balance of trade with some areas, particularly with India; but hardly on a scale to deplete the stock of precious metals in the Empire. It is extremely difficult to estimate the volume of production of gold and silver, but it does not seem to have been very high, nor to have

[1] From the abundant literature which has grown up around the problems of currency and inflation in the Roman Empire I have found the following the most useful (though I disagree with many of their conclusions): A. Segrè, 'Inflation and its implications in early Byzantine times', *Byzantion*, XV (1941), 249–79; G. Mickwitz, *Geld und Wirtschaft im römischen Reich des vierten Jhdts n. Chr.* (Helsingfors, 1931), and *Die Systeme des römischen Silbergeldes im IV. Jhdt. n. Chr.* (Helsingfors, 1932); L. C. West and A. C. Johnson, *Currency in Roman and Byzantine Egypt* (Princeton, 1944); H. Mattingly, 'The monetary systems of the Roman Empire from Diocletian to Theodosius I', *Num. Chron.* VI, vi (1946), 111–20.

I am not a numismatist and for information about the actual coins I have relied on the standard works on Roman coinage, such as Mattingly and Sydenham's *Roman Imperial Coinage* and the relevant British Museum Catalogues of Coins, together with the books and articles cited above. Two numismatists who are experts on the period, Dr Mattingly (mainly for the earlier half) and Mr Grierson (mainly for the later half), have been kind enough to read the manuscript and have corrected some numismatic errors of which I had been guilty, and in general most generously put their expert knowledge at my disposal. I am most grateful for their help, but they cannot of course be held responsible for any factual errors which may have survived their scrutiny, still less for my theories.

varied greatly from period to period. Only one important change is worthy of record, the acquisition by Trajan's conquest of Dacia of a large hoard of gold and of the Transylvanian gold mines, which remained in the possession of the Empire till 270. All mines were imperial property, and newly produced gold and silver was therefore directly available for minting. It is, on the whole, probable that the Empire's stock of the precious metals would remain fairly constant, new production being balanced by wastage and export.

For two centuries the Roman Empire successfully operated a bimetallic currency. Under Augustus the standard silver coin, the denarius, was struck at 84 to the pound, the standard gold coin, the aureus, at 40–42 to the pound, and 25 denarii went to one aureus.[1] About A.D. 64 Nero slightly debased the denarius, raising the percentage of base metal to about 10 per cent and reduced the weight of both coins, the denarius to one ninety-sixth of a pound, the aureus to one forty-fifth. He thus maintained approximately the same ratio between them, and the 25:1 relation remained unchanged.[2] Trajan again slightly debased the denarius, reducing its silver content from 90 per cent to 85 per cent, but this change did not upset the 25:1 relation; the fact that the same emperor put large quantities of gold, the captured hoard of the Dacian kingdom, into circulation, no doubt slightly lowered the price of gold and thus counteracted the debasement of the denarius.[3]

It is clear that the denarius was regarded as the standard coin. Accounts, public and private, were kept in denarii or in sesterces (quarter denarii), which, though no longer issued in silver, remained a unit of account. Most transactions of ordinary life must have been conducted in the denarius and its bronze and copper subdivisions, since the aureus was too valuable a coin to come much into daily use. The gross annual pay of a Roman soldier, for instance, during the first century of the Empire, was 225 denarii, paid in three instalments of 75 denarii each: Domitian added a fourth instalment, thus raising the total to 300. From this, deductions were made for rations, uniform, etc., which in the pay-sheets of two legionaries at Alexandria in A.D. 83–4, totalled 130–140 denarii. A Roman

[1] I express the weight of coins in this way because the Romans did so—e.g. Pliny, *H.N.* XXXIII, 47: 'postea placuit * XL signari ex auri libris, paulatimque principes imminuere pondus, et novissime Nero ad XLV'; *Cod. Theod.* XV, ix, 1: 'nec maiorem argenteum nummum fas sit expendere quam qui formari solet cum argenti libra una in argenteos sexaginta dividitur'. Cf. p. 298, n. 4 and 5. The practice of the mint was no doubt to hand over to the moneyers a pound ingot, and demand delivery of the proper number of coins. Thus the theoretical weight of a Roman coin should always work out as an integral fraction of a pound.

[2] Compare Tac. *Hist.* I, 24 with Suet. *Otho*, 4. 2 and Plut. *Galba*, 20, where 100 sesterces is equated with 1 aureus; Lucian, *Pseudolog.* 30; Cassius Dio, LV, 12. 4.

[3] Mickwitz, *op. cit.* p. 32, following Heichelheim, considers that Trajan deliberately debased the denarius to adjust it to the lower price of gold. I find it difficult to believe that he (or his *procurator monetae*) was capable of such subtlety of economic thought, and think that Trajan debased the denarius to cover his heavy war expenses, and that the windfall of Dacian gold fortuitously lowered the price of gold soon after.

private was most unlikely to handle an aureus, nine (or later, twelve) of which would have covered his gross pay for the year.[1]

In order to estimate the purchasing power of Roman coins over any length of time it is unfortunately necessary to rely on the price of one commodity only, wheat. Wheat is not an ideal commodity, since it was liable to violent seasonal fluctuations and local variations in price. The Roman Empire apparently produced barely enough for its needs and carried no reserves, so that a bad season would send prices rocketing till the next harvest brought them down to normal. Transport by land was moreover so expensive that it was scarcely ever economic to move a bulky load like corn more than one or two days' journey, and thus one city might be paying famine prices while conditions in another were normal, and in large inland towns which had regularly to draw their supplies from a distance prices were substantially higher than elsewhere. However, wheat figures have certain advantages. Wheat was the staple diet of the vast majority of the people, and far and away the largest item in their food bill. In the second place it had no variations of quality such as bedevil any attempt to use the prices of wine, oil or meat. And thirdly its prices are quoted in relation to measures of capacity which are more or less uniform. The official modius, to which most of our prices refer, was equivalent to nine-tenths of a peck. The only other unit which comes into question, the Egyptian artaba, was for official Roman purposes equated with $3\frac{1}{3}$ modii.

In the reign of Domitian the governor of Galatia was asked to intervene at Antioch in Pisidia, where there was a famine, and it was complained that landowners were holding up stocks for yet higher prices. He found on investigation that the modius of wheat had normally sold at 8 or 9 asses ($\frac{1}{2}$ to $\frac{9}{16}$ denarii), and ordered all citizens and residents to sell their surplus stocks to the civic authorities at 1 denarius.[2] What few other prices we possess from the first two centuries of the Empire accord with these figures. A number of Egyptian prices given in the papyri yield an average of 7·13 drachmae to the artaba:[3] four Egyptian drachmae were worth one denarius, so the price works out at slightly over half a denarius to the modius. From a rather earlier date (70 B.C.) Cicero cites a number of wheat prices from Sicily; he regards $2\frac{1}{2}$ sesterces ($\frac{5}{8}$ denarius) as a normal price,[4] 2 sesterces as cheap,[5] 3 sesterces as dear.[6] Finally, from Italy there is a second-century inscription which records the gratitude of a city to a local worthy for selling wheat in a shortage at one denarius the modius.[7]

[1] See H. M. D. Parker, *The Roman Legions* (Oxford, 1928), pp. 214ff.

[2] *J.R.S.* XIV (1924), 180.

[3] G. Mickwitz, *Aegyptus*, XIII (1933), pp. 95ff. It is at first sight rather surprising that prices in Egypt, which produced a large wheat surplus, should be the same as elsewhere in the Empire, but it must be remembered that a large proportion of the crop was taken in kind by the government and exported.

[4] Cic. *II in Verr.* III, 84, 90, 173–4. Cicero quotes prices in sesterces (4 to the denarius) to the medimnus (=6 modii).

[5] *Ibid.* 174.

[6] *Ibid.* 191.

[7] *C.I.L.* XI, 6117.

This price then would seem to have been regarded as a 'just price' in famine conditions. The normal price was half a denarius or a little more.

The Roman fiscal system was very rigid. The main source of revenue was the *tributum*, assessed on property in the provinces. This was supplemented by *ad valorem* customs duties, and a 5 per cent succession duty paid by Roman citizens. All these taxes were at fixed rates, and the total revenue cannot have varied greatly from year to year. It seems to have met annual expenditure but allowed for no surplus, and could only with very great difficulty be increased to meet additional charges.[1] When the State incurred additional expenditure, as for instance during wars, the government was compelled to sell public property, to confiscate private property (by encouraging informers to lay capital charges against wealthy persons and securing their conviction),[2] or to debase the currency. Marcus Aurelius sought to relieve the financial stringency caused by his long wars by the first method,[3] but also had to resort to the third. Septimius Severus, who increased annual expenditure by raising the pay of the troops,[4] made ruthless use of the second method[5] but again had to use the third also. Caracalla again raised the pay of the troops (by 50 per cent).[6] He resorted to confiscations on a large scale, and also made the one recorded attempt to raise the regular revenue, by making all free inhabitants of the Empire Roman citizens and thus liable to the succession duty, whose rate he doubled.[7] The original rate was restored five years later by his successor, Macrinus.[8] But despite confiscations and increased taxation Caracalla was obliged to continue the debasement of the currency.

