Grain prices and grain markets in the Roman world

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'Wine sells for twenty *asses* and wheat for four:
drunk and stuffed, the farmer is broke.'[1]

1. Grain prices in the Roman world: the data

In contrast to ancient Babylonia, we have remarkably few grain prices from the Roman world. That has not deterred scholarly interest, and it is reasonable to wonder whether anything new and sensible is left to be said. In this paper I outline what price data we do have (this section), review the main recent discussions of the implications of the extant prices for reconstruction and interpretation of the grain market or markets in the Roman world (section 2), and try to establish what conclusions relevant to the interests of this conference can and cannot legitimately be drawn (section 3).

My Roman world here is limited to Rome and Italy of the second century BC to third century AD and the areas of the Mediterranean and beyond as they came under Roman protection or rule. Politically in this period Rome had an oligarchic government, dominated by the senate in the Republic and an emperor in the Principate (first to third centuries AD), with administration mostly devolved to the governors of provinces and the local councils of landowners which ran the cities-cum-territories, the basic social and administrative blocks of most of the empire. Militarily Rome was the dominant power throughout; only on her eastern frontier did she face another complex imperial state, the Parthians and then Sassanians, in a stand-off punctuated by futile wars.

This half millennium is also appropriate for studying prices because it had monetary unity. First minted in 212/1 BC, the silver denarius was the principal coin of the Roman world from the mid-second century BC to its replacement in AD 274/5, supplemented in the Principate by the gold aureus always tariffed at 25 denarii. Other silver coins - various denominations of drachmas - were sometimes minted in the eastern provinces, but all as denarius-equivalents, and the central and local 'bronze' (copper) coinages were fractions of the denarius. Note, however, that the Romans frequently reckoned prices in sestertii (symbol HS), of which there were 2.5 to the denarius down to 141 BC, and 4 to the denarius thereafter. Of particular importance is that there was no

[1] Martial 12.76: amphora vigesis, modius datur aere quaterno. | ebrius et crudus nil habet agricola.

competitor foreign coinage, even in the east, to challenge the token value of the denarius-dominated coinage. As it happens we have only a couple of prices, of dubious reliability, which pre-date the denarius, and although price data for the fourth century AD are relatively abundant, at least from Egypt, they relate to a new monetary system quite different in its structure and operation.[2]

Although the collection and study of prices, costs and values of all sorts from the Roman world is a long established scholarly activity, we still lack a full and authoritative catalogue, even for grain prices. However, what we already know suggests that it would not aid us greatly. Instead of rehashing all the data again, I select only those which are significant for market behaviour (Table 1).[3]

Table 1: Select grain prices in the Roman world

(with equivalent in g silver / hl)

a. Market prices of wheat at Rome in severe shortages

1. 211/0 BC — Polybius 9.11a.3
   15 dr. per Sicilian medimnos, i.e. 25 asses per modius. ***= 130 g***

2. late II / early I (?) — Dionys. Halic. 12.1.12 (*under 439 BC*)
   12 dr. (HS 48) per modius; ***= 536 g***
   Benefactor sells grain at 2 dr. (HS 8) per modius. ***= 89 g***

3. AD 6 (Augustus) — Eusebius, *Chron*. II 146-7
   Up to 5.5 denarii (= HS 22) per modius. ***= 246 g***

b. State subsidised prices of wheat at Rome

4a-d. 203, 201, 200, 196 BC — Livy 30.26.6, 31.4.6, 31.50.1, 33.42.8
   Aediles distribute surplus tax at 4 or 2 asses (per modius). ***= 21 or 10 g***

[2] For more detail and references see Rathbone 2009.

[3] For grain prices see Rathbone 2011a, supplemented by 2009 (with list of price collections) and 1987 (Roman Egypt). No one yet claims to have looked systematically for all grain prices from the provinces of the Roman empire apart from Egypt, but probably there is little that has been missed. For conversion of prices to grammes of silver per hectolitre, I take the modius as equivalent to 8.62 l, and the denarius to 4.49 g silver to 157 BC, to 3.85 g from 156 BC to AD 64, and to 3.36 g from AD 65 on.

5. 123 - 83, 73 - 59 BC Livy, *Epit*. 60; *Schol.Bob*. 2.135 St.; Cic., *pro Sestio* 55
Gracchan *frumentatio* costs 6 1/3 asses per modius, presumably from 5 modii (monthly ration) for 2 denarii, i.e. HS 1.6 per modius. ***= 18 g***

6. 74 BC Pliny, *NH* 18.16; Cic., *De Off*. 2.68
Bad shortage; aedile sells wheat at 1 modius for 1 as (= HS 0.25).
= 2.8 g

7. AD 19 Tacitus, *Ann*. 2.87
Shortage, Tiberius sets maximum price [*maybe something like HS 8 per modius?*], and pays merchants compensation of 2 *nummi* (HS) per modius.

