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TAXES AND TRADE IN THE ROMAN EMPIRE (200 B.C.–A.D. 400) *

By KEITH HOPKINS

This essay is speculative and tentative, a preliminary attempt at exploring a broad territory of Roman economic history over a long period. For the sake of clarity, I have canvassed several probabilities in the form of propositions, but the evidence is so sparse that it is difficult to *prove* that each proposition is right. It is disappointing to confess at the outset that one's case is unproven and that the generalizations advanced are disproportionately large in relation to the supporting evidence.[1] Even so, the experiments made here with both evidence and methods may stimulate others into refuting or reshaping the propositions. And besides, some of the methods can be usefully applied to other problems in Roman history.

Propositions 1 and 2

The first proposition is that the Romans' imposition of taxes paid in money greatly increased the volume of trade in the Roman empire (200 B.C.–A.D. 400). Secondly, in so far as money taxes were levied on conquered provinces and then spent in other provinces or in Italy, then the tax-exporting provinces had to earn money with which to pay their taxes by exporting goods of an equal value.[2]

These two propositions may seem unexceptionable, but their applications are interesting. At the risk of simplification, they lead us to envisage the Roman empire in the central period of the High Empire (the first two centuries A.D.) as comprising three spheres:

(A) an outer ring of frontier provinces in which defensive armies were stationed,
(B) an inner ring of relatively rich tax-exporting provinces, such as Spain, southern Gaul, northern Africa, Asia Minor, Syria and Egypt,
(C) the centre, comprising Italy and the city of Rome, the seat of the Court and of the central government, which, like the armies on the frontiers, consumed a large volume of taxes.

The armies on the frontiers (A) and the city of Rome, the Court and the central government (C) consumed more taxes than were produced locally. The two propositions imply that in the long run, on average, these tax-importing regions (the frontiers and the city of Rome) imported goods to a value which roughly equalled the imported tax.[3]

The main focus of this paper is on large-scale inter-regional flows of taxes and trade. But large-scale flows were the cumulative result of myriads of local transactions and transformations. Even at local levels, the Roman imposition of money taxes and their expenditure outside the region where they were levied had a serious impact on simple cultivators; they were forced to produce, and to sell, more food in order to pay taxes. The impact was greatest in those regions in which simple cultivators had paid little or no tax in money before the Roman conquest. There, cultivators were forced to produce and sell a surplus which they had not previously produced, or which they had previously consumed themselves (afterwards they simply went without). Some of this surplus was

* An earlier version of this paper was first given in the American Academy at Rome by kind invitation of its then Director, John D'Arms. I am most grateful to him and to the members of his seminar for hospitality and criticism. I want also to thank Sir Henry Phelps Brown and Alan Budd for kindly helping me along with economics; I am very much indebted to Michael Crawford for guidance, and not only on numismatic matters. Finally, I should like to thank Graham Burton, Ronald Mellor, John North and members of seminars in Cambridge, Durham and the Institute of Historical Research in London for their critical thoughts. Inevitably, on this topic, my paper is written in friendly debate with Sir Moses Finley and his *The Ancient Economy* (1973).

[1] I shall concentrate here on argument and on the economic structure of the Roman empire, rather than on what Romans thought they were doing or on surviving sources. I have adopted this tactic simply because I want to cover a broad canvas in a relatively short article, not because I feel that the Romans' own economic thoughts or writings should be neglected. But it does mean that some of the conventional sign-posting is missing.

[2] I must stress the correlative form of the second proposition: In so far as . . ., then . . . (in so far as . . .). For the moment, I make no estimate of the volume of taxes, nor of the extent to which they were raised in money.

[3] These two propositions also imply an explanation for the increase of imports into Italy during the High Empire. I do not mean that Italy stopped exporting, only that the balance of trade favoured imports; the explanation is to be sought more in economic forces than in an Italian moral decline.

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probably shipped direct to tax-consuming regions (for example, Spanish olive oil to the city of Rome). But the costs of transporting staple foods for long distances, especially overland, were high;[4] besides, tax-consuming regions grew some of their own food and in addition drew upon taxes levied in kind (for example, wheat sent to the city of Rome).

The two propositions imply another process, which we can guess at in simple terms. In economically unsophisticated regions, peasant tax-payers increasingly sold some of their primary produce in local markets in order to raise money with which to pay taxes. The food which they sold was consumed locally by artisans, who made goods of higher value and lower volume than staple foods (for example, textiles, leather goods, pots). Again some of these hand-made, relatively valuable goods were consumed locally; but others were exported from inner provincial towns, both to the frontier provinces and to the city of Rome.[5]

This simple model implies a whole series of small-scale changes in production, distribution and consumption, whose cumulative impact over time was important. There was a significant increase in agricultural production, an increase in the division of labour, growth in the number of artisans, in the size of towns where many of them lived, development of local markets and of long-distance commerce. Complementarily, there were changes in the pattern of consumption: government employees, soldiers and officials, received tax monies as pay and spent their money on food, services and artisan-made goods, some of which came from the distant provinces which paid the original money taxes. There was an increase in the number of people who made it their job to look after the needs of soldiers on the frontiers and of officials in the city of Rome. Thus the model implies an increased monetization of the Roman economy, the commercialization of exchange, an elongation of the links between producers and consumers, the growth of specialist intermediaries (traders, shippers, bankers), and an unprecedented level of urbanization.[6] The model illustrates the close connection between changes on the level of individual action by simple peasants and relatively large-scale changes, such as the growth of towns.

