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Fourth-Century Prices: New Evidence and Further Thoughts

Since the publication of *Currency and Inflation in Fourth Century Egypt* (BASP Suppl. 5, Atlanta 1985), new editions of papyri have added to the information available for the course of prices in Egypt in the fourth century. In addition, recent studies have added to our information about the metallic content of the coins in use during the period. None of the new information, it seems fair to say, alters in any radical way the picture that I presented several years ago; but in a number of ways it is now possible to be more precise about certain aspects of the monetary evolution in the century. Some of the editors' restorations, datings and commentary, moreover, appear to me open to improvement. What follows is a series of eight comments on different aspects of the question.¹

1. Gold, Silver, and Wheat in the Edict of Maximum Prices

One of the major fixed points for monetary history of the early fourth century has been the appearance of prices for gold (28.1a: 48 Talents/lb.²), silver (28.9: 4 T./lb.), and (among numerous other types of goods) wheat (1.1a: 100 denarii/modius = 1,333 dr./art.³) in Diocletian's Edict of Maximum Prices.⁴ It is striking that the relationship of the pound of gold to the artaba of wheat is only about 1:216 in the Edict, or 10 modii/3 artabas per 4 grams of gold (the weight of the later Constantinian solidus). This is an extremely low figure; 1:576 is the fourth-century average, and 1:720 is common in later centuries. Naturally enough, this fact has led to some expressions of doubt that the market price of wheat really reached the level in the Edict.⁵

New evidence allows a different approach. In *CPR VI 75*, published in 1985, there is a value of 640 dr. per artaba assigned to wheat.⁶ The date is in Mecheir of 301, thus 26 January to 24 February. Now this document antedates the Currency Edict which took effect on 1 September 301, when existing coinage was doubled in value.⁷ It seems, as one would expect, that when a coin heretofore worth 12.5 den. was stated to be worth 25 den. the prices of goods doubled to take account of the move. If we double the price in *CPR VI 75*, it comes to 1280 dr./art., or just slightly

¹ These remarks arise from the coincidence of the publication of *P. Oxy. LIV* with my preparations for an international conference on inflation in the fourth century, which was held at the Istituto Italiano di Numismatica (Rome), 23-25 June 1988. I am grateful to Sara Sorda and Elio Lo Cascio for the invitation to this conference and to the participants for many stimulating observations.

² As in *Currency and Inflation* (hereafter *C&I*), I have converted many figures to talents (T.) to provide a common scale for figures diversely expressed in the documents.

³ Assuming that the rate of 3 artabas to 10 modii was in use, cf. *P. Col. VII 154.24,37n.*; a slightly different rate would make no difference to the argument.

⁴ I use the text by M.H. Crawford, J. Reynolds et al. in *ZPE 26* (1977) 125-51 and 34 (1979) 163-210.

⁵ Cf. Jean-Pierre Callu and Jean Noël Barrandon, "L'inflazione nel IV secolo (295-361): il contributo delle analisi", *Società Romana e impero tardoantico. Istituzioni, Ceti, Economie*, ed. A. Giardina, I (Rome/Bari 1986) 804 n. 24.

⁶ The editor offers some reserves about this reading, which appears in the note to line 5, but it is in my opinion correct; no other reading is both possible in itself and consonant with the rest of the text.

⁷ See *C&I 20* for details and references.

less than the 1333 dr. in the Edict (November/December 301). Now any individual price may be misleading (see section 2 below), and some caution must be used. But the coincidence of price level is striking, suggesting that the wheat price in the Edict is neither a regional peculiarity of Asia Minor nor out of line with real prices at that time.

It seems to me impossible that wheat can have been as expensive proportionate to gold in 301 as the figures in the Edict would suggest. I have seen no other wheat price this high, in fact. Now the government had a strong incentive not to underestimate wheat prices. Arrears of wheat taxes were often paid in cash, at least in Egypt, and the government would not wish to announce an official wheat price which made it advantageous for the farmer to delay payment and offer money in its place. With gold and silver, however, the incentives were the reverse. The imperial government engaged in large-scale compulsory purchases of precious metals from landowners in the early fourth century,⁸ and it is clear that they did not reimburse the full value of the gold and silver collected. A lower than market price, therefore, would benefit the government's profit on the transaction. It may be added that gold was already selling on the open market for 42 T./lb. in 300,⁹ so that one would expect a realistic price in December, 301 to be at least 84 T./lb. after the doubling of nominal values. At that figure, the wheat price in *CPR VI 75* would indicate 393.75 art. per pound of gold, which is more plausible (though still high). Gold on the open market, in fact, may have been still higher; we have no evidence.