8. AD 64 Tacitus, *Ann*. 15.39
Fear of shortage, Nero reduces price (of surplus state wheat?) to 3 *nummi* per unit, i.e. HS 3 per modius. = ***33 g***

c. Other grain prices from Italy and the west

9. c. 150 BC Polybius 2.15.1
Gallia Cisalpina (Po valley) so fertile, wheat could cost as low as 4 obols per Sicilian medimnos, i.e. 1 as per modius. ***> 4.5 g***

10. c. 150 BC Polybius 34.8.7, apud Athenaeus 8.330c
Lusitania (Portugal) so fertile, wheat costs 9 obols per Sicilian medimnos, i.e. 2.5 asses per modius. ***= 11 g***
[Also ***barley*** 1 drachma per medimnos, i.e. 1.5(?) asses per modius. = **6.7 g**?]

11a-b. AD 70s (?) Duncan-Jones, *EREQS* 146
Two graffiti at Pompeii imply wheat prices equivalent to HS 3 and, probably, HS 7.5 per modius. = ***29 to 73? g***

12. c. 100 - 150 (?) *CIL* XI 6117 (+ p.1397)
Shortage, benefactor at Forum Sempronii (Marche) provides wheat at a denarius (HS 4) per modius. = ***39 g***

13. II AD (?) *CIL* VIII 25703 and 25704
Shortage at Thuburnica (Tunisia), price reaches 10 denarii (HS 40 per modius).
= ***393 g***
Benefactor sells wheat at lower price (number lost).

d. Grain prices in Sicily in the late Republic (under Verres)

14a. 74 BC Cicero, *in Verrem* 2.3.213-6

Wheat cheap in 76, but expensive in 75 because taken (Cicero was quaestor) to meet shortage at Rome. In 74 (shortage at Rome again) pre-harvest price reaches 5 denarii (= HS 20) per modius; ***= 223 g***
commutation of *frumentum in cellam* at 3 denarii (HS 12) per modius is fair pre-harvest, but unfair after it, i.e. price had dropped below HS 12. ***< 134 g***

14b. 73-71 Cicero, *in Verrem* 2.3.163, 173-4
73 BC lex Terentia Cassia: for revived *frumentatio* at Rome, Verres to purchase a second tithe (*decuma*; 3 million modii) at HS 3 per modius, and in addition 800,000 modii *frumentum emptum* at HS 3.5 per modius;
he commutes Halaesa's contribution at HS 15 per medimnos, i.e. HS 2.5 per modius, when the average price is HS 2 to 2.5 per modius.

14c. 73-71 Cicero, *in Verrem* 2.3.188-97, 201-2
SC authorises Verres to buy *frumentum in cellam* at HS 4 per modius, and HS 2 for **barley**; he commutes it all at HS 8 per modius (pocketing HS 12 per modius); the normal market price across all Sicily was then HS 2 to 3 per modius. ***= 22 to 33 g***

14d. 70s Sicily, conclusion: under normal conditions, range of HS 2 to 4 per modius, ***= 22 to 45 g***

e. Egypt and other eastern provinces in the Principate

15. AD 45 (Sep.-Oct.) and 46 (Dec.) Rathbone 1997
Retail prices in the village of Tebtunis (Egypt) range between 4.36 and 8.73 (Alexandrian) dr. per artaba, roughly HS 1 to 2 per modius.
= 11 to 22 g

16. AD 49 Eusebius, *Chron*. (Schoene II 152-3)
Severe shortage in Greece, wheat reaches 6 denarii (HS 24) per modius.
= 268 g

17. AD 93/4 *AE* 1925.126b, = *DocsFlav* 464.ii
Winter shortage in Antioch in Pisidia (Anatolia), governor orders sale of surplus stocks at not more than one (denarius, i.e. HS 4) per modius. ***= 39 g***
Before shortage had been 8 or 9 asses (HS 2 to 2.25) per modius (presumably 3 dr. to 3 dr. 2 ob. per medimnos). ***= 19 to 22 g***

18. c. AD 125-7 *SEG* XI 492, = *AE* 1929.20
Shortage at Sparta, price reaches 40 denarii per medimnos, i.e. HS 26.67 per modius. ***= 260 g***
Sitones (grain official) distributes wheat at a hemiekton (1/12 medimnos) per denarius, i.e. HS 8 per modius. ***= 78 g***

19. later II AD Robert & Robert, *La Carie* II no. 172
Price of wheat at Sebastopolis (Caria) reaches 4 denarii per *kupros*, i.e. HS 5.3 per modius? ***= 65 g?***
Benefactor sells 2,000 *kuproi* at 2 denarii, i.e. HS 2.7 per modius? ***= 26 g?***

(Assuming *kupros* = 0.5 medimnos, following Hesychius, s.v. *diptuon*.)