It was the denarius only that was debased. In Marcus's reign the silver content of the denarius sank to 75 per cent, in Severus's to 50 per cent. Caracalla issued a new coin, about 1½ times the size of the denarius, which was probably tariffed at 2 denarii; this coin has been dubbed, on rather slender grounds, the Antoninianus.[9] Meanwhile, the aureus was still issued at its original purity and weight (45 to the pound) until Caracalla, who slightly reduced it (to about 50 to the pound). The reason for this curious inconsistency was probably that the great mass of the expenditure, notably the pay of the troops, had to be made in denarii, whereas there was no pressing

[1] Only one emperor is recorded to have increased the rate of *tributum*: Vespasian (Suet. *Vesp.* 16). The rigidity of the Roman fiscal system is strikingly demonstrated by S. L. Wallace, *Taxation in Egypt* (Princeton, 1938), which shows from receipts on ostraka and papyri that, with one or two insignificant exceptions, taxes continued throughout the inflationary period to be collected at the same rates.

[2] This charge is brought against most 'bad' emperors, e.g. Nero (Suet. *Nero*, 32) and Domitian (Suet. *Dom.* 12; Pliny, *Paneg.* 42), as well as those cited below.

[3] *Hist. Aug.*, *Ant. Phil.*, 17. The same measure is recorded of Trajan (Pliny, *Paneg.* 50).

[4] Herodian, III, viii, 5.

[5] *Hist. Aug.*, *Severus*, 12–13.

[6] Herodian, IV, iv, 7.

[7] Cassius Dio, LXXVIII, 9.4–5.

[8] Cassius Dio, LXXIX, 12.2.

[9] There is no evidence what value was put on this coin, but there would have been no object in issuing it except to increase the number of denarii that could be got out of a pound of silver; I take it therefore that it was worth 2 denarii.

reason to debase the aureus. Cassius Dio, writing late in Severus's or early in Caracalla's reign, still speaks of the aureus as worth 25 denarii.[1] The emperors may have hoped, at first at any rate, that the debasement of the denarius would pass unnoticed, or may have thought to maintain its value by keeping it at 25 to a still undebased aureus. This can only have been an official rate. The number of denarii circulating in the Empire must have increased considerably as a result of the successive debasements, and prices, including that of gold, must have increased substantially. Although custom would have maintained the 25:1 ratio for a while, it is hardly credible that by Dio's time there was not a black market in aurei. This is implied by an inscription dating from shortly after Caracalla's death,[2] which records that a military tribune in recognition of special merit was rewarded by receiving his salary of 25,000 sesterces in gold: he would presumably have been paid in aurei (at the official rate of 100 sesterces to the aureus), which he could change at great profit into denarii at black market rates. Even as an official rate, the 25:1 ratio can have had little meaning. For the government would not, except in such special cases as that mentioned above, pay out good gold when it could pay in bad silver; and indeed Dio complains that Caracalla used his gold to pay subsidies to barbarians (who, as hoards prove, refused the debased denarius and Antoninianus) and fobbed off his subjects with debased silver.[3] On the other hand, no citizen would pay his taxes in aurei, when he could pay them in bad silver. The government could only obtain gold through the levy of *aurum coronarium*. This was a nominally freewill offering, originally of gold crowns, but by this date of bullion, made to the emperor by the cities of the Empire on such auspicious occasions as his accession, or a triumph. Dio complains that Caracalla was continually reporting victories to serve as an excuse for a levy.[4]

For the next fifty years the Antoninianus, which from the middle of the century completely superseded the denarius, went from bad to worse, until it contained less than 5 per cent of silver, as well as being substantially reduced in weight. Eventually Aurelian carried through some reform of the coinage. In place of the many issues of variable weights then current he minted two series of silver-plated copper coins, the larger labelled XX.I or XXI or XX (in Greek KA) and the smaller VSV. The meaning of these symbols is unfortunately unknown, but it is probable that the reform was inflationary in tendency: it is therefore a plausible suggestion that XX.I means that the one new coin is equivalent to twenty old units. The interpretation of VSV is even more uncertain. It has been suggested that it means that the half (S) coin is worth ten (VV representing 5 + 5) units, but this seems very unnatural. A more plausible explanation is that it means VSVALIS, the regular or normal coin. The meaning then may be that the small coin was tariffed as an Antoninianus (by now the standard coin). In which case the

[1] Cassius Dio, LV, 12.4. [2] *C.I.L.* XIII, 3162.

[3] Dio (LXXVIII, 14.3–4) actually says 'spurious silver and gold', but as Caracalla issued perfectly good gold, the last words must be a rhetorical flourish.

[4] Cassius Dio, LXXVIII, 9.2.

larger coin was probably worth 20 sesterces or 5 denarii. This easy way of increasing the nominal value of coins, once discovered, was naturally resorted to again. There is evidence that about thirty years later the large piece, which was known as the nummus, was tariffed at 25 denarii.[1] Gold issues became sporadic and rare, and were moreover minted at variable weights. It is probable that the gold coins were used only to distribute as donatives to the troops on accessions and other festive occasions, the gold being obtained through simultaneous levies of *aurum coronarium*. For practical purposes it would seem that gold went out of circulation, being converted into plate and jewellery.[2] Prices as reckoned in debased denarii naturally rose. The proceeds of taxation, in so far as it was *ad valorem*, would have risen concurrently, but the *tributum*, which formed the bulk of the revenue, appears to have remained fixed at its pre-inflation figure. The government was thus unable to go on increasing its expenditure, especially military pay, in proportion to the rising cost of living. The soldiers had to be fed and clothed. The solution eventually reached was that the government requisitioned (without payment) the wheat, meat, wine, oil, textiles and leather needed to feed and clothe the troops, and issued them free. It seems unlikely that this result was achieved at one stroke.[3] Supplies for the army had always been obtained by compulsory purchase at prices which were often below market rates. The first step was doubtless to continue paying the same rates, despite the rise in prices. The soldier similarly had always drawn his rations, uniform and equipment against deductions from pay. Here again the deductions could be frozen at pre-inflation figures. Eventually, when owing to the rise in prices the payment had become nugatory, supplies were requisitioned outright, while the troops were entitled to rations, uniforms and arms, issued in kind, plus a small sum by way of money pay. The effect of this development would have been, by eliminating the currency from a large and important range of transactions, to increase the inflationary tendency.

Diocletian endeavoured to restore a silver and gold currency. He issued a pure silver coin at 96 to the pound.[4] Its name is unknown, but as it was of the same weight and purity as the old pre-inflatory denarius, it may have been called the *denarius argenteus*: this is suggested by the fact that the debased denarius is called in Diocletian's Edict of Prices the *denarius communis*. Gold coins were issued at 70, and later 60, to the pound.[5] It is not known at what rate they were intended to exchange with the silver:

[1] See below, p. 299, n. 2.

[2] Mickwitz, *Geld und Wirtschaft*, pp. 65–6, tries to prove that gold continued in circulation in this century, but fails to explain why the hoards of the inflationary period contain practically no gold.

[3] Van Berchem, *L'Annone militaire* (*Mém. Soc. Nat. Ant. de France*, 1937, pp. 117ff.), argues for the abrupt introduction of requisition without payment and free issue by Septimius Severus. I have expressed doubts of this thesis in my *Greek City*, pp. 329–30, nn. 94–5.

[4] These coins are marked XCVI, so that there is no doubt of their theoretical weight.

[5] These coins are marked O (70) and Ξ (60).

at the very unusual relation of the two precious metals prevailing at the time, about ten argentii would have gone to one aureus.[1] Both the silver and the gold issues are excessively rare, and it is difficult to see how Diocletian could have found the metal to make large issues. The government's stock of gold had long vanished into private hoards, and its stock of silver had either been similarly lost or was dissipated in giving a small silver content to the vast quantities of debased denarii. It is clear from the Edict of Prices that the *denarius communis* remained the staple coin. Diocletian deflated the denarius by ordering that the current nummi (XX.I pieces), which were by then tariffed at 25 denarii, should be reduced in value by half, and by issuing a new and much heavier silver-washed copper coin, also somewhat enigmatically marked XX.I and called the nummus, to represent 25 denarii.[2]

The Edict[3] gives an immense list of prices, but only two are of interest for our present purposes. Wheat is tariffed at 100 denarii the modius,[4] and gold, in bar or in coins, at 50,000 denarii the pound.[5] Now it is clear from the preamble that Diocletian was endeavouring to fix normal prices, and we are told by a contemporary, Lactantius,[6] that the effect of the Edict was to drive goods off the market. The prices were therefore probably below current market level. The figure of 100 denarii is therefore comparable with the low average price of the first and second centuries, half a denarius. The price of wheat had then gone up about 200 times in a century and a half. The price of gold in the second century was 1,125 denarii to the pound (25 denarii to the aureus, of which 45 went to the pound). Gold therefore in the same period had risen only about 45 times.

The figure for silver in the Edict does not survive, but a papyrus of six years later (307)[7] shows that in an official transaction it was then valued at 8,328 denarii the pound, that is 86 times the second-century price of 96 denarii to the pound. Silver thus rose less than half as much as wheat,

[1] The aureus, at 60 to the pound of gold, would be worth 833 (50,000/60) denarii communes. The price of silver six years later than the Edict was 8,328 denarii the pound (see p. 298, n. 3): the argenteus, at 96 to the pound, would therefore be worth 86½ denarii.

[2] This appears to emerge, as Segrè has divined in *Byzantion*, XV, pp. 252–5, from a combination of *P. Oslo*, III, 83; *P.S.I.* 965; and *P. Ryl.* IV, 607. See also Additional Note.

[3] Diocletian's Edict is most conveniently consulted in Tenney Frank, *Economic Survey of Ancient Rome* (Baltimore, 1940), vol. V, Appendix.