These changes were most dramatic in regions which were economically primitive before their conquest by the Romans. But there were regions, such as Syria and western Asia Minor, which had paid money taxes to local rulers for centuries before the Roman conquest, regions which were already urbanized and had well-established networks of intra-regional and inter-regional trade. Other regions lay between these two extremes of economic simplicity and sophistication.[7] Conquest by the Romans disrupted established patterns even in economically advanced regions: the Romans plundered the stored reserves of generations, from towns, temples and from rich individuals' treasure chests. They siphoned off skilled and unskilled labour as slaves; they gave loans to oppressed landowners and then distrained upon their estates, when they were unable to pay extortionate

[4] The problem of how much staple food was transported, long-distance overland or by ship, cannot be solved simply by pointing out the high *relative* cost of land transport. That alone did not make it *absolutely* prohibitive. I suspect that availability of transport, information and trader organization were also important. Comparative evidence illustrates the problems. In Italy in the sixteenth century, staples were occasionally transported from the eastern coast of Italy overland to the city of Rome (J. Delumeau, *La vie économique et sociale de Rome* (1959) II, 521 ff.), but in southern France in the same period, the volume of transport available for carting supplies between towns was too small to even out inter-city variations in price (R. Baehrel, *Une croissance: la Basse Provence rurale* (1961), 531 ff.).

[5] Archaeological evidence is uncorrectably biassed by the survival of pots, which cannot have been so important in the Roman economy. The salvation is that surviving pots can reasonably serve as proxy for perishable goods such as textiles, which have not survived archaeologically but which probably were important economically. Thus distribution maps of pots illustrate the viability and direction of long-distance trade. For one example see D. P. S. Peacock in J. du Plat Taylor and H. Cleere (edd.), *Roman Shipping and Trade: Britain and the Rhine Provinces, The Council for British Archaeology Research Report* 24 (1978), 49.

[6] On the growth of towns, see especially M. I. Finley, 'The Ancient City: From Fustel de Coulanges to Max Weber and Beyond', *Comparative Studies in Society and History* 19 (1977), 305 ff.; K. Hopkins, 'Economic Growth in Towns in Classical Antiquity', in P. Abrams *et al.* (edd.), *Towns in Societies* (1978), 35 ff., where several of the issues discussed here are put in a different form.

[7] Once again, I am for the moment concerned more with the logic of the argument than with the evidence by which one could allocate regions conquered by the Romans along a continuum of economic sophistication, or lack of it. I am certainly not assuming that all western provinces were economically primitive before the Roman conquest. I suspect (though how would one prove ?) that they did become more sophisticated after conquest by the Romans. Cf. note 13 below.

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rates of interest. The plunder of capital, labour and land, the loans and the debts, were short-term adaptations to the long-term redirection of taxes and trade. The local population had to accommodate the fact that taxes were no longer spent in the regional metropolis, but far away in the city of Rome or in the frontier provinces. In the long-term, as we know, the inner-core provinces were not impoverished by the Roman conquest; indeed, it is plausible to assert (but difficult to prove) that these economically advanced regions adapted to the changed conditions under Roman domination so well, that in the High Empire they reached a level of general prosperity equal to or higher than any reached previously.[8]

Some qualifications

Up to now I have concentrated on the reciprocal flows of taxes and trade, their cumulative impact and their contribution to the integration of the economy of the Roman empire. I have stressed the growth in production and consumption, the increasing monetization of the Roman economy and the commercialization of exchange. But several qualifications deserve equal emphasis. Firstly, the complex networks of tax-stimulated trade were only gradually established in the wake of Roman conquest, after considerable initial disruption. Secondly, much trade flowed without the stimulus of money taxes. It was based on reciprocal needs and on the location both of supply and of demand. For example, only some districts had a readily available supply of metals, such as gold, silver, copper or lead, for which the demand was widespread. Hence an important export trade all over the Mediterranean basin.

Thirdly, the pattern and volume of demand was also heavily influenced by fluctuations in rainfall. At first sight, the unity of the climate in the Mediterranean basin might suggest a uniformity of crops grown throughout the region, and therefore no necessity for long-distance trade in staple foods (wheat, barley, wine, olive-oil). But sharp inter-annual fluctuations of rainfall created local gluts and local shortages and stimulated unpredictable flows of surplus staples to unpredicted markets; hence small-scale (but in aggregate large-volume) inter-regional trade in staples, mostly sea-borne.[9] The volume of demand, that is the capacity to pay for food and goods brought over a long distance, was a function both of production over and above the level of minimum subsistence and of inequality. Let me mention, just in passing, that the simple categories, élite/peasantry, luxury trade/trade in staples, cannot do justice to the complexity of demand within the Roman economy. In my view, such simple divisions lead implicitly to a serious underestimate of the sophistication, variety and volume of goods commonly traded in the Roman empire.[10]

Fourthly, many taxes were raised in kind. These taxes in kind, such as wheat from Egypt and North Africa, stand outside my two initial propositions. Taxes in kind do not stimulate trade, because such produce flowed only in one direction from tax-payer to tax-consumer. Indeed, taxes levied in kind limited the sphere of market or monetary transactions; and they tempted the Roman government to have produce transported (such as wheat distributed free of charge to over two hundred thousand persons in the city of Rome) without consideration of the total cost.[11] The volume of such flows reflected political power; they affected, but they did not depend on, the level of trade.