20. (II AD?) *IG* XII (5) 947
[***Barley*** on Tenos (Aegean) sells at 5 denarii per medimnos, i.e. HS 3.3 per modius. = **32 g**
Benefactor sells at 5 asses per medimnos, i.e. HS 0.2 per modius. = **2.0 g**]

21. long II AD Sperber 1991: 102 (rabbinic texts)
In Judaea wheat cheap at 1 denarius per *se'ah*, expensive at 4 denarii.
If *se'ah* = modius (so Sperber), range is HS 4 to 16. = ***39 to 156 g***

22. AD 70s - 160s Rathbone 1997
'Farm-gate' prices in middle Egypt have normal range of 6 to 12 (Alexandrian) dr. per artaba, ***= 13 to 26 g***
median 9 dr. per artaba, i.e. HS 2 per modius. ***= 19 g***

23. AD 190s - 270 Rathbone 1997
'Farm-gate' prices in middle Egypt have normal range of 12 to 20 (Alexandrian) dr. per artaba, = ***26 to 43 g***
median 16 dr. per artaba, i.e. HS 3.56 per modius. = ***35 g***

Because of the lack of private and public documentation outside Egypt, most of our data are for extraordinary high prices in times of shortage, which may be rhetorical rather than actual prices, or for subsidised prices set by agents of the state. The only three market prices we have from Rome itself (items 1 to 3) are shortage prices in 211/0 BC, around 100 BC (if I am right that this reflects the contemporary experience of the writer of the annalistic account followed by Dionysius, rather than being pure invention) and AD 6. Otherwise we have only five examples or groups of state subsidised prices (items 4 to 8), including four sales of surplus state stock in the period 203 to 196 BC and the token price set for the monthly grain ration (*frumentatio*) to resident adult male citizens instituted in 123 BC, which persisted, with a gap, until the ration was made free in 59 BC. The five other prices for Italy and the west (items 9 to 13) are a mixed bag: two perhaps rhetorical prices to illustrate the fertility of two regions, a couple of graffiti of uncertain interpretation from Pompeii (which has proved a big disappointment as a potential source of price data), and two prices relating to shortages. More useful is the group of market and state purchase prices given by Cicero for Sicily in the 70s BC (item 14), although we have to beware some misrepresentation to strengthen his prosecution of the governor Verres for extortion. The eastern Greek-speaking half of the empire would be no better with five shortage prices (items 16 to 20), including one for barley, were it

not for the rabbinic tradition about wheat prices in Judaea (item 21) and the data from texts on papyrus from Roman Egypt (selected and summarised as items 15, 22 and 23). Even the Egyptian data are not abundant. We have no grain prices from Alexandria, the second city of the Roman empire, or the Delta, and only a few from Upper Egypt (which are early and problematic, and so I omit here). From Middle Egypt we have a set of seven retail prices from one village in three months of 45-46, and a number of later prices which come from estate accounts - hence what I call 'farm-gate' prices - which appear to fall into two chronological phases, the first from the AD 70s to 160s (12 prices), the second from the AD 190s to 270 (23 prices). This, in sum, is the data on which the modern views, summarised in the next section, are or claim to be based; whether they are in fact sufficient to form a basis for conclusions may be doubted, but any hypothesis about grain prices in the Roman world must at least be able to accommodate them.

2. Grain markets in the Roman world: previous views

Most interpretations of the grain market in the Roman world argue for a single unified market centred on Rome. Some instead argue for unintegrated regional, or even local, markets, and some try to follow a middle way, which is the line I will take in the third section. The disagreement is symptomatic of, and often explicitly located in, a broader debate about the extent to which the Roman economy in general was unified, monetised, sophisticated, prosperous, productive and capable of growth. It may be noted that most ancient historians, in contrast to writers on the grain market, tend to favour the view that the Roman economy was relatively simple and undeveloped.

The most straightforward argument for a unitary market centred on Rome is that advanced by Kessler and Temin 2008, adapted for its place of publication to foreground the monetary unity of the empire which is implicit in the market argument.[4] Their regression analysis of six pairs of contemporaneous wheat prices from Rome (in fact Rickman's estimates) and an overseas location purports to find a direct, statistically robust, correlation between provincial wheat prices and distance (as the crow flies) from Rome. Their explanation is that Rome's political and monetary unification of the Mediterranean created a scale and ease of trade sufficient to unify prices which were set by the city of Rome as the massive centre of consumption of the surplus wheat produced in the provinces. This explanation has been advanced before in more general terms, but

[4] In draft form this paper has been available online since 2005.

also with more coherent historical and economic background, by Hopkins and von Freyberg. In his 1980 paper, rewritten and nuanced in the 1995/6 version, Hopkins argued that in order to meet Rome's monetised fiscal demands, which were mostly disbursed on military expenditure in the frontier provinces, the inner ring of civilian provinces had to increase production to sell goods to Rome and its army and hence gain the money to pay their taxes. This created a single unified monetary zone and market in which 'Rome was at the peak of a pyramid of rising prices'.[5] Von Freyberg, like Temin an economist, has applied 'terms of trade', or 'comparative cost', analysis to the Roman economy. He argues that throughout the Principate capital was transferred to Rome and Italy, mainly by ever-increasing taxation and the central issue ('sale') of imperial coinage, also through private Italian acquisition of estates in the provinces, and because of the central location of most imperial demand. The net result was to depress provincial prices and raise those in Rome and Italy, giving provincial production a significant comparative cost advantage and causing Italian production to stagnate. The main earlier study of ancient Mediterranean grain prices (and other data), had reached the opposite conclusion: Heichelheim, like his contemporary Rostovtzeff, believed that the Hellenistic monarchies had created a world economy in and around the eastern Mediterranean before their conquest by Rome, but that a crisis in the late second century BC, followed by unrelenting Roman imperial exploitation, caused a long-term rise in prices, but not wages, and thus economic depression in the eastern provinces.[6]