[4] *Ed. Diocl.* I, 1. The *modius castrensis*, the unit of capacity generally used in the Edict, has at last been proved by Segrè (*Byzantion*, XV, p. 277), from a papyrus published by Boak (*Harvard Studies in Classical Philology*, LI, no. 4), to be none other than the ordinary modius, of which 3⅓ (nearly) went to the artaba.

[5] *Ed. Diocl.* XXX, 1. Mattingly's conjecture (*Num. Chron.* (1946), p. 113) that the figure on the stone (E) had been misread and should be restored as 10,000 (A) has been disproved on reinspection; the figure, though mutilated, is undoubtedly E. It remains a puzzle why χρυσὸς ἐνηγμένος in the next line should be valued at only 12,000 denarii. It is possible that one or other figure is an engraver's error, but more probably χρυσὸς ἐνηγμένος is a trade term for some inferior alloy.

[6] *de mortibus persecutorum*, vii, 6.

[7] *P.S.I.* 310.

but twice as much as gold, so that the gold:silver ratio stood at 1:6 instead of 1:11¾.

Some scholars have endeavoured to extract from these figures a gold price index for wheat. In the early Empire, they argue, a pound of gold would buy 2,250 modii; under Diocletian it would buy only 500 modii. These facts are incontrovertible, but the implication that the real price of wheat had gone up fourfold or fivefold is false. For the Roman Empire was not on the gold standard: in it gold was a commodity whose price expressed in the normal currency, the denarius, might vary like that of wheat.

Agricultural production had undoubtedly declined since the second century: there are constant complaints of previously productive lands being left uncultivated. The decrease in the quantity of wheat produced would thus be one factor in the rise of wheat prices. But it is clearly less important than the enormous increase in currency. Moreover, by Diocletian's time a very large proportion of the State's requirements were levied and distributed in kind, thus limiting the circulation of the coinage for the most part to private transactions. It is unfortunately impossible to evaluate the relative importance of these three factors. It is, however, suggestive that the silver content of a Neronian denarius was rather over 3 grains and that of a Diocletianic 25-denarius piece rather under ½ grain. The same quantity of silver which went to a denarius before the inflation could produce coins to the face value of 150 denarii. This is not to say that 150 times as many (nominal) denarii were circulating in Diocletian's reign as in the second century, for large quantities of silver must have vanished into hoards.

It may be asked why in the circumstances the price of gold rose only 45 times. I can only suggest that the price of gold in the first two centuries was enhanced by the fact that a considerable proportion of the gold stock of the Empire was absorbed in the currency. When in the third century gold was virtually demonetized, and used for plate and jewellery only, its value would have sunk, and Diocletian's tentative attempt to recreate a gold currency was on too small a scale to affect the position.

The same consideration would apply in a modified degree to silver. Much of the pure silver coinage would have been withdrawn from the currency in the inflationary period, thus increasing the stock available for plate and other luxury uses, but the debased coinage still continued to absorb a considerable quantity. Hence silver sank in real price only half as much as gold.

After Diocletian's abdication in 305 his successors continued to issue gold and silver coins. From Egypt we have some evidence of how they obtained the necessary bullion. In A.D. 306 and 307 Maximin was imposing a surcharge of silver (which was paid partly in gold coin) on the wheat tax at the rate of 1½ oz. to 100 artabae,[1] and a similar surcharge

[1] *P. Oxy.* 1653, *P. Merton*, 31, *P. Cairo*, 57049 (*Chron. d'Egypte*, 1952, p. 247).

appears again in 311 (payable in gold and silver).[1] Licinius also made compulsory purchases of gold from the cities—the allotment of Oxyrhynchus was 38 lb.[2] These measures, together with a renewed depreciation of the denarius (Diocletian's 25-denarius piece had by the early 320's sunk to less than a third of its original weight), sent the price of gold up steeply. In the compulsory purchase order the price fixed by the government is 100,000 denarii the pound, twice the rate fixed in the Edict. And by 324, when Egypt fell to Constantine, the pound of gold had reached over 300,000 denarii.[3]

Constantine from the beginning of his reign began to issue the solidus, a gold coin struck at 72 to the pound, which was to remain unchanged for seven centuries. The number 72 was evidently chosen so that fractions of the pound, which was divided into 12 ounces of 24 scruples, could be readily made up in solidi, which each weighed 4 scruples. The solidus was theoretically divided into 24 siliquae (in Greek, carats, κεράτια), but no gold coins were ever issued below the semissis (12 siliquae) and tremissis (8 siliquae). The solidus, it may be noted, was not in the full sense of the word a coin. Issued by the government to effect payments, it was decreed to be worth $\frac{1}{72}$ lb., and the emperors insisted that in private circulation solidi, unless clipped, should be accepted at their face value.[4] But taxes and fines were reckoned in gold bullion, and if 72 solidi did not make up a pound, they had to be supplemented. Valentinian and Valens even insisted that solidi collected in taxes must be melted down into bullion bars, whose weight and purity could be readily checked, before transmission to the treasury.[5] One of the factors which kept the solidus up to standard was no doubt the constant reminting which this procedure entailed. It is clear also that the public did not, at first at any rate, regard solidi as money in the ordinary sense. *Pecunia* in fourth-century Latin means debased denarii in contrast to *aurum* and *argentum*,[6] and people spoke of buying and selling solidi when they changed denarii for solidi or

[1] *P. Thead.* 33.

[2] *P. Oxy.* 2106. It is unfortunately impossible to date this document precisely. From the fact that Augusti and Caesars are mentioned both in the plural, it must fall either in the latter part of Diocletian's reign (293–305) or in the immediately following period (305–8) or in the latter part of Licinius's reign (317–24). It seems unlikely that Diocletian would have abandoned the price he had fixed for gold in the Edict of 301 during the next four years. On his abdication Oriens (including Egypt) came under the rule of the Caesar Maximin, while Asia Minor was ruled by Galerius Augustus. In the document the gold bought in Egypt is to be delivered at Nicomedia, and it seems improbable, however cordial their relations, that Maximin would have allowed Galerius to extract gold from his territory. The emperor in question is therefore probably Licinius, who normally resided at Nicomedia and ruled the whole of the eastern half of the Empire.

[3] *P. Oxy.* 1430.

[4] *Cod. Theod.* IX, xxii, 1 (343).

[5] *Cod. Theod.* XII, vi, 12 (366), 13 (367).

[6] E.g. Augustine, *Sermo* 127.3: 'ad aliquid ergo magnum et pretiosum comparandum parares aurum vel argentum vel pecuniam vel fructus aliquos pecorum aut frugum qui in tua possessione nascerentur'.

vice versa.[1] The solidus was primarily a gold unit for the use of that department of the imperial treasury (the *sacrae largitiones*) which dealt with levies and issues in the precious metals.

Constantine and his successors also issued silver on a considerable scale down to the end of the fourth century. The coins, to judge by the surviving specimens, were struck at a bewildering variety of weights, and it remains an unsolved problem what names the various pieces bore, and what relation they were supposed to bear to the solidus or to the *denarius communis*. It is on the whole probable that gold and silver exchanged at a fluctuating rate corresponding with the relative values of the two metals. The government, when it accepted gold in lieu of silver due in taxes or fines, demanded 4 or 5 solidi to the pound, varying the rate quite arbitrarily, it would seem. In a document which probably dates from the latter part of Constantine's reign silver is commuted at an official rate of 4 solidi to the pound. In a constitution dated 397 the treasury accepts five solidi in lieu of 1 lb. silver. A constitution of 422 permits a payment of 4 solidi for 1 lb. silver. But Justinian in 528 reproduces the constitution of 397 in his Code.[2] In the circumstances a bimetallic currency can hardly have existed, and in fact the ancient sources, on the rare occasions when they speak of gold and silver in the same transaction, specify the quantity of each separately without any attempt to reduce them to a common basis.[3]

Nor does there seem to have been any fixed relation between the gold coinage and denarii. The price of gold laid down in Diocletian's Edict evidently does not envisage any regular relation, for by it the aureus (at 60 to the pound) would be worth $833\frac{1}{3}$ denarii. During the next twenty years, as we have seen, the price of gold rose in denarii according to market conditions. A report of Symmachus, Prefect of the City, to Valentinian II in 384–5 makes the situation clear. He is writing on behalf of the *collectarii* or money-changers, a corporation among whose duties it was to buy solidi for the government. Gratian (375–83) had fixed a price, reasonable at the time, at which the government reimbursed the *collectarii* for the solidi they supplied, but, Symmachus explains, the price of the solidus had, owing to the rise in gold, gone up on the open market, and the *collectarii* were now losing on the transaction.[4]

[1] E.g. *Cod. Theod.* IX, xxii, 1 (343): 'omnes solidi, in quibus nostri vultus [ac] veneratio una est, uno pretio aestimandi sunt atque vendendi'; XII, vii, 2 (363): 'emptio venditioque solidorum'; Symmachus, *Relatio* 29: 'vendendis solidis... collectariorum corpus obnoxium est'; Augustine, *Sermo* 389.3: 'cum solidum ut assolet vendidisset centum folles ex pretio solidi pauperibus iussit erogari'; Val. *Nov.* xvi (445); *Anon. de Rebus Bellicis*, iii, 1.

[2] *S.B.* 6086; *Cod. Theod.* XIII, ii, 1; VIII, iv, 27; *Cod. Just.* X, lxxviii, 1.