In sum, the gold and silver prices in the Edict appear to be artificially low, and the wheat price probably close to reality. The market price of gold at that time was probably in the 85-125 T./lb. range, but we must wait for further evidence to be certain. Whether any will come to light, given that such prices would have been illegal, it is hard to say.

2. Variability of Prices

I noted in *Currency and Inflation* that substantial variation in the price of any given commodity was normal; the causes included the seasonal character of transactions involving agricultural produce, the relative positions of the parties involved, and the type of transaction and documentation.¹⁰ This caution, based in considerable part on the prices in *P. Oxy.* LI 3628-3636, is now reinforced by the extensive documentation published by Revel Coles in *P. Oxy.* LIV, particularly in *P. Oxy.* 3773. We find there, for example, variation in wheat between 40 and 50 T., for barley between 15 and 25, lentils between 20 and 35, vegetable seed between 50 and 80, wine between 1 and 1.7. Even silver, which one might have thought more stable, ranges from 1033 to 1213. Nor do commodities fluctuate together: one may be up while another is down. For example, barley costs anywhere from .3 to .55 what wheat does; lentils from 1.33 to 2 times what wheat does. When these figures are averaged over the entire period recorded, they come very close to the historical norms which I used in constructing the indexing constants in *Currency and Inflation* (p. 4),

⁸ See *C&I* 49-51 for references.

⁹ *P. Panop. Beatty* 2.216; officials had been authorized to pay 40 T./lb., but they had to pay 42 to get the gold.

¹⁰ *C&I* 5-6.

but they make it clear that one must resist attempts to use single prices for precisely calibrated judgments.

One example will show what I mean. Callu and Barrandon have argued that «from 295 to 324, according to a rapid but sufficiently regular rhythm, an alternation between strong coverages [of the value of the nummus by its metal content] and weak coverages operated; three times the coverage approached a half, three times it fell back to about a quarter or a fifth.»¹¹ This judgment, however, is based on a small number of commodity prices, interpreted with excessive precision. It is simply not possible to make such judgments without a cluster of prices which produce a reasonable consensus on the price of gold which can be inferred from them.

3. Gold and Silver as Commodities

Perhaps the most striking contribution of *P. Oxy. 3773* to monetary history is its revelation that both gold solidi and silver bullion (by the pound) were included in the monthly price declarations which are summarized there. The preserved prices for solidi are 233 T. 500 d., 240 T., and 243 T. 500d. (cf. the table on p. 208). The range of fluctuation is a little over 4 percent during the course of thirteen months for which the prices are preserved. Coles restores figures of 206 T. 500 d. in Phaophi and 190 T. in Thoth, but these are unjustifiable. They rest on two assumptions: that the relationship of gold to silver «is probably meant to be consistently – if not always calculated absolutely accurately ... – 1 : 14.4», and that the prices of silver follow those of gold «after a few months' delay». There is no reason that either of these improbable¹² assumptions should be adopted. If, instead, we simply follow the table's information, we find that the two metals traded independently. The ratio is 14.4 : 1 in three months, but 14.24 : 1 in two, 14.44 : 1 in one, 14.75 : 1 in four, and 16.25 : 1 in three. In other words, more than half of the time the ratio is 14.75 or higher. It follows that we know neither gold nor silver prices for Thoth and Phaophi.

It may also follow that we do not know the gold:silver ratio for the earlier part of the century. I pointed out in *Currency and Inflation* (p. 28) that all of the evidence on hand so far pointed to a 1 : 12 ratio for at least the first part of the century, at least in official reckoning. But given the artificiality of official prices for precious metals in the period up to 324, it is entirely possible that the ratio is equally artificial. The market prices of *P. Oxy. 3773* might well have been similar to those earlier in the century.¹³

Curiously enough, the table contains no prices for bronze. We know that price declarations for bronze were collected, because one survives.¹⁴ But the new volume adds no bronze prices to our repertory. A gold:bronze ratio of 1 : 1440 appears in the Edict of Maximum Prices,¹⁵ and that (along with 1 : 12 for gold:silver) was the figure I used in *Currency and Inflation* in computing the

¹¹ Callu and Barrandon, "L'inflazione", 569.