The main counterblast to this majority view is Erdkamp 2005, a wide-ranging study of the production and distribution of grain in the Roman empire, indeed the only monograph to date on the topic. Erdkamp's principal argument is that the grain market of the Roman empire resembled that of pre-industrial Europe as interpreted by Persson 1999. A combination of heavy taxation, small and autarkic production units and limitations of information and transport meant that there was too little tradeable surplus for specialist merchants or an integrated market to emerge. Hence there was huge price variation caused by local shortages, which could only be palliated by intervention by the local, or sometimes the imperial, authorities. Overall Erdkamp concludes that lack of confidence in the food supply deterred investment of capital away from agriculture into industrial production, and thus inhibited economic growth. Silver 2007 accepts the

[5] Hopkins 1995/6: 220.

[6] Heichelheim 1970: passim. For his earlier studies of prices which underlie this, see Rathbone 2011b.

general picture but disagrees on one important point: in his view it was the political readiness of the authorities to intervene, and to cut the profits of producers and merchants to the benefit of consumers, which had caused the problem by encouraging improvident consumption and discouraging speculative storage. In general terms Erdkamp's thesis is in the Finleyan tradition of an undifferentiated Graeco-Roman economy in which, despite urbanisation, trade was marginal. An alternative tweaking of the Finleyan picture is Bang 2008, which imagines the Roman economy, vaguely on a model of Mughal India, as a patchwork of 'bazaars', by which he seems to mean unintegrated local markets dominated by small-scale adventitious exchanges, with high price variability, because various material and institutional factors discouraged inter-regional trade.[7]

A sort of middle way is advanced, at least implicitly, by Garnsey 1988. His crucial points are that in peacetime there are few known cases of people suffering prolonged food shortages, let alone famine, and that, with the partial exception of the *annona* of Rome, the direct acquisition, shipping and distribution of grain by civic and imperial authorities was rare, and their interventions were typically limited to encouraging shippers or discouraging profiteering. It follows that the absence of serious crises implies a reasonably efficient market in grain, supported by official intervention on occasion. Lastly, returning to the price data, Bransbourg 2011 demonstrates that the price analysis of Kessler and Temin 2008 is statistically flawed because of weaknesses in the evidence and its interpretation.[8] He uses the model of eighteenth-century French grain prices to argue that price relativities in the Roman empire too will have been determined primarily by the ease or difficulty of transport to any and from local area. Indeed he claims that if the reliable Roman prices are reworked to allow for real transport distances they imply that, while inland areas were essentially on their own, coastal areas near ports did to some extent belong to a unified grain market centred on Rome, although he also suggests that prices in the eastern Mediterranean were generally higher than in the west.

Such is the range of views on the grain market in the Roman world. It may be noted that of the studies cited above, only two (Kessler and Temin, Bransbourg) actually present and discuss some price data, and only Heichelheim had actually made a systematic collection of the data. The following section therefore starts with prices before looking at the wider background.

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[7] See Bang 2008: 153-66 on the trade in grain.

[8] I am grateful to the author for allowing me to use his paper before publication.

3. Grain prices and markets in the Roman world: a re-assessment

With the exception of the Egyptian data, the grain prices we have from the Roman world are too few and too rhetorical, that is cited to illustrate special circumstances, to be suitable for straight statistical analysis. In the search for chronological and regional patterns, it is safest to start with the best data, and then to see how far the rest can be sensibly related to them. Our private price data from Egypt show two long central periods of stable prices of wheat (items 22 and 23): in the AD 70s to 160s the normal price fluctuated between 6 and 12 drachmas per artaba, in the AD 190s to 170 between 12 and 20 drachmas. The doubling of prices which occurred in the later second century AD, and affected all commodities, is generally agreed to have been a result of the Antonine plague, although we lack evidence to explain quite how it happened and whether, as one might expect from comparison with the Black Death, the real value of wages rose.[9] In AD 274/5 all prices suddenly increased tenfold, apparently the result of a misguided coinage reform, but that is another story. The Tebtunis prices of AD 45/6 (item 15), which follow a particularly poor inundation, may suggest that wheat prices in the earlier first century AD were lower than the level reached by the 70s, but their typicality remains uncertain. I would expect the chronology of step-increases in the Egyptian wheat prices to provide a model for the Roman empire as a whole, although this would be doubted by scholars who still find it convenient to believe that Egypt was exceptional.