[3] The accession donative is regularly stated to be 5 solidi and 1 lb. silver for each man (see p. 311, n. 4). The cost of Leo's Vandal expedition was 65,000 lb. gold plus 700,000 lb. silver according to John Lydus (*de mag.* III, 43), 47,000 lb. gold from the Praetorian Prefect's treasury and 17,000 lb. gold plus 700,000 lb. silver from the *largitiones* according to Candidus (fr. 2, *F.H.G.* IV, p. 137).

[4] Symmachus, *Rel.* 29.

Constantine not only levied, like his predecessors, the *aurum coronarium* at intervals of five years, and continued to impose the gold and silver tax on land like Maximin;[1] he also exacted the rent of imperial estates in gold,[2] and instituted a new tax on traders, payable in gold and silver and hence known as the *collatio auri atque argenti*, or in Greek *χρυσάργυρον*.[3] But his principal stroke was the confiscation, late in his reign, of the temple treasures.[4] This measure must have brought into circulation very considerable quantities of gold and silver, and it is indeed regarded by an author writing a generation later as the basis of the new coinage. 'In the time of Constantine', he writes, 'there was lavish expenditure; he assigned gold to mean transactions instead of bronze, which formerly used to be held of high value. The origin of this avarice is believed to have derived from the following cause. When gold and silver and a great quantity of precious stones which had been stored of old in the temples came into public use, it inflamed the desire of all for giving and possessing. And whereas the expenditure even of bronze, which, as I have said, was stamped with the face of the kings, already seemed heavy and excessive, nevertheless owing to a kind of blindness there was a more lavish zeal for expenditure in gold, which is considered more valuable.'[5]

The economic thought of this anonymous fourth-century author is crude. He appears to think that using a more precious metal for the currency makes things dearer. But though the economic theory may be wrong there seems no reason to doubt that the creation of a new gold and silver currency, in addition to the existing denarius currency, out of hoards which had long been sterilized, must have had an inflationary effect. The precise influence which Constantine's monetary policy had on prices is, however, very difficult to estimate. The situation is exceedingly complex, for there were henceforth three currencies circulating simultaneously over the same area. Prices found their levels independently in gold, silver and copper (as we may now call denarii, although they continued for old times' sake to receive a silver wash), and the currencies exchanged against each other according to the market.

The gold prices of wheat are of the same order as those of the first centuries. In the second quarter of the fourth century there was a shortage one year in Egypt, and wheat stood at 5 artabae (16 modii) to the solidus. Pachomius sent out a monk to buy for his monastery, and he eventually

[1] *Cod. Theod.* XI, ix, 2 (337): 'si quis fundum vel mancipia ob cessationem tributorum vel etiam ob vestium auri argentique debitum quae annua exactione solvuntur occupata...comparaverit'. This tax appears to be different from the 'collatio auri atque argenti' which Constantius II imposed on land donated by the crown to individuals (*Cod. Theod.* XI, XX, 1, 2).

[2] *Cod. Theod.* XI, XVI, 1 (319); XII, VI, 2 (325). The rents of the estates given by Constantine to the Roman basilicas (*Liber Pontif.* 34) are all calculated in solidi, apart from special rare products.

[3] Zosimus, II, 38.

[4] Eusebius, *Vit. Const.* III, 1, 54, *Laud. Const.* VIII, ix, Julian, *Or.* VII, 228bc, Libanius, *Or.* XXX, 6, 37, LXII, 8.

[5] *Anon. de rebus bellicis*, ii, 1.

found an obliging tax-collector who sold him corn from public stocks at 13 artabae (43 modii) to the solidus, in the expectation of postponing delivery to the government till after the harvest, when he could replace what he had—illicitly—sold. Pachomius repudiated this transaction, and wheat was ultimately bought at $5\frac{1}{2}$ artabae (18 modii) to the solidus.[1] These prices are exceptionally low, and suggest that Egypt was producing a good surplus, which was not all absorbed by taxation. For the year 362–3 the emperor Julian quotes some rather high prices for Antioch. To alleviate a shortage he imported wheat from neighbouring cities and sold it at 10 modii to the solidus, and later shipped corn from Egypt, which he sold at 15 modii to the solidus. Even in normal conditions, he asks rhetorically, was wheat often sold at the latter price?[2] Wheat was doubtless normally dear at Antioch, since it was a very large town and must have drawn its supply from considerable distances, but we may suspect that Julian is painting normal conditions rather black, to glorify his own achievement. At Carthage a few years later Hymetius, proconsul of Africa, sold wheat during a shortage from government stocks at 10 modii to the solidus (this seems to have been regarded as a 'just price' in a famine), and refilled the granaries next year, buying at the rate of 30 modii per solidus.[3] In 445 Valentinian III fixed the price of wheat in Numidia and Mauretania at 40 modii to the solidus,[4] but this, being an official rate for government purchases, may have been below market prices. The same official rate is found in sixth-century Egypt,[5] and here the market price was about the same: twenty prices given by papyri average about 12 artabae to the solidus.[6] These Egyptian prices are, however, probably below the level of the empire. Joshua Stylites[7] quotes 30 modii to the solidus as being the normal price in Mesopotamia in 495 before locusts and war created famine conditions. If 30 modii be taken as the normal quantity which a solidus would buy, the price works out approximately the same as the first- and second-century price reckoned in gold. A pound of gold in the earlier period was equal to 45 aurei, each worth 25 denarii, each of which would buy nearly 2 modii; it would therefore fetch rather less than 2,250 modii. In the later period the pound of gold, being equal to 72 solidi, each of which would buy 30 modii, would fetch 2,160 modii. As far as gold prices went, therefore, there was no inflation. On the contrary, the strong demand for gold by the government for minting sent the price of gold up from the low level recorded in Diocletian's Edict, until roughly the same relation between gold and wheat was reached as had prevailed in the first and second centuries.

This result is partially confirmed by a study of the price of another standard food, pork. Here we possess no figures for the early Empire, but

[1] *Patr. Or.* 4. v, 'Histoire de S. Pacôme', 33–4.
[2] *Misopogon*, 369.
[3] Amm. Marc. xxviii, i, 17–18.
[4] Val. *Nov.* xiii, 4.
[5] *P. Cairo*, 67320.
[6] Wheat prices in solidi are listed in Johnson and West, *Byzantine Egypt, Economic Studies* (Princeton, 1949), pp. 177–8.
[7] Ch. 26.

in Diocletian's Edict[1] the price is fixed at 12 denarii the pound. Thus on the Diocletianic tariff a pound of gold was equivalent to 4,000 pounds of pork. In the fifth century (452) the standard price for Italy was 240 lb. to the solidus;[2] in Africa a lower price for meat, 270 lb. to the solidus, was set by the government in 445;[3] and in Egypt 200 was in the sixth century the standard government rate for commutation of military supplies.[4] Thus a pound of gold would purchase 14,400, 17,280 or 19,440 pounds of pork. In terms of pork, therefore, as in terms of wheat, gold has roughly quadrupled in value from the time of Diocletian.

The prices of military uniforms tell the same tale. A requisition order dated A.D. 138[5] authorized payment for one chiton and four cloaks at 24 denarii each. The Diocletianic tariff[6] prices a 'military indictional chlamys (best quality)' at 4,000. In denarii the price has been multiplied by 166, in gold it has risen from 0·02 to 0·08, that is, fourfold. In the fourth century a military chlamys cost one solidus (0·014 lb. gold), three-quarters of the second-century price.[7]

The great inflation of the third century had a permanent effect in reducing the real wages and salaries of all employees of the State. The private soldier of the second century had received gross pay of 300 denarii, that is 12 aurei or $\frac{4}{15}$ lb. gold. It is difficult to calculate exactly the pay of a private soldier in the fourth century, when it was made up of rations (*annona*), uniform (*vestis*), and arms issued in kind, together with pay (*stipendium*) in debased denarii, and a quinquennial donative in gold or silver. By the fifth and sixth centuries the *stipendium* had melted away, and the issues in kind had been commuted for gold. By this time the soldier received 4 or 5 solidi a year for *annona*,[8] and a quinquennial donative of 5 solidi.[9] His allowance for *vestis* is uncertain, but as he received 1 solidus (per annum) for his chlamys,[10] and was entitled to three garments in all, chlamys, pallium and sticharium,[11] we may put it at about 3 solidi. The

[1] *Ed. Diocl.* IV, 1.
[2] Val. *Nov.* xxxvi, 2.
[3] Val. *Nov.* xiii, 4.
[4] *P. Cairo*, 67320; cf. *J.H.S.* (1951), p. 271.
[5] *B.G.U.* 1564.
[6] XIX, 1.
[7] *P. Ross. Georg.* V, 61 (D5) prices 15 chlamydes at 17 solidi. The official *adaeratio* was raised from $\frac{2}{3}$ to 1 solidus in 396 (*Cod. Theod.* VII, vi, 4).
[8] Val. *Nov.* xiii, 3 (445, four solidi); *Cod. Just.* I, xxvii, 1, §§ 22–38 (five solidi): Just. *Edict* xiii, 18, implies four solidi.
[9] Proc. *Anecd.* xxiv, 27–9.
[10] *Cod. Theod.* VII, vi, 4 (396), repeated in *Cod. Just.* XII, xxxix, 3.
[11] All these garments appear in *P. Oxy.* 1905; στιχάρια and πάλλια in *P. Oxy.* 1424 and 1448; χλαμύδες in *P. Lond.* 1259; χλαμύδες, πάλλια and στολαί and πέπλα (vague terms which may cover στιχάρια) in *P.R.G.* V, 61. All these documents are probably concerned with military clothing. The Edict of Diocletian gives prices for χλαμὺς στρατιωτικὴ ἰνδικτιοναλία καλλίστη (XIX, 1, 4,000 denarii) and στίχη ἰνδικτιοναλία (XIX, 2, 2,000 denarii) under woollen garments, and for στιχῶν στρατιωτικῶν (XXV, 28–30, 1,500, 1,250 and 1,000 denarii according to quality) under linen garments: no figures survive for the πάλλιον, which was probably the most expensive garment.