[8] The concept, general prosperity, is purposely vague. We know that the rich were rich, and we admire great public buildings, such as the theatre at Aspendos or the temples at Petra and Palmyra. But how can we know about the distribution of wealth, and the standard of living of relatively poor townsmen or peasants?

[9] 'Traders roam from sea to sea looking for some market which is badly stocked', so Philostratus, *Life of Apollonius of Tyana* 4. 32. Inter-annual fluctuations of rainfall have been largely ignored by ancient economic historians, perhaps because no ancient source mentions them. See the *International Yearbook of Agricultural Statistics* for modern national figures.

[10] The most exciting documents which illustrate the nature of ancient Mediterranean trade are the Geniza papyri from Cairo, dating from the tenth century A.D. onwards (see S. D. Goitein, *A Mediterranean Society* I (1967)). Nothing from the classical period can rival them. In spite of their late date, they are useful for Roman historians. The long lists of produce in T. Frank, *ESAR*, passim, reflect an antiquarian idea of what economic history should be. The main questions should be: which organizations of traders, by what mechanisms (partnership, investment, credit, cash?), sold how much of what to whom? Even the customs lists at Zarai, Numidia (*CIL* VIII, 4508) and Palmyra (OGIS 629) do not help us reach an answer to these questions.

[11] Augustus, *Res Gestae* 15; D. van Berchem, *Les distributions de blé et d'argent à la plèbe romaine dans l'empire* (1939); cf. the Chinese experience in supplying Peking: H. C. Hinton, *The Grain Tribute System of China* (1956).

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Finally, the economy of the Roman empire, in spite of its sophistication in some respects, was predominantly a subsistence economy. The monetary economy constituted a thin veneer of sophistication, spread over and tied to the subsistence economy by the liens of taxes, trade and rent. The concept, subsistence economy, has important implications. The bulk of the labour force in the Roman empire, perhaps 80–90 per cent, were primarily peasants who produced most of what they themselves consumed and consumed most of what they produced. This solid mass of self-sufficient production always stood outside the money economy. However, this cellular autarky of individual peasant farmers and of most districts was penetrated, but not pervaded, by outside demands. By this I mean that peasants were affected, even burdened, by demands for taxes, for rents and for goods bought in the market (such as knives, or clothes). But the payment of taxes and rents constituted only a minor element out of total production, even if they constituted the major part of peasants' disposable surplus.[12] The term, subsistence economy, also implies that on average levels of consumption were not dramatically above the minimum level of subsistence. Here again, several distinctions should be made. In general, Roman levels of consumption were obviously and significantly higher than pre-Roman levels of consumption, at least in the western provinces.[13] Not only was the Roman élite extremely rich, but the lower strata of the empire's population were differentiated; even among the poor there were differences; hence the high volume of aggregate demand for traded food and goods. That said, the *average* level of consumption was not high. Under proposition 6, I shall try, rather rashly, to estimate how much of their total produce the subjects of the Roman Empire paid in tax, and to gain some idea about how much on average they lived above the level of minimum subsistence, and finally to gauge, albeit inadequately, the thickness of the monetary veneer.

Proposition 3: rents and taxes

Rents, in many respects, functioned in a similar way to taxes. Both were charges on the surplus produced by peasants, which helped support the superstructure of Roman society.[14] Proposition 3 is simply a corollary to propositions 1 and 2: conquest by the Romans brought about an increase in the amount of rent paid, especially in the western provinces. In so far as money rents were levied and then spent away from the farms or districts in which they were levied, to that extent money rent-paying farmers had to earn money with which to pay their rents, by selling crops or labour, equal to the value of the rent. Put formally like that, it sounds innocuous, obvious. But the process was important locally as well as inter-regionally. The imposition of money rents implied an expansion of the market for peasants' crops, both in local towns and beyond. Local landowners resident in towns away from their estates and provincial élites who spent their incomes derived from rents in the chief provincial towns helped create local networks of trade.

[12] Two cautions. First, not all peasants paid rent, and the categories rentier/free holder/tenant overlap, since many small landowners in the course of the family cycle supplemented their livelihood by renting out surplus land or by renting it in. This is clear from the evidence of Roman Egypt and is explained theoretically by A. V. Chaianov, *The Theory of Peasant Economy* (1966). Secondly, I do not wish to imply that the surplus was fixed in size. Indeed, I argue that the demand for taxes and rent probably increased the size of the surplus produced. Moreover, the concept 'disposable surplus' is an objective account of what was produced over and above minimum subsistence. Peasants themselves may not have thought of it as surplus, although the concept did exist in classical times.