¹² The range from 14.24 to 16.25 is too large to assign to computation error, and it is hard to think of any reason why silver alone would wait a month (or two, or three) to adjust.

¹³ Callu and Barrandon, 579, want to attribute a move in ratio from 1 : 12 to 1 : 14 to the reorganization of denominations in 358. It is clear that the move is not something official of this sort, and equally clear that ratios of 14 and higher were effective by around 340.

¹⁴ *P. Oxy.* I 85, reedited in *ZPE* 39 (1980) 115-23.

¹⁵ Cf. *C&I* 7.

value of coins. But a ratio for raw metal of 1 : 1935 is indicated (using 40 T./lb.; 2032 using the 42 T. actually paid in *P. Panop. Beatty* 2) by *P. Ant.* I 38 (cf. *C&I* 63), 1800 in *CTh* 11.21.2 (396). The price of a pound of bronze in 338 was one-sixth that of an artaba of wheat; at the average relationship of the artaba to the solidus in *P. Oxy.* 3773 of 5.75, and range of 4.6 to 6.1, one might derive figures of 2484 average, 1987 to 2635 range – except, of course, that we do not know how much bronze itself fluctuated.¹⁶ It is worth pointing out that if the bronze price of 50 d. per pound in the Edict of Maximum Prices is a real market price, and if gold was at 84 T./lb. on the market, the market ratio then would have been 1 : 2520, not the official 1 : 1440. It is hard to know if this is really how things were, but the evidence does overall seem to suggest that the Edict's ratio is unrealistically low.

For the period after 324, at least, it seems that gold solidi and silver bullion, along with raw bronze, all traded independently at free-market values in denarii. Solidi were, of course, money; but they did not, apparently, have any fixed value in denarii.¹⁷ Billon coinage contained small amounts of silver and larger amounts of bronze, both of which traded separately. The unit of account, the denarius, recorded the complex interrelationship of the three metals; the values of silver and bronze, in turn, determined the relationship between the official value of the current coin, the nummus, and its intrinsic value.

4. Periods of Stability

The central conclusion of *Currency and Inflation* was that the rise in price levels through the fourth century did not represent an “inflation” in modern terms; rather, it represented a reaction of price levels to the metal content of a new issue of coins. A key consequence of this theory is that by and large prices rise swiftly and suddenly in response to new coins, followed by a period of relative stability. This is not to say, of course, that prices could not sometimes drift upward; but for the most part, the theory would predict stability within a particular period. A useful opportunity to test the theory is offered by *P. Oxy.* LIV 3773. We find the following:

Gold:	233.3 T. / solidus, 243.3, 240.
Silver:	1033.3 T. / lb., 1166.7, 1186.7, 1213.3.
Wheat:	45 T. / art., 46.7, 50, 45, 40.
Barley:	20 T. / art., 25, 20, 25, 15, 20, 22.
Lentils:	20 T. / art., 22, 25, 22, 25, 30, 35, 30.
Vegetable seed:	50 T. / art., 45, 50, 75, 80, 75.
Wine:	1 T. / sext., 1.3, 1.7, 1.

¹⁶ A looser computation involving indexed levels led me in *C&I* 40 and 63 to suggest that the ratio could have gone as high as 1 : 3300. This was misused by Callu and Barrandon, 569, as if it were an actually attested ratio; it must be insisted that calculations like that cannot be pressed that far.

¹⁷ For this reason, the concept of convertibility is completely inapplicable to this period. Cf. the interesting article of E. Lo Cascio, “Teoria e politica monetaria a Roma tra III e IV d. C.,” *Società Romana e impero tardoantico* I 535-57, who deals with the conception of money. I cannot, however, agree with him that a solidus with no fixed value in denarii was not money at all. One could set prices in solidi, just as one could in denarii; but there was no automatic equivalence between them.