allowance for arms is unknown,[1] but if it be reckoned at another 3 solidi, his total emoluments would be 12 solidi, or $\frac{1}{6}$ lb. gold, that is, about two-thirds in gold value of the pay of the second-century soldier. This calculation can be checked by reckoning the surplus which a soldier might save after paying his expenses. The soldier of the fourth century had only a *stipendium* of negligible value, and one-fifth of his periodical donative—probably a solidus per annum. The fifth- and sixth-century soldier similarly had only a solidus to spare, for the commutation of *annona* and *vestis* was not on a generous scale. The soldier of the principate[2] on the other hand had 60 denarii (2·4 aurei) deducted for rations, and from 50 to 60 denarii (2 to 2·4 aurei) for uniform. Two soldiers whose pay-sheets we possess had no deduction for arms in the year in question (arms would not often require replacement), and their total outgoings including boots and sundries total only 134 to 144 denarii, or less than two-thirds of the 225 denarii (9 aurei) which the troops then—before Domitian's increase of pay—received. If deductions were not increased when the pay was raised to 300 denarii (12 aurei), soldiers of the second century would have been able to save about half their pay, 6 aurei, equivalent to about 10 solidi.

On higher officials and officers the effect of the inflation was even more severe. Equestrian officials in the second century were graded as *sexagenarii*, *centenarii*, *ducenarii* and *tricenarii*, drawing salaries of 60,000, 100,000, 200,000 and 300,000 sesterces, or, reckoning in gold values, $13\frac{1}{3}$, $22\frac{2}{9}$, $44\frac{4}{9}$ and $66\frac{2}{3}$ lb. gold. The highest senatorial office, the proconsulship of Africa, carried a salary of 1,000,000 sesterces, or over 220 lb. gold.[3] During the inflation the same salary scales continued to be paid in debased denarii, so that in Diocletian's reign a *magister memoriae* was still receiving 300,000 sesterces,[4] that is, 75,000 debased denarii, and even in the last decade of Constantine's reign the *praepositus* of a unit was getting only 36,000 denarii, probably not much more than twice what an officer of equivalent grade received in the second century.[5] These salaries were supplemented by multiple *annonae* and *capitus*, but what little evidence there is suggests not on a scale to compensate for the fall in the value of money. We have unfortunately no fourth- or fifth-century figures, but in the sixth Justinian states that the salary of the Augustal Prefect of Egypt

[1] That there was a money allowance for arms may be inferred from Theophylact Simocatta, VII, 1, where the emperor Maurice ἐβούλετο τριτταις μοίραις συντάττεσθαι τὴν ἐπίδοσιν, δι' ἐσθῆτος καὶ ὅπλων καὶ χαράγματος χρυσοῦ. He appears to have been trying to restore the issue in kind of uniform and arms, hitherto commuted for gold; the suggestion was very unpopular.

[2] See p. 295, n. 1.

[3] The salary grading of equestrian officials is attested by many inscriptions. For the proconsul of Africa see Cassius Dio, LXXVIII, 22.5.

[4] Eumenius, *pro Instaurandis Scholis* (*Pan. Vet.* IX (IV), 11), 'trecena illa sestertia, quae sacrae memoriae magister acceperam.'

[5] *P. Oxy.* 1047: the date on which the donative was paid (25 July) fixes the document to Constantine's reign, and it cannot be earlier than 324 when Constantine acquired Egypt. For officers' rates of pay in the principate see *Papers of the British School at Rome*, XVIII (1950), pp. 68–9.

was, prior to his reform of the Egyptian administrative system, 50 *annonae* and 50 *capitus*. The salary of the Dux of Libya at this date amounted to 50 *annonae* and 50 *capitus* in gold, equivalent to 400 solidi in all, and 90 *annonae* and 120 *capitus* in kind, commuted for 1,005¼ solidi.[1] It is plausible to suggest that the official salary of both these officers, who were of equal (*spectabilis*) grade, was 50 *annonae* and 50 *capitus*, and the Dux had supplemented his income by appropriating, in the fashion familiar to the later Empire, some of the *annonae* of his troops; the Augustal Prefect no doubt made up his salary by other perquisites. If so, the official salary of officers of *spectabilis* grade would have been *annonae* and *capitus* (there is no suggestion that they had any other regular and official emoluments) amounting to the value of 400 solidi, or roughly 5½ lb. gold. The Augustal Prefect and the Dux held posts which were equivalent to those of *ducenarii* of the second century. The official salary of such officers had then, as a result of the inflation, dropped to about one-eighth of second-century rates. This circumstance may help to explain, if not to excuse, the constant attempts of late Roman officials to supplement their salaries by perquisites, some of which eventually received legal sanction.

Justinian endeavoured to check these and other types of corruption by consolidating and raising salaries. Even his revised scales are, however, well below second-century levels. He normally gave about 10 lb. gold to *spectabiles*, and raised many officers to this grade.[2] But even this salary was only three-quarters of that of the most junior procurators, the *sexagenarii*. The Moderator of Arabia received 15 lb. gold[3] and the Proconsul of Cappadocia 20 lb.,[4] while the Dux of Libya kept his old salary, which amounted to about 20 lb. The post of Augustal Prefect of Egypt was united with that of Dux of Egypt and was allotted 40 lb.,[5] nearly as much as a *ducenarius*. The newly created Praetorian Prefect of Africa, whose post would correspond in dignity to, and carry more onerous duties than, the old proconsulate of Africa, received 100 lb. gold, less than half the proconsul's salary.[6]

It is noteworthy that the common soldier, in theory at any rate, lost very much less by the inflation than high officials and military officers. He had to be decently fed, clothed and armed, and there was less spare to cut. When on the other hand the large cash salaries of the higher grades melted away they were replaced by allowances in kind on a much more modest scale. In practice the contrast was not so sharp, as officers regularly intercepted a proportion of the pay and allowances of their troops.

The creation of a new gold and silver currency, competing with the old copper currency for the same volume of goods, must inevitably have sent prices up in terms of denarii. But the papyri reveal that in Egypt the rise

[1] Just. *Edict* XIII, 3 and 18.
[2] Just. *Nov.* XXIV–XXVII (800 solidi), XXVIII. 3, XXIX. 2 (725 solidi), XXXI. 1 (700 solidi). *Edict* IV, 1, 2 (10 lb. = 720 solidi).
[3] Just. *Nov.* CII, 2.
[4] Just. *Nov.* XXX, 6.
[5] Just. *Edict* XIII, 3.
[6] *Cod. Just.* I, XXVII, 1, §21.

in prices was far greater than could be explained by this fact alone. The Egyptians went on reckoning in drachmae (though tetradrachms ceased to be minted in 296) and in denarii throughout the fourth and fifth centuries and even in the sixth, though by this time it was becoming more usual to keep accounts in fractions of the solidus. As prices rose it became customary to quote them in talents (1 talent = 6,000 drachmae = 1,500 denarii) or in myriads of denarii. In 335 wheat, which had been tariffed by Diocletian at 100 denarii the modius (330 denarii the artaba), stood at 14 talents (21,000 denarii) to the artaba, and in 338 at 24 talents (36,000 denarii). A few years later the artaba stood at 50 talents (75,000 denarii), and later again at 183 talents or about 500,000 denarii.[1] Other papyri give the price of gold either by weight or in solidi. In 324, the year in which Constantine acquired Egypt, $10\frac{1}{2}$ grammes of gold were valued at 7 talents 3,720 drachmae, which would make the pound of gold cost 313,488 denarii and the solidus about 4,350 denarii.[2] Other undated fourth-century documents give prices of 36 talents (54,000 denarii), 100 talents (150,000), 120 talents (180,000) and $183\frac{1}{3}$ talents (275,000) for the solidus.[3] In the last document the price of corn is quoted as 26 talents (39,000 denarii), which suggests a date near 338; reckoned in solidi the price is unusually high (about 7 artabae to the solidus). A papyrus dated to the middle of the fourth century gives a price of gold which works out at 3,840 talents or 576 myriads of denarii to the solidus; and in another document the writer states, 'The solidus now stands at 2,020 myriads; it has gone down'.[4] Yet other papyri, dated to the late fourth century, equate the solidus to 25,000 and 30,000 talents (3,750 and 4,500 myriads).[5] Some indirect data confirm these equations and make the chronology of the inflation rather more precise. In a document dated 362 meat is priced at 7,200 myriads for 500 lb., and in another dated 390 at 105 myriads for $3\frac{1}{2}$ lb., i.e. at $14\frac{2}{5}$ and 30 myriads per lb. respectively.[6] If meat in the fourth century stood at the standard fifth-century price of 200 lb. to the solidus, the solidus was equated with 2,880 myriads in 360 and 6,000 myriads in 390.

The denarius of the papyri was not, of course, a coin. In 324 the *nummus*, the principal copper coin, had a value of 25 denarii, so that a solidus could have been bought with 174 *nummi*. During the fourth century the successive issues must have been assigned higher and higher face values in denarii, while at the same time the coins tended to become smaller and smaller.