The variation in Egyptian wheat prices raises some interesting points.[10] An analysis by months does not show the seasonal variation we would expect and which is mentioned in letters from Roman Egypt; instead it shows that our sample is too small for reliable statistical analysis. Variation between years according to the quality of the preceding inundation is demonstrable, as is its parameters. The particularly poor harvests of AD 99 and 191, which provoked state intervention, led only to prices at or slightly above the top of the normal range. A series of poor floods in the later 240s, which stimulated state intervention in 246, led to a run of high prices for seven years (albeit not necessarily constant high prices), after which lower prices returned: this is the worst grain shortage attested in Roman Egypt. One curiosity is the roundness of the prices. In the 70s to 160s prices in round drachmas, but no fraction (excepted for a discount on one bulk

[9] Rathbone 1996; Scheidel 2002.

[10] The following comments on Egyptian wheat prices draw on Rathbone 1997.

price), occur across the range of 6 to 12 drachmas, but in the 190s to 270 all wheat prices but a couple of cases (at 18 drachmas) are stepped at 4-drachma intervals, the value of the standard coin of Roman Egypt (the Alexandrian tetradrachm), so that the normal range comprised only three prices: 12, 16 and 20 drachmas. The extent of variability had declined too: whereas in the 70s to 160s it had been 33% around the median price, in the 190s to 270 it was 25%. It seems that our evidence, which comes mostly from the records of surplus-producing estates, reflects the operation of a wholesale market with pretty regular patterns of supply and demand. The evidence from the village of Tebtunis shows more flexible pricing in retail sales, achieved by varying the amount of wheat sold for a tetradrachm (like the Babylonian prices). One other factor to note is that the state, as well as raising taxes in grain, not infrequently made compulsory purchases, which in the AD 70s to 180s were almost always at 8 drachmas per artaba, only one drachma below the median value of the normal wholesale price range, and more in times of shortage; in the later period state purchases were at varying market-related prices. Overall the wheat prices from Roman Egypt imply an integrated provincial market, with distinct wholesale and retail levels, in which the state was an important but largely reactive participant, where public and private systems of distribution (taking advantage of the Nile) and storage (the network of civic and village granaries) to a considerable extent were able to even out variations in production, and more so in the third than in the second century AD.

Roman Sicily was in some ways comparable to Egypt: famous for its productivity in grain, a major supplier of Rome and an integrated provincial market, as Cicero observed, because no city was more than a day's journey from a port.[11] In the 70s BC, according to Cicero (item 14), the normal price range was between HS 2 and 3 per modius; to allow for Cicero's forensic exaggeration, and comparing state payments for extra levies, I suspect the normal range was more like HS 2 to 4, with 33% variation around the median price. Still extraordinary are the pre- and post-harvest prices of HS 20 and HS 12 in 74 BC, which fall into the empire-wide range of 'crisis' prices (see below), but these were clearly the result of special Roman levies to meet a shortage at Rome, apparently turning the poor Sicilian harvest of 75 BC into a local disaster, from which, however, two reasonable harvests led to a full recovery.[12] This is but one case among

[11] Cicero, in Verreem 2.2.192; see below for his contrast with Asia and Spain.

[12] The shortage at Rome was probably the culmination if supply problems and civic unrest caused by Sulla's abolition of the Gracchan distribution scheme which the senate was about to restore in 73 BC.

several of exceptionally high wheat prices caused in the Greek world of the second to first centuries BC by the crude imperial aggression of the Roman Republic with arbitrary diversion of food supplies to its armies and citizens.[13] The rabbinic tradition about wheat prices in second-century AD Judaea (item 21) to me suggests a normal range of 1 to 2 denarii per *se'ah* (with 33% variation around the median price) and prices reaching 3 or 4 denarii in local shortages, but this is speculation.

Because of the different coins and measure used, to compare prices across time and place we have to use a common equivalent, which here is grammes of silver per hectolitre of wheat. The stunning lack of evidence for market prices of wheat in Rome and Italy has already been noted. In another paper I have argued that the normal range in Rome and Campania of the late Republic to early Principate was probably HS 6 to 10 or 12 per modius, equivalent to 67-97/117 grammes of silver per hectolitre, and also that wheat prices had probably doubled between the 190s and the 130s BC.[14] Unsurprisingly, wheat was two to three times more expensive at Rome than in Sicily of the 70s BC (item 14d). Polybius' prices for wheat in the Po valley and in Lusitania (Portugal) around 150 BC (items 9 and 10) are probably exaggerations to underline the fertility he is claiming for them, but may reflect the bottom end of the scale of normal prices as they were before the second-century BC price rise at Rome.

In the Principate most of our evidence comes from the eastern half of the empire. The benchmark here is the normal range in Egypt of the AD 70s to 160s of around 13-26 g (item 22), which was probably somewhat higher than the normal range in the earlier first century AD (item 15). Comparable to this are the alleged normal range of 19-20 g at Pisidian Antioch, inland Anatolia, in the AD 90s (item 17), and the later benefactor's price of 26 g (if the equivalence is correct) at Sebastopolis in Caria (item 19). Wheat prices in second-century AD Judaea, however, were a step higher at say 39-78 g (item 21). This is comparable to 5 to 6 drachmas per medimnos, roughly 37-45 g, which had been the normal wheat price in the major coastal cities of the Greek world right through the fifth to second centuries BC.[15] Indeed it is at first sight surprising that wheat prices in inland Asia Minor should be as low in Egypt where yields were at least double. Two ancient comments about prices in Asia Minor suggest an answer. In a speech in the AD

[13] Se further Rathbone 2011a.