Gold finishes up 2.9 %, silver up 17.4 %, wheat down 11.1 %, barley up 10 %, lentils up 50 %, vegetable seed up 50 %, wine unchanged. Overall, it must be concluded that in the context of a 14-month period in which swings of 50 % are not uncommon, gold, silver, wheat, barley, and wine are all effectively unchanged. Despite the higher figures for vegetable seed and lentils, then, it seems justifiable to view the papyrus as a strong confirmation of the essential stability of the price levels once a readjustment takes place.

5. Compound Rates

In analyzing the accumulated price information provided by *P. Oxy.* LIV and other texts, Coles provides a table (pp. 232-40) covering a period from 301 (the Edict) to 359. For each item in it, he has computed two annual rates of inflation, one including the Edict and one without it. These cover the period from 301 until whatever is the last price attested for the item in question. For all items, the average is 13.91 % including the Edict, 18.97 % excluding it. Coles calculates that the average reduction in the silver content of the nummus from 301 to 352 was about 13.75 %, which he naturally compares, with some satisfaction, to the average price rise including the Edict.

There are many problems with these figures. Coles himself points out that the fluctuations in *P. Oxy.* LIV 3773 shows «how unreliable these inflation percentages may be». And he remarks that «the pace of inflation was more irregular than is implied by my annual percentage figures». The percentages including the Edict are lower than those without it, he notes, because the prices in the Edict for numerous items are for higher-quality merchandise than what was covered in the Egyptian declarations. Moreover, the data excluding the Edict mostly come from the period after 310, which saw a faster rate of inflation than the first decade of the century.

All of these points are true enough, and others can be added. The most salient, probably, is the fact that by the 350s the silver content was small enough that it probably did not represent more than half the value of the nummus – if, indeed, it was detectable at all. A figure which ignores the value of the bronze, therefore, will radically distort matters. The latest estimates of metallic content indicate the nummus of 295-307 contained 315 mg of silver, but including the bronze the equivalent of about 394 mg of silver, while that of 353 has about 20 mg of silver, but including the bronze an equivalent of over 33 mg.¹⁸ Silver content, therefore, has fallen to 6.35 % of that at the start of the century, but metallic content as a whole only to 8.38 %. The difference is significant.

All this being said, however, it is more important to insist that any average compound inflation rate is a meaningless statistic. Price rises took place in steps, not on a slope. It is as if one were to average 25, 0, 0, 0, 0, 0, 0, 0, 100, 0, 0, 0, 0, and 50 to get an annual average of 12.5. That figure would mean absolutely nothing either experientially or structurally. Such things are better off abandoned.

6. Sales of Slaves

Slave sales are not common in the fourth century.¹⁹ Two which contain prices have been published recently, *P. Köln* V 232 and *P. Nephros* 33. In both cases, the price is 500 T. In the

¹⁸ Callu and Barrandon, 560 and 579.

¹⁹ For a discussion of this fact, see my article "Slavery and Society in Fourth Century Egypt", forthcoming.

Cologne papyrus, a small part of the consular date is preserved:]ανοῦ τῶν λαμπροτάτων, Παχῶν κς. The editor, B. Kramer, arguing that the text can hardly have been written later than 328 (on grounds of the price), offers as possibilities 301, 302, 314, 315, 325, and 326; of these she restores the consuls of 314.

In *P. Nephros* 33, on the other hand, the date is entirely lost. On the basis of the price, the editors conclude that it is to be dated «am ehesten zum zweiten oder dritten Dezennium des vierten Jahrhunderts», which translates to «early fourth century» in the heading.

Slaves can of course vary in value quite substantially. But orders of magnitude nonetheless control the discussion. Only three slave sales from the fourth century with preserved prices had previously been published, *P. Abinn.* 64 (two male slaves sold for 1200 T. each), *SB V* 8007 (female slave sold for 913 T. 2000 dr.), and *P. Lond.* III 977 (p. 231) (object of sale lost, price is 1166 T. 4000 dr.). Of these, only the London papyrus has a date, to 330. The Abinnaeus papyrus, however, presumably belongs to the 340s (at all events before about 352). All three of these, clearly, are of the same order of magnitude, as are the two undated papyri with the price of 500 T.