The peculiar conservatism of the Egyptians, who went on reckoning in the old units of the drachma and denarius long after they had ceased to be coins, enable us to trace the course of the inflation; it appears from the figures given above that from the time when Constantine conquered the East (324) till the reign of Julian (360–3) the inflation was extremely rapid.

[1] *P. Lond.* 1914; *P. Oxy.* 85; *P. Lond.* 427; *P. Princeton*, 183v.
[2] *P. Oxy.* 1430.
[3] *P.E.R.* 187 and 37; *S.P.P.* xx, 96 and 81.
[4] *S.B.* 7034; *P. Oxy.* 1223. [5] *P.S.I.* 960–1. [6] *P. Oxy.* 1056, 1753.

During these forty years the value of the denarius sank from about 4,500 to the solidus to about 30,000,000. Thereafter the movement was checked, and in the next thirty years the denarius sank only by 50 per cent.

These figures all come from Egypt, but they cannot be written off as peculiar to Egypt. The same coins circulated in Egypt as in the rest of the Empire, and it shared the same fiscal system.[1] There was certainly a vast inflation of the denarius in Egypt in the fourth century, and, unless the contrary can be proved, what happened in Egypt happened in the rest of the eastern part of the Empire at any rate. It is a more plausible hypothesis that during the periods when the Empire was divided the *comes sacrarum largitionum* in the western part may have pursued a different policy from his eastern colleague, and that the history of the denarius may therefore have followed a different course in the west than in the east. We have no information about the value of the denarius in the west during the fourth century, but there is a figure for the early fifth century which taken at its face value suggests that no inflation had taken place. In a constitution dated 419[2] the price of salt pork is fixed at 50 denarii to the pound, and in another dated 452[3] that of pork at 240 lb. to the solidus. In 419, then, the denarius at Rome will have stood at about 12,000 to the solidus. The figure is surprisingly low, for the western denarius could not have parted company from the eastern until 337, when on Constantine's death the Empire was divided between his sons, and by that date the Egyptian documents suggest that it had already sunk to the neighbourhood of 250,000.[4] We must in fact presume a policy of deflation in the west as against rapid inflation in the east.

There are, however, serious grounds for questioning this conclusion. In the first place, the issues of copper coins from the western and eastern mints are, in general, uniform. There is nothing in the coins themselves to suggest that a radically different monetary policy was being pursued in the two halves of the Empire, though it is of course possible that similar coins were tariffed at entirely different rates in east and west. In the second place the Empire was not as yet permanently divided into two parts; it was only on Theodosius's death in 395 that the eastern and western parts finally parted company. It is rather difficult to conceive how in these circumstances a radically different monetary policy can have

[1] It has been argued that the fact that Alexandria alone of the imperial mints never issued solidi would account for a local inflation in Egypt. Solidi, however, came into circulation not where they were minted but where they were paid out, and it is in fact abundantly evident, both from finds and papyri, that they circulated freely in Egypt. In general, finds indicate that coins travelled widely and freely from their place of minting. There is one constitution (*Cod. Theod.* IX, xxiii, 1) of mid-fourth-century date which forbids merchants to carry copper coin from place to place beyond specified sums for travelling expenses, but other clauses of this law, prohibiting the sale of coin, make it plain that it was an emergency measure, designed to prevent speculative transactions in the copper currency at a moment when certain old issues had been declared no longer legal tender.

[2] *Cod. Theod.* XIV, iv, 10.

[3] Val. *Nov.* xxxvi.

[4] See p. 308, n. 3.

been pursued in east and west. Thirdly, there are two pieces of evidence which suggest that the denarius was rapidly depreciating in the west. In 361–3 the Consular of Numidia, fixing a scale of *sportulae* (fees payable by litigants to officials), expressed them in modii of wheat or the price thereof;[1] he would hardly have done so unless the denarius was depreciating so rapidly as to be useless as a standard of value. In 384–5 the *collectarii* of Rome protested, apparently with justice, that the official price of a solidus in denarii, recently raised by Gratian (376–83), required to be raised again to correspond with market rates.[2]

The apparent contrast between east and west is probably to be explained by a difference in terminology. The Egyptians continued to reckon in notional denarii, and not in actual coins, and thus their accounts present a faithful picture of the progress of the inflation. In the west, it would seem, the current copper coins of the day were popularly called denarii. Thus when John Cassian,[3] writing in the early fifth century in Latin for a western public, speaks of a cheap loaf costing 3 denarii in Egypt, he is thinking of three copper coins, which an Egyptian would have tariffed at, say, a myriad denarii each. Denarius seems to be synonymous with nummus. In 445 the rate of exchange between the solidus and the nummus was stabilized at 1:7,000–7,200.[4] Writing in about 510, Cassiodorus states that the ancients wished the solidus to be 6,000 denarii.[5]

The copper coinage issued during the fourth century does not by itself suggest a cataclysmic inflation but is not incompatible with it. There were frequent and abundant issues in various denominations in both east and west. All denominations tended to sink in weight in successive issues, and periodically a fresh start was made with a heavier coin, which in its turn dwindled in size. This in itself suggests that the currency was being steadily debased, but to account for the scale of inflation revealed by the papyri one must assume that successive issues of coins were tariffed at higher and higher values reckoned in denarii.

It might seem at first sight that the process of altering the nominal value of successive issues of coins without indicating this fact in any way on the coins themselves would have led to inextricable confusion. The papyri, however, prove that the Egyptians were able to cope with the situation. In general the imperial government does not seem to have tried to demonetize or withdraw old issues. Only two attempts are recorded. A mid-fourth-century constitution alludes[6] to certain types of *pecunia* as being banned, probably those issued before the new series inaugurated in 348. Another constitution of 395[7] prohibits the circulation of the *decargyrus*

[1] Bruns, *Fontes*[7], 103 (=*C.I.L.* VIII, 17896).

[2] Symm. *Rel.* 29. *Cod. Just.* XI, xi, 2 (dated by Seeck to 371–3) suggests that an attempt at deflation had recently been made, but apparently without lasting success.

[3] *Inst. Mon.* IV, 14.

[4] Val. *Nov.* xvi.

[5] Cassiodorus, *Variae*, I, 10, §5.

[6] *Cod. Theod.* IX, xxiii, 1. The date given the code (356) is rejected by Mommsen and Seeck, but on inadequate grounds.

[7] *Cod. Theod.* IX, xxiii, 2 (395).

nummus. It may be doubted whether these laws were very effective; to judge by hoards, coins of all different dates circulated together. It seems likely that the older coins were rated by the money changers according to their size and weight and commanded a market value based on the official valuation of the current issue. Thus the large coins surviving from earlier reigns would pass current as multiples of the minute nummi issued in the last years of the fourth century.[1] If this was what happened, it helps to explain the rapidity of the inflationary process: for every time the government increased the face value of a new issue, the whole of the copper coinage in circulation would be revalued in sympathy.

After the death of Theodosius the Great in 395 issues of copper almost cease, and those of silver become very rare: the coins already circulating, supplemented by unofficial imitations, had to serve for currency for eighty years in the west, and for a century in the east. In these circumstances one would expect the inflation to cease and even to recede. This seems to have been the case. In the west, the denarius or nummus stood at about 12,000 to the solidus in 419, had risen to about 7,000 in 445 (when the imperial government forbade the sale of solidi *under* that price), and later was stabilized at 6,000, if Cassiodorus be taken to mean that this figure had been official in his day for some considerable time. For the east we have unfortunately no fifth-century figures from Egypt, but by the sixth century the denarius had at any rate not greatly depreciated from the lowest values recorded in the fourth: we possess quotations of 5,200 and 7,200 myriads for the sixth century, as against 6,000 (inferred) for the end of the fourth.[2]

It remains to be considered why the denarius was inflated at so prodigious a rate in the mid-fourth century. During this period government expenditure was to a very large extent either in kind or in gold and silver, and was supplied by corresponding levies in kind and the precious metals. The heaviest item in the budget, the *annona* and *capitus* of troops and officials, was paid in foodstuffs, which were levied in kind from the provincials under the annual *indictio*. The *vestis* of soldiers and officials was also usually issued in kind; the garments needed were either produced in the state factories or levied from the provincials. Public works, in so far as they were not built by forced labour from requisitioned materials, seem to have been paid for in gold.[3] The other main items of expenditure, the accession and quinquennial donatives to the troops, were paid in gold and silver,[4] raised by concurrent levies of *aurum oblaticium*, *aurum coronarium* and the *collatio lustralis*. Gold was also probably used for the more casual benefactions of the emperor: the treasury of the *res privata*, fed by the gold

[1] This conjecture is supported by the character of the reformed coinage of the late fifth century (see p. 314 below).

[2] *P. Oxy.* 1911, 2195, 1917.

[3] Symm. *Rel.* 26 gives an estimate in solidi for repairing a bridge.

[4] The accession donative of 5 solidi and a pound of silver is frequently attested from Julian onwards: Amm. Marc. xx, iv, 18 (360); Const. Porph. *de caerim.* 412B (457), 432B (473), 423, 425B (491), 429B (518). The quinquennial donative of 5 solidi is recorded only by Proc. *Anecd.* xxiv, 27–9.

rents of the imperial lands, supplied this need. The *navicularii* were paid partly in corn, partly in solidi.[1] The lime-burners and carters of Rome received one solidus per load.[2]

It is not easy at first sight to discern how the government expended its copper issues, or if it did not expend them, how it put them into circulation; and yet unless the government had some urgent motive for putting excessive quantities of denarii into circulation, whether by spending them or by some other method, the great inflation would not have taken place.