[14] Rathbone 2011a.

[15] Rathbone 2011a.

70s criticising his fellow citizens for a riot about the high price of wheat, Dio of Prusa, another inland Anatolian city, noted that the current price (no figure is given) was high but not disastrous and was the norm in cities elsewhere, which recalls Cicero's observation in the 70s BC that Roman governors of Asia can profit legitimately from allowing Philomelium, another inland city, to pay cash in place of levies of wheat due for delivery at the great coastal city of Ephesus at the higher price normal there.[16] Cicero claims that this is a general phenomenon in provinces like Asia and Spain which have extensive inland areas in contrast to Sicily where no city is more than a day from the coast and the province therefore has a unified wheat market and price. This leads me to suspect that in the coastal areas of the eastern Roman empire of the first to second centuries AD the normal price range of wheat was broadly similar to what it had been in the fifth to second centuries BC.

Unsatisfactorily thin as the Roman wheat price data are, they seem to suggest a partially integrated market, determined primarily by regional productivity and demand on the one hand, and on the other by the ease or difficulty of transport. Basically the major coastal zones of the empire were linked into a hierarchical structure with the highest price band in Rome and Campania, where demand most exceeded production, a middle band in Sicily, the Greek cities and, to some extent, Judaea, and the lowest band in Egypt, which though not coastal was linked to the Mediterranean by the Nile, and where production most exceeded demand. In inland zones with productive land but poor transport links, wheat could be as cheap as in Egypt because surplus production was in effect unexportable. Wheat prices had doubled in late Republican Rome as it became the capital of an extensive tributary empire. Rome's demand for Egyptian wheat after its annexation in 30 BC may have increased prices there, but elsewhere the Greek world, after price rises caused by the Roman conquest and then the civil wars, seems to have seen a return to stable traditional levels. The economic shock of the Antonine plague led to a new higher, but more compact, normal range of wheat prices in Egypt, but we lack any evidence to assess how general this change was.

Lastly, before trying to draw some conclusions, I comment briefly on the odd prices in my list which have so far been ignored. Crisis prices cited as justification for state intervention or private benefactions are inherently suspect. I decline to assess the plausibility of the two highest, that of 536 g at Rome perhaps around 100 BC (item 2),

[16] Dio Chrysostom 46.10; Cicero, *In Verrem* 2.2.191-2.

and that of 393 g at second-century AD Thuburnica, in the Tunisian wheat-belt (item 13). More plausible is the group of crisis prices of 223 g in Sicily in 74 BC (item 14a), 246 g at Rome in AD 6 (item 3), 268 in Greece in AD 49 (item 16) and 260 g at Sparta around 125-7 (item 18); the 130 g at Rome in 211 BC (item 1) may be comparable in that it relates to a lower price band. Two benefactions, those at Sebastopolis and on Tenos (items 19 and 20), look more like dumping a surplus when prices were not especially high. Two benefactors' prices are purely gesture politics, in effect giving the grain away: the one (bronze) as per modius charged at Rome in 74 BC (item 6), and the one (bronze) as, in place of one (silver) denarius, charged on Tenos (item 20). The grain sales to its citizens by the state in Republican Rome were also at token highly subsidised prices (items 4 and 5). In the Principate, pricing by the Roman state and elite seems to show a belief in the universal applicability of an iconic fair price of one denarius (HS 4) per modius of wheat, iconic as one standard measure for one standard coin. This replaced for practical purposes the supposed early Republican iconic price of one as per modius, a still quoted fantasy that had been briefly made real -a return of the golden age - by an aedile in 74 BC (item 6). Every legionary received, in theory, a monthly ration of five modii of wheat for which, from Augustus to Domitian, HS 240 was deducted from his salary wherever in the empire he was stationed, that is one denarius per modius; when legionary pay was increased by a third in AD 85, so too, roughly, was the charge for wheat to HS 328 a year, a curious sum roughly HS 5.5 per modius, which was probably a ploy to claw back some of the rise rather reflecting abandonment of the iconic price.[17] In AD 64 after the great fire at Rome Nero probably deliberately sold wheat at one sesterce below this iconic price (item 8), and one denarius per modius was the price set by the Roman governor in Pisidia in AD 94 (item 17) and a second-century benefactor in Italy (item 12.). One other possible indicator of a general perception that the Roman empire had an integrated market for wheat is that all the inscriptions from the Greek-speaking provinces outside Egypt (items 16 to 21) cite prices in denarii although they used local measures and regional drachma-based coinages were still minted and widely used.