[13] This can be illustrated, but not, I think, proved. Roman levels in excavations reveal more artefacts than pre-Roman levels: more coins, pots, lamps, tools, carved stones and ornaments—in sum, a higher standard of living. Since archaeologists seem very reluctant to write synoptic works, I cite four corroborative illustrations from different regions: M. Clavel, *Bezières* (1970), 332; A. Schulten, *Geschichte von Numantia* (1933), 154–5; J.-P. Callu, *Thamusida* (1965), 187 ff.; C. H. Kraeling, *Ptolemais* (1962), 270 ff.

[14] Were rents paid in money? Wealthy landowners living in the city of Rome clearly needed large amounts of money to spend, as well as produce from nearby estates. Cicero (*Paradoxa Stoicorum* 49) expressed income in money terms, not in wheat, and much later Olympiodorus (frag. 44) declared that Roman aristocrats in the fourth century A.D. received one quarter of their incomes in kind. Income from large estates given to the Roman church by Constantine (*Liber Pontificalis*, ed. L. Duchesne (1886) 1, 170 ff.) was also mostly in money, and some of what was to be paid in kind was not grown on the estates but had to be bought in the market. The Igel monument of the third century A.D. does not show money payments by tenants, but payments made to workers—see the convincing arguments by J. F. Drinkwater, *Trierer Zeitschrift* 40/1 (1977/8), 116. My fragmentary illustration reflects the neglect of rent by Roman historians.

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The increased wealth of the central Roman élite (senators and some knights) was funded largely by rents drawn from estates scattered over many districts and regions. Expenditure of rents by absentee landowners in cities distant from their estates had a similar impact, but on a larger scale. Proposition 3 both emphasizes the functional similarity of taxes and rents, and directs attention to the competition between them. In order to understand the Roman political economy, we have to take into account the balance between public and private exactions, between taxes and rents. Since production could not easily be increased, taxes and rents competed for a limited surplus. I shall argue tentatively that taxes were kept quite low with the result that private exactions could be correspondingly high. But my main argument is that the impact of money taxes and rents, spent away from the area in which they were raised, was similar in that they contributed to the monetization and commercialization of the Roman economy and to the urbanization of the Roman empire.

Proposition 4: the growth of trade 200 B.C.–A.D. 200

I have outlined my main arguments. In the rest of this paper, I shall argue four supplementary propositions, which support those already advanced. The fourth proposition is that there was a very considerable rise in inter-regional trade in the period 200 B.C.–A.D. 200. This is corroborated by the greater incidence from this period of ships wrecked and recently discovered by underwater archaeologists. Dr. A. J. Parker has collected information on 545 dated sea wrecks, mostly from near the coasts of Italy, France and Spain, where under-water archaeology is most developed.[15] The evidence therefore relates predominantly to the western Mediterranean. There is no sorting by size or type of ship (warship, merchantship); the dating is often crude, so the periods are correspondingly long. The results are indeed striking (see Figure 1), if we can consider discovered shipwrecks as a reasonable index of ship-sailings. Given the large number of finds, this procedure seems reasonable; for example, such evidence surely provides a better basis for generalization than would statements on this topic, and on this time scale, in a literary source. And besides, it seems likely that the average size of merchantships engaged in long-distance trade increased to reach a peak in the High Empire.[16]

Let us take a closer look at Figure 1. There was a very steep rise in dated wrecks found from the period 200 B.C.–A.D. 200. The number of dated wrecks found from the last two centuries B.C. is three times greater than in the previous two centuries. Surprisingly, it is also higher than the number found from the first two centuries A.D. But the difference is absolutely and relatively small; it does not form part of a trend; the last two centuries were more marked by piracy and warfare than the later period; the difference may be due to chance; data do not always work out exactly as one would like. All these factors taken together persuade me to ignore the difference between the figures for the last two centuries B.C. and the first two centuries A.D. But it is surely significant that the number of dated wrecks found from the first two centuries A.D. is almost twice as high as from A.D. 200–400. The Late Empire witnessed a significant downturn in trade, deeper in the third century A.D. (as it seems from a sub-sample of the evidence) than in the fourth century A.D.[17]

Such evidence merely confirms what was commonly believed, but it gives an additional, quantitative dimension to accepted beliefs. The dated shipwrecks show that in the period

[15] A. J. Parker, 'Ancient Shipwrecks in the Mediterranean and the Roman Provinces', *British Archaeological Reports, Supplementary Series* (forthcoming) (1980); cf. *Progress in Underwater Technology* 4 (1979). I am most grateful to Dr. Parker for letting me know about his important findings before their publication.

[16] See now P. Pomey and A. Tchernia, 'Le tonnage maximum des navires de commerce romains', *Archaeonautica* 2 (1978), 233 ff., who show that there is now sufficient archaeological and legal evidence (*D.* 50. 5. 3) to indicate that ships of about 400 tonnes burden and over were commonly used from the last century B.C., a tonnage not reached again until the fifteenth century by Genoa and Venice. I am assuming that average size was influenced by the construction of these large ships, but no direct evidence on average size exists, *pace* L. Casson, *Ships and Seamanship in the Ancient World* (1971), 183 ff., who relies too heavily on *IG* XII, Suppl. 348, which has been doubtfully restored in the critical passage—cf. *BCH* 57 (1933), 394 ff.