One use for the copper issues may have been the annual pay of the troops. Under Diocletian soldiers certainly received, in addition to their *annona*, *capitus* and *vestis* in kind, *stipendium et donativum* in *denarii communes*:[3] this *donativum* is probably to be distinguished from the accession and quinquennial donative, which seems to have been in gold and silver, and was probably an annual bonus on pay. This pay in denarii continued under Constantine: a pay statement of a *praepositus* of that reign survives, showing that he received 36,000 denarii in *stipendium* and 2,500 in *donativum*.[4] Julian, in his letter to Constantius II after his proclamation as Augustus in 360, complains that his troops had received no *annuum stipendium* during his reign as Caesar.[5] Mamertinus speaks of his anxiety when appointed *comes sacrarum largitionum* by Julian in 361 over the arrears of *stipendium*.[6] Julian found the imperial barber at Constantinople was receiving, besides 20 *annonae* and 20 *capitus*, *annuum stipendium grave*.[7] Gregory Nazianzen describes how Julian, handing out royal gifts to the army, at either the regular annual distribution or one specially devised for the purpose, associated the payment with a pagan sacrifice.[8] We are not told in any of these cases that the payment was in denarii, and indeed Gregory speaks of gold. But though gold may have been paid to the imperial guard—Julian could not personally have paid the whole army—the ordinary soldier must have received his meagre pay in denarii. There is only one later allusion to *stipendium*, and that not a certain one, early in the reign of Valentinian I, when the tribune and notary Palladius was sent to Africa 'ut et militi disperso per Africam praeberet stipendium debitum'; the money is subsequently called *stipendium* or *donativum* indifferently by Ammianus.[9] This might refer to a delayed accession donative, but the use of the term *stipendium* suggests that arrears of annual pay are meant. The date when annual cash pay was abolished is uncertain, but if it was for the most part paid in denarii, it would be natural to infer that it ceased when the imperial government ceased to issue copper on a large scale, on the death of Theodosius the Great.

There is very little trace of the government collecting taxation in denarii after the reigns of Galerius and Maximin, who appear to have levied the *capitatio*—or at any rate the *capitatio* which they imposed on the

[1] *Cod. Theod.* XIII, v, 7 (334).
[2] *Cod. Theod.* XIV, vi, 3 (365).
[3] *Ed. Diocl.* preamble.
[4] *P. Oxy.* 1047.
[5] Amm. Marc. XX, viii, 8.
[6] *Pan. Vet.* III (XI), 1.
[7] Amm. Marc. XXII, iv, 9.
[8] *Contra Julianum* I (*Or.* IV), 82–4.
[9] Amm. Marc. XXXVIII, vi, 12; cf. 17, 19.

urban population—in copper.[1] After Maximin's death the *capitatio* of the *plebs urbana* was abolished[2]—to be later replaced by a tax in gold and silver, the *collatio lustralis*—and the *capitatio* of the *plebs rustica* was paid in kind.[3] Every issue of pay to the troops must therefore have been newly minted coin and have been added, without any compensating withdrawal, to the denarius currency in circulation. This would lead to a steady inflation, and prices would have risen continuously as reckoned in denarii. To the government, whose finances were based on gold and on issues and levies in kind, the steady depreciation of the denarius was not of any great moment. No doubt from time to time the *stipendium* had to be raised when its value became quite derisory, but the difficulty was met by assigning higher face values to the next issue of coins.

Another possible way in which the government disposed of its copper coinage is suggested by the way in which Symmachus[4] speaks of the *collectarii* of Rome: 'vendendis solidis, quos plerumque publicus usus exposcit, collectariorum corpus obnoxium est, quibus arca vinaria statutum pretium subministrat'. The guild of money changers was, that is, under the obligation of selling solidi to the government, being paid in denarii at a fixed tariff from the *arca vinaria*,[5] presumably the account into which was paid the money accruing from government sales of wine in Rome; the small change thus received was of no use to the treasury, which accordingly supplied it to the *collectarii* to purchase solidi on government account. We have no evidence that this technique was applied to newly minted denarii, but it is perhaps suggestive that there were 'provincial gold-buyers' (*ἐθνικοὶ χρυσῶναι*: the office is attested only by Egyptian papyri, but that is no reason to assume that it did not exist elsewhere).[6] These officials are only recorded to have banked taxes in gold, but their title implies a wider function, and it may be that they were responsible for buying gold from the *collectarii* against issues of denarii. If this practice was general, it would also have added to the stock of denarii in circulation without any counterbalancing withdrawal.

The technique described above would have been highly profitable to the government, which increased its stock of gold, in which it reckoned its

[1] Lactantius, *de mort. pers.* xxiii: 'post hoc pecuniae pro capitibus pendebantur'. Cf. Arcadius Charisius in *Dig.* L, iv, 18, §8: 'exactores pecuniae pro capitibus', and the series of receipts for *ἐπικεφάλαιον πόλεως* in *P.S.I.* 163, 302, 462, 780, dating from 301 to 315.

[2] *Cod. Theod.* XIII, x, 2.

[3] Riccobono, *Fontes Juris Rom. Ante Just.*, I, 83, *Année Epigr.* 1937, 232 (the Table of Brigetio, A.D.311): 'quinque capita... ex censu atque a praestationibus sollemnibus annonariae pensitationis excusent eademque immunia habeant'; 'ab annonario titulo duo kapita excusent, id est tam suum quam etiam uxoris suae'.

[4] *Rel.* 29.

[5] Otherwise mentioned only in *Cod. Theod.* XIV, vi, 3 (365), when a payment (in solidi) is made to the *calcis coctores* 'ex eius vini pretio... quod consuevit ex arca vinaria ministrari'. Cf. XIV, vi, 1 (359) for an earlier payment in actual wine, and XIV, iv, 4 (367) for a similar payment in wine to the *suarii*.

[6] Wilcken, *Grundzüge*, pp. 164–5.

wealth, at the cost of inflating the copper currency, which affected its finances little. It is indeed difficult to see why, if it had during the fourth century exploited this device, it should have ceased to do so in the fifth. It is, however, noticeable that by the beginning of the fifth century the gold currency seems to have been abundant, and that the government was beginning to commute the levies of *annona* into gold taxes:[1] in Africa the process seems to have been complete by 445, when Valentinian III reckons the taxes in gold, or *annona* commuted into gold, and in Italy by the time of Majorian, who in his Novels (458) assumes that all the annual *indictio* is collected in solidi;[2] in the east Anastasius made *χρυσοτέλεια τῶν ἰούγων* the general rule.[3] It may be that in view of the increase in its gold revenue from taxation, the government ceased to find it worth while to make further issues of denarii in order to buy solidi.

The abundance of gold may also have led to the virtual abandonment of the silver currency. It is noteworthy that for some twenty years before the silver issues fall off the government seems to have levied the *collatio lustralis* wholly in gold and no longer in gold and silver: it would seem to have been deliberate policy to abandon silver and concentrate on gold.[4]

From the year 473 large copper coins were issued at Rome bearing a mark of value, the figure XL, together with smaller pieces marked XX, X and V. Similar but rather lighter coins were issued at Carthage under the Vandal kings, marked NXLII, NXXI and NXII, presumably meaning 42, 21 and 12 nummi. It may be assumed that the units on the Roman coins also represent nummi, in which case the large pieces will have stood at 180 to the solidus, if Valentinian's law of 445 was still enforced, or more probably at 150 to the solidus, if Cassiodorus's statement is to be referred to this period. The largest coins of each series bear an obvious resemblance in size and weight to Diocletian's nummi and to dupondii (half sesterces) of the early Empire. This suggests that the reformers took as their model old coins which were still in circulation and popular. They seem to have tariffed the new coins at the current valuation of the old coins in terms of the little nummi which formed the bulk of the copper currency: this would

[1] The earliest allusion to the payment of land tax in gold seems to be the *auraria praestatio* of *Cod. Theod.* XI, i, 19 (384) in the east; for the west (Africa) see *Cod. Theod.* XI, i, 32 (412) and 34 (429). By 436 commutation into gold seems to have been a fairly commonly granted privilege in the east (*Cod. Theod.* XI, i, 37; cf. Theodoret, *Ep.* 42, who states that 15,000 of the 60,000 *iuga* of Cyrrhus became *χρυσοτελής* under Isidore, praetorian prefect of the east in 435–6).

[2] Val. *Nov.* xiii; Maj. *Nov.* ii, 3; vii, 14, 16.

[3] John Malalas, 394B.