My analysis of the Roman price date, thinly grounded and speculative as it is, raises doubts about some previous views of the grain market in the Roman world. The thesis of Kessler and Temin 2008 just does not fit the few data, at least in the simplistic

[17] See Rathbone 2009, with some other examples of state and private allowances which seem to suppose that a modius of wheat was typically worth one denarius.

form in which it is presented. Like the thesis of Hopkins, it attributes too much influence to the market of the city of Rome, and ignores the regional pull of other great cities such as Carthage, Alexandria and Syrian Antioch. The von Freyberg thesis works well as an explanation for the rise in prices in Italy in the second to first centuries BC, when we know that huge quantities of booty and indemnities were drained from the east to Rome, although it ignores the economic dislocation that Roman aggression caused in the east. Both Hopkins and von Freyberg exaggerate the fiscal suction of Rome in the Principate, granted the empire-wide dispersal of Roman troops and officialdom, and the probability that well over half of Roman taxation (which did not in fact increase) was recycled in the provinces rather than flowing to Rome, so that there was much less capital transfer than von Freyberg imagines. Archaeological evidence, incidentally, now suggests that Italy did not stagnate, while the provinces which did demonstrably benefit from the comparative cost advantage were the western ones of Africa, Spain and southern Gaul. The east, from which the regularised Roman taxation of the Principate was much less than the arbitrary levies during the conquest and subsequent civil wars, had enough urbanisation and internal capital transfer of its own not to need the stimulus of the the city of Rome. Conversely, the thesis of Erdkamp and others that a restricted market in grain is indicated by the high variability of wheat prices in the Roman world, raises questions as to how we judge ‘high’ both across time and across space. Where we do have some evidence, we find fairly compact normal ranges of wheat prices, perhaps increasingly so in the third century AD. The short-term crisis prices which dominate our data precisely because there were abnormal and hence worth recording, and even exaggerating, are exceptions to and not part of normal variability. The probability that the Roman world had distinct zones, and even sub-zones, of different normal price ranges is not incompatible with an overarching integrated market, once production and transport costs are taken into consideration. Indeed, as the widely varying price of a pint of milk or a pint of beer in modern London shows, price variability may testify to the multi-causal sophistication of a market rather than a lack of integration.

Briefly, to put the Roman wheat price data in a wider economic context, there are various factors we need to consider which may make the Roman world quite different from ancient Babylonia on the one hand and early modern Europe on the other. I start by listing the sort of considerations advanced by Erdkamp, among many, to argue that the free market in wheat in the Roman empire was small and unintegrated, and indeed, for similar reasons, the market in any common good. Wheat was the main staple crop and

food of the Roman empire. Many farms were small and from partially to near fully autarkic. Throughout the empire arable land was taxed in kind, typically a tithe in grain. The imperial state needed and used tax grain for the traditional civic distribution in Rome (*frumentatio*) and to supply its armies, and had a state organised system, the *annona*, to acquire and distribute the wheat it needed. In the Greek east cities had grain funds and officials to acquire wheat for their urban populations. Land transport was very slow and costly, which inhibited inland movement of bulky low value goods like wheat.

While these points are all to some extent true, they are all also open to qualification. Ideally I would illustrate this with proper citation of the evidence and some quantitative hypotheses, but for now I can only make some general observations. By pre-industrial standards, agriculture in the Roman empire was relatively productive: yields were quite high, and many farms were large enough to produce regular surpluses. While wheat probably was the single largest crop in terms of acreage, other grains and a wide variety of other crops were cultivated, and there was extensive pasture too, probably rivalling wheat in acreage. Particularly important were the cash crops of wine and olive oil, and also barley and green fodder to feed the probably historically high number of draught animals. Although taxes on arable land were normally assessed in wheat, they could be paid in other crops or even cash at a price set by the state (cf. Sicily in the 70s BC), and orchards and pasture were normally taxed in cash. The frequent use of compulsory purchase of wheat, best attested in Egypt but also known in other provinces, implies that the state often failed to meet its target for wheat to be acquired by taxation. Conversely, the overall target of the *annona* apparently comprised a generous safety margin, for there is evidence that its centralised stores at Rome and Alexandria, for instance, had surplus wheat to sell on the market. While land transport was not easy, its costs have been exaggerated, and much of this Mediterranean-centred empire was within practicable carrying distance by cart or donkey to a navigable river or the sea.

The issue of state intervention deserves closer scrutiny. The basic aim of the imperial *annona* was to supply an annual ration of 60 modii of wheat, somewhat more than an adult male needed, to 200,000 ticket-holders at Rome and some 350,000 soldiers, that is at most 25% of the total wheat demand of the city of Rome, assuming one million inhabitants, and a tiny fraction of the empire's total population of, say, fifty million. The *annona* dealt also in other goods, such as wine, olive oil and fodder for the imperial court and the armies. Much of this was purchased at set, but not unfair, prices in the

provinces.[18] The *annona* had no transport division but contracted private shippers who were given various status and fiscal inducements to commit to five-year contracts with the state. In effect this subsidised private shipping on the main Mediterranean supply routes, and also land transport to the frontier garrisons, and thereby encouraged cross-empire trade in other goods. The number and capability of civic grain funds in the Greek east should not be exaggerated; my impression is that fewer, and also fewer individual benefactors, are attested than in the Hellenistic period, and we know of no civic scheme with the regularity and scope of the *frumentatio* at Rome until the short-lived scheme at Oxyrhynchus in Egypt in the AD 260s. It should also give pause for thought that not a single grain fund or civic intervention has as yet been attested in the cities of Italy or the central and western Latin-speaking provinces.