[17] See Parker, op. cit. (n. 15). The unfortunately long time-periods used in Figure 1 reflect the crudity of dating available. Still, more intervals would create more problems at the boundaries. I imagine there may have been significant variations within each long period. It has been suggested to me that more ships sank in the central period because of the Roman penchant for transporting heavy loads—marble, amphorae—by ship. It may be so, but this argument also illustrates scholarly ingenuity when confronted with a plausible generalization.

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of Roman imperial expansion and in the High Empire (200 B.C.–A.D. 200), there was more sea-borne trade in the Mediterranean than ever before, and more than there was for the next thousand years.

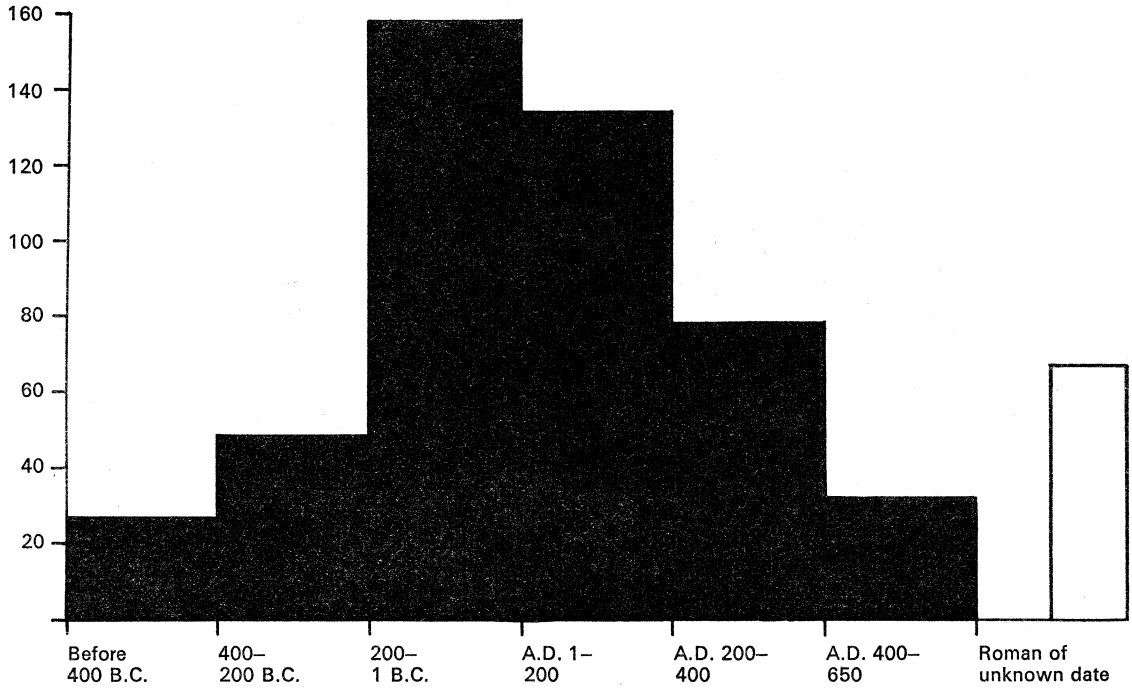

FIG. 1. NUMBER OF DATED ANCIENT SHIPWRECKS IN MEDITERRANEAN WATERS. See n. 15 for source.

Proposition 5: the growth of the money supply

An increase in the volume of inter-regional trade depended upon an increase in the volume of money to finance it. Merchants and their customers needed money in order to buy what was traded. In the modern world, most trade is financed by credit. We know almost nothing of credit in the Roman world; that does not mean that credit played a negligible role in Roman trade, but rather that we cannot estimate its importance. In any case, it is clear that money, predominantly silver coins, was the most important element in financing long-distance trade in the Roman world. Proposition 5 states that the supply of Roman silver coins increased enormously, perhaps tenfold, during a single century of the late Republic (157–50 B.C.). Proposition 4 and proposition 5 thus support each other. Once again, I suspect that this estimate of the growth in the money supply at Rome simply corroborates what is commonly believed by present-day Roman historians, but the method of measurement is novel. Since I am not a numismatist, the arguments may need some corrections.

The evidence which I shall now present is drawn exclusively from Michael Crawford's *catalogue raisonné*, *Roman Republican Coinage*. His data tell us the amount of silver coins issued in Rome each year in the period 157–50 B.C., since coin issues can be distinguished by the types (obverse and reverse) used. The chronological sequence of individual dies (roughly 30,000 obverse dies from this period) is our single best guide to the volume of coinage in circulation.

Modern experiments with ancient techniques for producing coins and estimates of the number of new coins needed for specific purposes in some few years suggest a normal minimum of 30,000 coins struck per obverse die.[18] The acceptance of this minimum

[18] M. H. Crawford, *Roman Republican Coinage* (1974), 694. The evidence supporting the conclusion that 30,000 coins were struck per die, normally, is impressionistic and plausible, but by no means certain. See contra, H. B. Mattingly, 'Coinage and the Roman State', *Numismatic Chronicle* 17 (1977), 206 ff., arguing for 15,000 *denarii* struck per obverse die and for lower military costs. In my judgement, Crawford wins the argument, on points (but see n. 29).