[4] *Cod. Theod.* XIII, i, *de lustrali collatione*, laws 1 (356), 4 (362), 6 (364) and 8 (370) all speak of gold and silver, whereas laws 9 (372), 11 (379), 15 (386), 17 (399), 18 (400), 19 (403), 20 (410) and 21 (418) all mention gold alone; only in I. v. 14 (405) is silver mentioned during this period as forming part of the *collatio lustralis*. The name *χρυσάργυρον* survives in Greek, but the tax was in the later fifth century certainly collected in gold only (Joshua Stylites, XXXI).

account for the very odd and inconvenient figure of forty-two adopted in Africa.[1]

In Africa the Vandal kings later issued small silver coins, weighing 2, 1 and ½ a scruple (that is, at 144, 288 and 576 to the pound), marked DNC, DNL and DNXXV respectively. The unit marked DN must have stood at 3,600 to 2,880 to the solidus according as the pound of silver was valued at 4 solidi or 5, and must therefore have been worth twice the nummus. If the letters DN stand for denarius, the denarius must have been reckoned as worth two nummi in Africa. Alternatively, the letters might be interpreted as dinummus, a double nummus.[2]

In 496 Anastasius followed the lead of Rome and Carthage by issuing substantial copper coins marked M (40), K (20), I (10) and E (5). These pieces were known, according to a contemporary chronicler, in Latin as *terunciani*, in Greek as *follares*.[3] There survive two separate series of these coins. One is rather smaller and very much lighter than the corresponding Roman coins; the other is both larger and heavier; the lighter series was issued by no later emperor. It seems likely that the two series, which are readily distinguishable at sight, were intended to be of different values, and that, therefore, the unit marked on the larger series was different from that marked on the smaller. The small M coins, which, though considerably lighter, are not much smaller than the Italian XL coins, may well have been intended to represent, like them, 40 nummi, and have been issued for use in areas where that unit was commonly used. The unit on the larger M coins may perhaps have been the myriad of denarii by the Egyptian reckoning. This is suggested by the following facts. Justinian, according to Procopius,[4] lowered the hitherto prevailing rate of 210 *folles* to the solidus to 180: the change is probably to be associated with his reform of the copper coinage in 538, when he raised the weight of the *follis* by over 25 per cent. Before 538, then, 8,400 units went to the solidus; after 538, 7,200. Now an undated papyrus of the sixth century quotes a rate of 7,200 myriads to the solidus.[5] It would seem likely therefore that the Egyptians reckoned the units on the large *folles* as representing a myriad. This theory involves the consequence that the *follis* must have depreciated very considerably since its first issue by Anastasius. For if the smaller M coins were intended to

[1] I owe this interesting suggestion to Mr Philip Grierson, who will be publishing a full statement of it in the *Numismatic Chronicle*. He points out that there exist sestertii and dupondii of the principate with the numerals LXXXIII and XLII scratched on them (see *B.M.C., Coins of the Vandals, Ostrogoths and Lombards*, p. xviii): these figures would represent the number of nummi at which they were priced in the fifth century. He also points out that the standard coin marked IB, peculiar to the Alexandrian mint in Justinian's copper coinage, bears a close resemblance to the old Alexandrian tetradrachm. The only explanation would seem to be that tetradrachms were still in circulation, and valued at 12 (myriads?), and that Justinian copied them.

[2] The word dinummus is apparently only known from a gloss, cited in *Thes. Ling. Lat.*, s.v. binio, which equates δίνουμμα and δηνάρια.

[3] Marcellinus Comes, s.a. 498.

[4] Proc. *Anecd.* XXV, 12.

[5] *P. Oxy.* 1917.

represent 40 nummi they must have been originally issued at 150 to 180 to the solidus, and the larger M coins must have been tariffed at twice this value at least, to judge by their weight and size. The large *follis* must therefore have dropped from about 80 to 210 between 496 and 538. In the east the *follis* seems to have appreciated yet further in the latter part of Justinian's reign, for a papyrus dated 557[1] reckons 5,200 myriads, that is 130 *folles*, to the solidus.

In Italy Justinian, during the latter part of his reign, issued small silver coins, which, to judge by their weight, were probably struck at 240 and 480 to the pound. These issues are marked CN (250) and PKE (125) respectively, and must presumably have been meant to represent 250 and 125 nummi. As the pound of silver was at this date tariffed at 5 solidi, about 12,000 nummi must have gone to the solidus; that is, the nummus must have depreciated to half its value under the Ostrogothic kings. The explanation may be that Justinian on the conquest introduced his own eastern monetary system, reckoning his *folles* as representing 40 double nummi, as Anastasius may well have reckoned his heavier series, and thereby marking down the surviving Ostrogothic XL coins to half *folles*. By this procedure, since the *follis* was tariffed after 538 at 180 to the solidus, the Italian nummus will have been halved in value.

The reformed copper currency issued in Italy under Odovacar and in Africa under the Vandal kings, and finally adopted in the eastern empire by Anastasius, was no doubt a boon to the public. There must have been a growing lack of the small change needed for everyday transactions, and the money current must have been very inconvenient to handle, a mixture of issues of varying sizes, including many unofficial imitations. That Anastasius's copper coinage was welcomed by the masses is stated by a contemporary chronicler—'nummis quos Romani teruncianos vocant, Graeci follares, Anastasius princeps suo nomine figuratis placabilem plebi commutationem distraxit'.[2] But the governments which issued the new coins may have had fiscal motives also. Anastasius, as the chronicler says, sold (*distraxit*) his new coins to the public, that is, he bought solidi with them, and bought them cheap; for the minting cost of the number of *folles* at which the solidus was tariffed must have been very substantially below a solidus. The coins show that the government from time to time succumbed to the temptation of increasing their profit by reducing the size of the *follis*—and no doubt issuing it in greater quantities. This tendency was, however, checked periodically, when the *follis* was restored to its original weight, or even made heavier than Anastasius's first issue. The exchange rates extant show considerable fluctuations, but within a reasonable range, and it would appear that the government on the whole restricted its copper issues to an amount which did not seriously disturb the balance, and were able effectively to control the exchange rate. They thus established what approximated to a fiduciary copper coinage. The copper issues, though intrinsically worth much less, were accepted as

[1] *P. Oxy.* 1911.

[2] See p. 315, n. 3.

equivalent to the fraction of the solidus for which they were exchanged, a fraction which though not absolutely fixed varied only within reasonable limits.

The inflation of the third century was of a normal type. It resulted from the debasement and multiplication of the standard coin of the Empire, the denarius, and its progress was relatively slow. It is interesting for three of its effects. By driving gold out of circulation it substantially reduced its price, relatively to other goods. It forced the government, whose fiscal system was too rigid to adapt itself to the rising prices, to abandon the use of money for most purposes and fall back on levies and issues in kind. It permanently and drastically reduced official salaries in real value. The inflation of the fourth century was more peculiar. The Empire now possessed two currencies, gold and copper. The copper currency was inflated at a speed and to a degree paralleled only in modern times, and by a method, it would seem, analogous to that of the printing press, by arbitrarily assigning ever increasing face values to the coins. At the same time the gold currency was carefully kept up to standard in weight and purity, and gradually increased in volume until the government was enabled to commute levies and issues in kind into gold payments. The government during this period seems to have made the best of both worlds. Its own finances were based on the stable gold solidus, and it was therefore indifferent to the fate of the copper denarius, which it inflated recklessly. The purpose of this inflation remains somewhat obscure, but it would appear that the government issued vast quantities of denarii partly to cover army pay and partly to buy solidi on the open market. By the end of the fourth century the denarius had sunk so low that the government abandoned its issue. But meanwhile it had built up the gold currency, bringing more and more gold into circulation by heavy taxes and, if I am right, by purchase. Eventually, towards the end of the fifth century, a new copper currency was provided for the use of the ordinary citizen, whose needs had been completely neglected during the inflationary period and during the cessation of all copper issues which followed.

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Additional Note

As the question is important and controversial, it may be as well to outline the evidence. *P. Ryl.* 607 is a letter, dated on various grounds to about A.D. 300, from an official (who is evidently 'in the know') to a subordinate, instructing him urgently to buy goods at any price with all his (the writer's) Italian money (*Ἰταλικὸν ἀργύριον*), the reason being that the emperors have ordered the Italian coin to be reduced to half a nummus (*προσέταξεν ἡ θεία τύχη τῶν δεσποτῶν ἡμῶν τὸ Ἰταλικὸν νόμισμα εἰς ἥμισυ νούμμου καταβιβασθῆναι*). It is generally agreed that *τὸ Ἰταλικὸν νόμισμα* (or *ἀργύριον*) means the normal imperial coinage by contrast with the local Alexandrian tetradrachms which ceased to be issued in A.D. 296, that is the Aurelianic XX.I pieces. The most natural interpretation of the phraseology would be that these pieces had hitherto been known as nummi, but were henceforth to be tariffed at half nummi.

P. Oslo, III, 83, also dated to about A.D. 300, is unfortunately fragmentary. It contains portions of three official letters, of which the third alone concerns us. It is clearly concerned with the regulation of the currency, and alludes to the καθολικός or *rationalis*, the imperial minister who controlled the mints or his local representative in Egypt, and to a πρόγραμμα or public notice issued by some high authority (παρὰ τῆς μεγαλειότη[τος]). The first line speaks of something having reached 25 denarii (ἕως εἰς εἴκοσι πέντε Ἀττικάς) and the third of nummi (being reduced?) to 12½ denarii ([τ]ῶν δὲ νούμμων εἰς δώδεκα ἥμισυ Ἀττικάς). It is hard to resist the conclusion that this document refers to the same operation as *P. Ryl.* 607, and states that the nummus, which had previously been raised to 25 denarii is now reduced to 12½.

P.S.I. 965 is also fragmentary. The opening four lines state that the emperors have issued the *Edictum de Pretiis*, lines 5 and 6 are concerned with currency changes. Line 5 alludes to denarii (Ἀττικῆς), line 6 (τὸ δὲ μέχρι τῆς δεῦρο ἀντὶ τοῦ δύο καὶ δέκα [καὶ ἥμισυ] may indicate that the coin hitherto current is to be valued at twelve (and a half denarii?).

It may be added that some half nummi of Licinius are marked XIIS.