The common concern of imperial and local officials in a highly urbanised and civilian society with a strong civic ideology was that their cities, the embodiment of their regime, should appear prosperous and happy, and that meant avoiding severe food shortages which might provoke unsettling riots by aggrieved citizens. In the Greek east, in the 'democratic' tradition modelled on Athens, cities appointed special officials, sometimes backed by earmarked funds, to resolve bad shortages. In the Roman-style municipalities of the Latin-speaking centre and west, a more oligarchic tradition instead empowered town councils to punish any attempt to force up prices, and clearly grain prices are primarily meant, by heavy fines: this clause, which probably derived from Augustus' law about the food-supply (*annona*) of 18 BC, is found in the known charters of Spanish towns, and was probably in every western municipal charter. The two different approaches share a common presupposition that normally the free market should work and that when it did not, this was often caused or exacerbated by large landowners and merchants trying to profiteer. They also share the same fundamental weakness that the civic officials were drawn from the very landowners and investors in commerce who were seeking to profit from grain sales. Hence sometimes, as at Pisidian Antioch in AD 94, the local elite was unable to achieve a solution by internal consensus and had to take the embarrassing step of calling in the Roman provincial governor to enforce one. This and the two attested cases from Egypt of intervention by the governor in AD 191 and 246 reveal that the imperial administration had devised a standard play-book for the situation:

[18] The assertion of Kessler and Temin 2008 that there is no evidence to contradict their assumptio that the *annona* purchased sits supplies in Rome at market rates is simply wrong.

make all large landowners declare their wheat stocks immediately, then order them to put their surpluses on sale by a set date and, if appropriate, at a set price.

It is worth noting the ideological limits to state intervention. The political elite of the Roman empire, to a man large landowners and investors in commerce, were perfectly aware of the economic downside of over-intervention. At Antioch in AD 94 and Egypt in 246 the governor took pains to fix a price which would still give landowners a reasonable profit. So too the emperor Tiberius, when obliged to set a maximum price for wheat at Rome in AD 19, paid compensation to merchants (item 7). And the founder of the Principate, Augustus, is cited approvingly by Suetonius, writing under Hadrian in the earlier second century AD for his attitude: Augustus apparently recorded that he had only retained the *frumentatio* at Rome for political peace, and tried to manage it with farmers and merchants in mind, presumably meaning his strict restriction of the number of entitled recipients; he also once flatly refused a demand to subsidise wine, telling the protestors that Rome's aqueducts supplied plenty of water. Only in the late third century AD, after the failed coinage reform, did the emperor Aurelian start providing subsidised wine and meat to the populace of Rome. The farmers' lobby is neatly represented to us by the epigram quoted at the head of this paper which was written in the AD 80s by Martial, himself a modest landowner, 'Wine sells for twenty *asses* and wheat for four: drunk and stuffed, the farmer is broke.'[19] The Romans knew full well that golden-age iconic prices were good politics and poor economics.

In conclusion, the market in wheat in the Roman empire was essentially a free market, comprising and being influenced by the administered market of the imperial *annona* and civic interventions. Rome's achievement deserves recognition. For several centuries an urban population of around 30% of the total, and more if we include the non-farming element in rural communities, was provided with a reliable supply of wheat at reasonable prices, at least in the main urban centres. It is striking that no serious food shortage at Rome is attested after AD 6 until the Antonine plague in the late 160s. That the wheat market was not entirely free cannot be twisted into a general judgment on the Roman economy. For one thing markets are often imperfect: even in today's developed free market economies pricing is inevitably influenced by non-market considerations (e.g. supermarkets profiteering from farmers, the low price of gasoline in the US). More positively, as Hopkins once suggested, if urban consumers in the Roman world benefitted

[19] The prices are rhetorical, not real, a poetic barb about excessive subsidy of urban consumers.

from state-influenced lowish grain prices, that increased their spending power on other agricultural and manufactured goods. Of course it might instead have depressed wages, but we know that urban and also rural consumption of wine, olive oil, clothes, jewellery and so on was relatively high, and indeed it was through viticulture, oleiculture and pastoralism, as well as investment in craft production and commerce that the elite made and increased their wealth. If we had another conference on wine prices, I am confident that I would be able to demonstrate a complex and integrated market for wine across the Roman empire, with much more price sophistication than the market in wheat. And if the picture I have drawn is correct, it is not really plausible that Rome missed an industrial revolution for want of a sufficient agricultural surplus.

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