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estimate (30,000 coins per die) as the average output of all dies is obviously risky. First, the estimate itself is not certain; secondly, we do not know by how much some dies outlasted this minimum; thirdly, we do not know whether some dies were discarded, because of breakage or because of a change in the officials responsible for minting or for any other reason, before this minimum had been reached. Tentatively, I have accepted Crawford's estimate of 30,000 coins minted on average per die as the single best estimate.

However, it is worth stressing that the credibility of Figure 2 in no way depends upon the acceptance of this average number. Providing we accept that the average number of coins struck per die was roughly stable throughout the period 157–50 B.C., then we can regard Figure 2 as being drawn on a ratio scale, with the exact values on the vertical axis unknown. It is enough to say that, in this period, the volume of Roman silver coinage in circulation rose over tenfold.

But I have jumped the gun. Acceptance of this growth in money supply and in the monetization of the Roman economy depends upon two further questionable assumptions: the rate of loss and the initial stock in 157 B.C. We know nothing for certain about the rate at which silver coins were lost. That losses were substantial can be gauged from the volume of survivals in modern museums. Individual coins were lost accidentally; other coins were buried in hoards and then for some reason or another were not recovered. Cargoes including coins were lost at sea. Roman coins of this period were almost pure silver, so that they suffered considerably from wear. But their purity also restricted the benefits of reminting, the cost of which fell upon the mint.[19]

Figure 2 is based upon a constant loss rate of 2 per cent per year. Tentatively, I have taken this figure as the single best estimate available. It is derived, incongruously, from Patterson's analysis of loss rates of American silver coins in the forty years before 1962; for that period we have accurate data on the size of coin issues and the number of coins recalled and in circulation. The loss rate was 3 per cent per year (more for smaller value coins, less for higher value coins). The differences between the functions of coinage in the USA recently and in Rome two thousand years ago are too obvious to recount. A loss rate of 2 per cent per year was simply Patterson's best guess about ancient losses in the absence of any obviously reliable ancient evidence.[20] On this point, sophisticated analysis of several ancient coin hoards might help us estimate rates of loss, but we always should bear in mind that the composition of single hoards may reflect many factors besides the random availability of coins in the total economy. I should stress that assuming a constant rate of loss is a heuristic device, not a description of reality. In reality, loss rates must have varied considerably, depending for example on the rate of hoarding, the rate at which hoards were recovered and spent, the rate of reminting. The 2 per cent annual loss rate (amounting to a large mass of silver) is simply an attempt to average out these variations. Patterson's main point, and it seems to me convincing, was that the stock of silver diminished sensibly each year, except in so far as it was replenished by fresh production. Alternative rates of loss, 1 per cent or 3 per cent per year, even of 5 per cent per year, do not radically change the shape of the growth curve in Figure 2.[21] On any reasonable assumption, it seems clear that between 157 and 50 B.C. the money supply at Rome grew substantially, perhaps tenfold.

The second questionable assumption is the stock of silver coins in circulation in Rome at the beginning of the period in 157 B.C. The problem is that we do not know how many silver coins were minted before 157 B.C. For the purpose of Figure 2, I made arbitrary estimates after consultation with Michael Crawford, by the simple process of

[19] Why would the Roman mint systematically take in partly worn old coins, of almost pure silver, and remint to heavier new coins of the same purity? By doing this, the mint would shoulder all the cost of wear and of reminting. The answer depends partly on the fiduciary element in the currency, on how far coins were valued above their silver content, and on the availability of silver bullion. According to Polybius (Strabo 3. 2. 10), the Roman state in the mid-second century B.C. received 25,000 *drachmae* per day from the silver mines at New Carthage, Spain, in which 40,000 men worked. This comes to *c.* 35 tonnes per year for 365 days.

[20] C. C. Patterson, 'Silver Stocks and Losses in Ancient and Modern Times', *Economic History Review* 25 (1972), 207–10.

[21] If we increase the rate of loss to 10 per cent per year, the overall rise in silver coin stock 157–77 B.C. is still fivefold; the rise during the second century becomes slower, but the fall in the money supply from 77 to 50 B.C. becomes dramatic—more than 50 per cent. Surely, it is too dramatic to be credible. So is the implied absolute loss of coins.

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splitting the difference between a high and a low estimate.[22] The result was a stock of silver coins worth 35 million *denarii* in 158 B.C. This may not be right, but it does not matter too much, since the importance of the initial stock diminishes. With a loss rate of 2 per cent per year, the initial stock (whatever its size) halves in thirty-five years. By 120 B.C., the initial stock of 35 million *denarii* accounted for less than one-tenth of the total money supply; reasonable variation of the initial stock does not change the shape of Figure 2.[23] In sum, Figure 2 is based on three or four assumptions: (*a*) *either* 30,000 coins were on average struck per (obverse) die, *or* the average number of coins struck per die was roughly stable throughout the period 157–50 B.C.; (*b*) the rate of loss was significant, and is here set tentatively at 2 per cent per year; (*c*) the initial stock of silver coins in 158 B.C. is tentatively set at 35 million *denarii*. The detailed figures, as I have tried to make clear, are insecure, but the general trend seems firm.