In the edition of the Cologne papyrus, Kramer argues that «Die Preise stiegen ja zu Beginn des 4. Jhdts. noch nicht so rapide an wie später, so daß ein gewisser zeitlicher Zwischenraum zwischen den Texten anzunehmen ist». But prices did not rise like that. The general level of prices rose something like 6-fold around 325, tripled again around 330, then roughly doubled again around 337, with some smaller rises in the 340s. A slave price in three digits, then, is simply impossible before 325, and it seems unlikely that one of 500+ could date before the rise of 330.

There are three years in the 330s when -ανοῦ appears in this place in the consular formula, 330 (49 letters to be restored), 332 (40 letters²⁰), and 337 (38 letters). Length favors the first, as does perhaps the price; but these are not quite probative considerations, given the variability of slave prices and the possibilities that the consular formula might have been written in a larger hand than the body of the text. Both of these texts with prices of 500 T., at all events, seem likely to date to the 330s, while *SB V* 8007 may come from that decade or the next.²¹

7. Dating the Archive of Nephros

The editors of *P. Nephros* note (p. 3) that most of the texts in the archive are undated letters. There are dated texts from 329, 335, and 344, another probably 336/7. But the editors are uncomfortable with a span as long as 15-20 years for the correspondence, and various elements in the contents seem to point to a date after 335. After discussing the prices, they conclude (p. 4) that the archive comes from after about 344, though before the great rise in prices which they see toward the end of the century.²²

²⁰ This figure assumes a formula Παπίου Πακατιανοῦ καὶ Μεκιλίου Ἰλαριανοῦ τῶν λαμπροτάτων, which is probably what stood in *SB XII* 11024.21, rather than the usual longer formula.

²¹ The editors of *P. Nephros* 33 propose a date in the 320s.

²² They argue that the loan of 344 (no. 32), for 80 talents, would be a very small amount – the value of one sextarius of oil – if no. 8 were of the same date; such a small amount seems to them unworthy of a loan. This may be true, but comparing the wheat prices in *P. Oxy.* 3773, the loan amount is at best the value of two artabas of wheat, hardly a large amount.

There are two data of real interest for the investigation. First, a sextarius of oil costs 12 myriads in 8.7. Now the index figure in *Currency and Inflation* for oil is 2880, which would point to gold at 230,400 T. But quality and type fluctuated considerably, and indexing is less valuable here than for most commodities. That index figure is based on P. Oxy. XIV 1753, where oil is 40 sextarii per solidus. The figure might well have been 3600 in the mid 330s (comparing SPP XX 93, 2 T./sextarius, with P. Vindob. G.25840,²³ 7200 T./lb. for gold), and that would bring us to 288,000.²⁴ At all events, the gold index is in six figures. That does not occur until the currency change of ca 352, and the use of myriad by itself (without denarius) also points to a date after the introduction of the myriad as a coin (with denarii no longer needing to be specified).

Second, 3 minas of iron cost 20 myriads (8.9-10). There is only one other iron price, P. Oxy. I 84, 360 dr./lb. in 316. If gold on the open market was 288 T./lb. then, as it seems to have been in 317-318 (and no major monetary change intervened), that amounts to 4800 pounds of iron per pound of gold. Now 3 minas are $3\frac{1}{8}$ lbs., and a pound of iron then costs 6.4 myriads, or $42\frac{2}{3}$ talents. This times 4800 yields 204,800 as a gold index, very consonant with the oil indication. Since the prices are both from the same document, P. *Nepheros* 8, that consistency is particularly helpful.

With both index figures in six digits, a date in or after 352 seems inevitable for P. *Nepheros* 8. There is no way of being sure that the rest of the texts fall in the same period, but there is certainly no objection to such a date. The editors' instinct for a date after 344 is thus given strong support and somewhat more precision.

8. Prices of Tow

In P. *Nepheros* 4.19, a bundle of something unspecified costs 14 myriads; and 6 bundles of something unspecified cost 94 myriads in 8.5-6, or $15\frac{2}{3}$ myriads per bundle. It will be noted that the latter figure comes from the same source as the oil and iron prices. The rough agreement of prices in the two papyri suggests (but does not prove) that they refer to the same commodity in identically-sized bundles. The editors note in 4.16 n. that tow is the most likely substance, but there are other possibilities, which are enumerated in 8.5 n. It is worth investigating to see if in fact tow is possible.