What are the implications of a tenfold increase in money supply? First, some qualifications. Bullion (uncoined silver and gold) is not taken into account; nor is bronze coin, but the relative value of bronze was low. Gold coins are included; their value has been expressed in terms of silver coin. The annual loss rate of 2 per cent is large enough to take account of some hoarding, but in some years, particularly in years of civil disorder and uncertainty, hoarding probably reached much higher levels than normal. Figure 2 may therefore exaggerate the amount of money in circulation. Finally, the Roman state had no monopoly of silver coinage. Even conquered states continued to mint silver coins. Indeed, in the eastern Mediterranean, few Roman silver coins are found in hoards deposited before the age of Sulla; that is remarkable and important for the interpretation of Figure 2.[24] It implies that we are dealing here with money supply only in Italy and in the western Mediterranean. Even so there are difficulties. The sphere of Roman influence widened in the period with which we are concerned. Africa and southern Gaul became Roman provinces. In Spain, large numbers of local silver coins continued to be minted until about 70 B.C.; then Spain used Roman coins.[25] In other words, some part of the growth in Roman silver coins was simply a replacement for the coinage of the conquered. It seems impossible to measure how much, but archaeological evidence suggests that the volume of pre- and post-conquest provincial coinage was much smaller than subsequent Roman Republican coinage.[26] Whatever the qualifications, there was a real increase in the money supply in the Republican period of imperial expansion in the western Mediterranean. The volume of new silver coinage was huge. In the peak period of minting, 119–80 B.C., an average production of 14 million *denarii* a year consumed over 50 tonnes of silver per year, roughly half the average level of silver imported from America into Europe in the sixteenth century.[27]

A steep rise in the money supply is likely to result in an increase in prices, unless there is at the same time a fall in the speed of circulation of money (V), or a rise in the quantity of goods produced (Q).

[22] Both the high and the low estimates were probably on the high side. The high estimate was based on the following assumptions:
200–158 B.C.: the equivalent of one million *denarii* p.a.
220–201 B.C.: the equivalent of two million *denarii* p.a.
240–221 B.C.: the equivalent of one million *denarii* p.a.
The low estimate was half these levels. A loss rate of 2 per cent per year was also assumed. The result was 46 million and 23 million *denarii* respectively for the stock of silver coins in circulation in 158 B.C. The guesswork in these crude calculations hardly needs stressing. Please note that Crawford had already underlined the low volume of silver coins minted in the decade before 157 B.C., op. cit. (n. 18), 625.

[23] If, for example, we began with a stock of 80 million *denarii* in 158 B.C. instead of 35 million *denarii*, again with a loss rate of 2 per cent per year, then the total silver coin stock still rises sixfold to its peak in 77 B.C., although the rate of growth in the second century B.C. is slower. The general trend remains similar.

[24] M. H. Crawford, *Roman Republican Coin Hoards* (1969).

[25] idem, 'The Financial Organization of Republican Spain', *Numismatic Chronicle* 9 (1969), 84.

[26] Compare, for example, the fifteen British coins found at Maiden Castle with the several hundred Roman coins found at Verulamium (R. E. M. Wheeler, *Maiden Castle* (1943), 329; *Verulamium* (1936), 223 ff.). But are the sites comparable? In any such comparison there are some difficulties. And besides there were exceptions: some districts of Britain had come under Roman commercial influence before the conquest. Even so, in spite of the difficulties of illustrating it, the generalization still holds, I think.

[27] See G. Parker in C. M. Cipolla (ed.), *Economic History of Europe* (1974) II, 527–8; on the huge scale of Roman silver mining, see J. M. Blazquez, 'Explotaciones mineras en Hispania durante la República y el alto Imperio Romano', *Anuario de Historia económica y social* 2 (1969), 9–68; D. Avery, *Not on Queen Victoria's Birthday* (1974), 413 ff.; also Patterson, op. cit. (n. 20), 218 ff.; and Hopkins, op. cit. (n. 6), 56.

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$$\overset{(P)}{\text{Price}} = \frac{\overset{(M)}{\text{Money Supply}} \times \overset{(V)}{\text{Speed of Circulation}}}{\text{Quantity of Goods (Q)}}$$

We have no evidence of a substantial rise in the price of goods; the argument from silence is notoriously dangerous. But surely, even our jejune sources might have noted a five- or tenfold increase in prices. It would be reasonable to argue that the speed at which money circulated (V) probably slowed down in this period, for three reasons: the state treasuries must have kept huge sums in reserve and even stored money as treasure; so too did private individuals and professional bankers; thirdly, the greater distance which separated tax-payers and tax-spenders left considerable amounts of cash idle in transit.[28] But above all,