A standard bundle of tow was 5 minas (or 5.2 lbs.), as is indicated in P. *Mil.* II 52, P. *Laur.* IV 176 (apparently), P. *Rainer Cent.* 86.12, and P. *Oxy.* LIV 3765. We cannot be sure that all bundles of tow are always 5 minas, but that is the only size attested. If we apply that to these two figures, we get in 4 17.92 T./lb., in 8, 20.05 T./lb. Now the number of pounds buyable with a pound of gold (i.e., the index figure) depends on quality; in the Edict of Prices (301), the range is 3000 to 4500, and that range seems fairly sound in other instances (cf. below). That would give a gold price of 53,760 to 90,225 for the two extremes. This is off by an order of magnitude from the iron and oil prices. The most likely conclusion, uncomfortable though it may be, is that the commodity is not tow.

²³ See *BASP* 20 (1983) 4-6.

²⁴ An angeion of oil is 60 myriads in 4.20, but we do not know how big the angeion is; 5 sextarii, as the editors suggest, would be very suitable.

Let us, however, give other tow prices further scrutiny to see how firm that conclusion is. *P. Oxy.* LIV 3753 (319) gives 450 den. for top quality, 162 den. for normal, 100 den. for inferior. The ratios have a wider spread than in the Edict. Applying the index for normal in the Edict, 3600, one would get gold at 388.8 T./lb., which is fairly congruent with other indications for the aftermath of the reduction of gold content in 318.²⁵

P. Oxy. LIV 3765, dated *ca* 327 by the editor, has 720 den. for top quality, 576 for ordinary. Ordinary would indicate gold at 1,382.4 T./lb. This is low but not at all impossible for the late 320s in light of the price swings attested.

P. Oxy. X 1288 (no date) has a figure of 1 T. 2000 dr. for tow, but both numerals are dotted and unreliable. Line 9 seems to speak of 1 T. per bundle, which would give 288 den./lb.; indexed at 3600, that comes to 691 T. This might be lower quality tow and the date 318-323.²⁶

SPP XX 96 (around 337) has 4 T./lb., or 14,400 for gold; although gold seems itself not to be that high quite yet, many commodities yield such an index around that time.²⁷

P. Oxy. XLVIII 3429 poses serious problems, because there are several radically different figures which can represent the price of a solidus: 6,000 T. (line 17), 8,300 T. (line 18), 3,245 myriads (or 21,633 T.) (line 24). These yield various gold pound prices of 432,000, 597,600, and 1,557,576. Indeed, line 19 may have a price of 27,200 T. for a solidus, 1,958,400 per pound. The first two prices are conceivable in the period 352-360, the third in the 360s and 370s, and the last in the 380s, roughly. None seems clearly excludable, none clearly secure. Tow is 350 T./bundle, or 67.2 T./lb., which indexed at 3600 gives 241,920. If these are standard bundles, a date in the 350s seems preferable. But there must remain some uncertainty here.²⁸

P. Rainer Cent. 86 is a loan in which the borrower must pay 1 bundle of tow per month per solidus borrowed, i.e. 12.5 lbs./year per solidus. In *P. Köln* III 151 introd. an interest rate of 12 % is assumed, but as in repayment in kind one will generally suppose a concealed higher rate, so perhaps here too we should assume something higher. The assumption of a rate of 24 % would indicate an imputed value of 3750 lbs./lb. of gold, which is close to the 3600 used above.

The evidence for tow thus seems reasonably consistent, given the wide variation in quality. It seems, therefore, that no amount of variation in bundle size or quality is likely to be sufficient to allow the references in the *Nepheros* papyri to refer to tow. Perhaps hay is meant.

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²⁵ See *C&I* 32.

²⁶ Rather than 324-330 as suggested in *C&I* 69.

²⁷ See *C&I* 38.

²⁸ This was put *ca* 375-385 in *C&I* 69, but that was without so much evidence about tow available and based on the editor's opinion about the solidus prices.