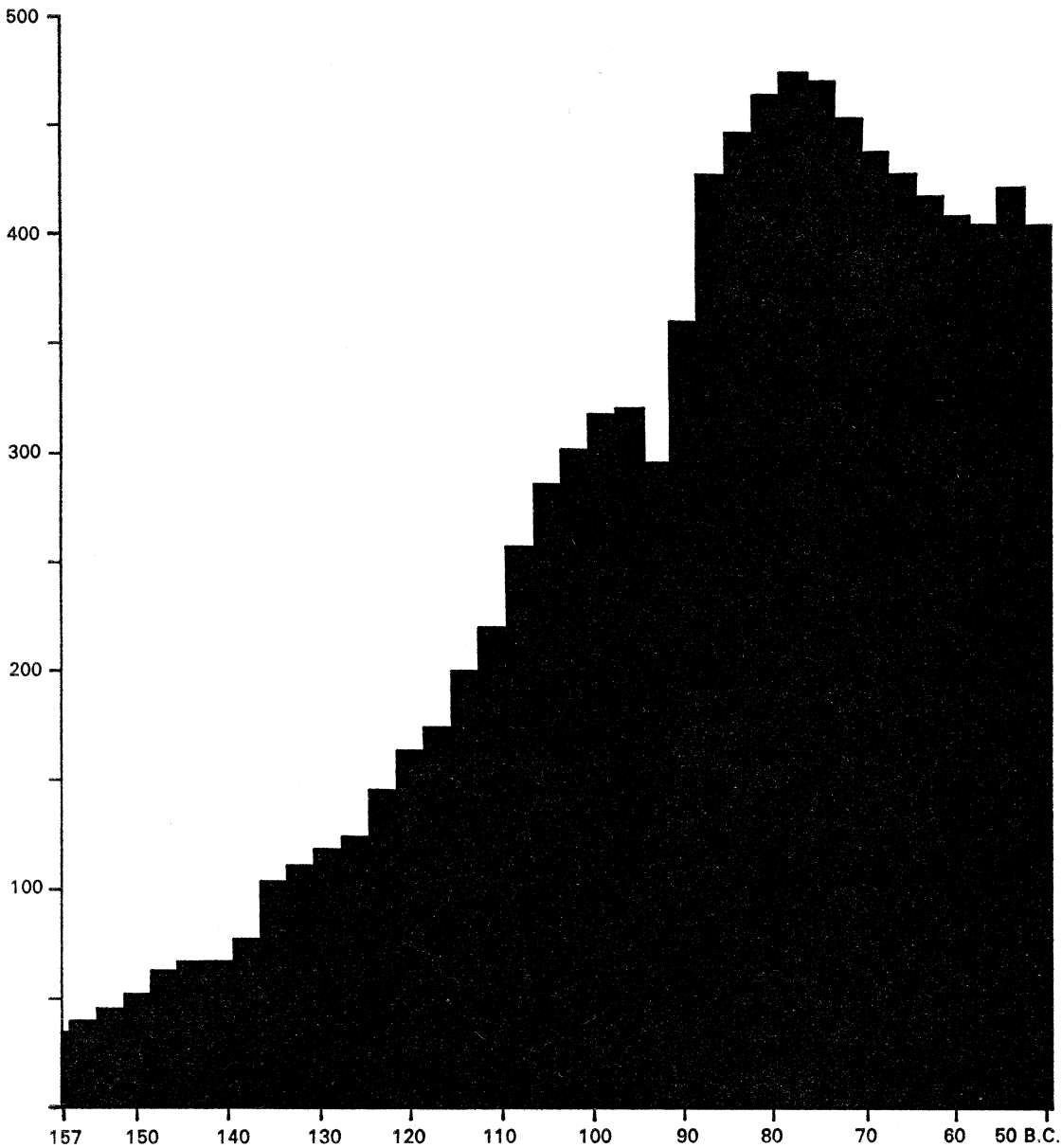

FIG. 2. ROMAN SILVER COINS IN CIRCULATION 157–50 B.C. (in millions of *denarii*, by three year periods.)

[28] G. Ardant, *Histoire de l'impôt* (1971) I, 114; cf. *Théorie sociologique de l'impôt* (1965).

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and this is the chief implication of the steep rise in money supply, it had little impact on prices, partly because of the substantial rise in the volume of trade in an expanded area, and partly because money percolated into a myriad of transactions which had previously been embedded in the subsistence economy. Both M and Q increased. For example, tens of thousands of peasants joined the army and received pay as soldiers, or migrated to the city of Rome where they consumed food and drink, clothing and shelter for which they paid money. The supply of money rose because more people were using it for more activities. Figure 2 captures that change in economic activity better than any literary source.

Up to now we have been concerned with the consequences of an increasing money supply for the Roman economic system, without considering the intentions of those who decided to mint more coins. Of course, it is possible that Roman senators, who decided each year how much money should be minted, were in detail and in gross ignorant about the economic implications of their separate decisions and of their cumulative impact. But Crawford has argued that the volume of coins minted was primarily determined by the volume of military expenditure; he postulated a 'remarkable correlation between (military) expenditure and the volume of coinage'.[29] This is *prima facie* plausible, as Figure 3, derived from Crawford's tabulation, shows. Fortunately, Crawford provides us with the data, money minted and army cost for the period 157–97 B.C., with which we can test his hypothesis.

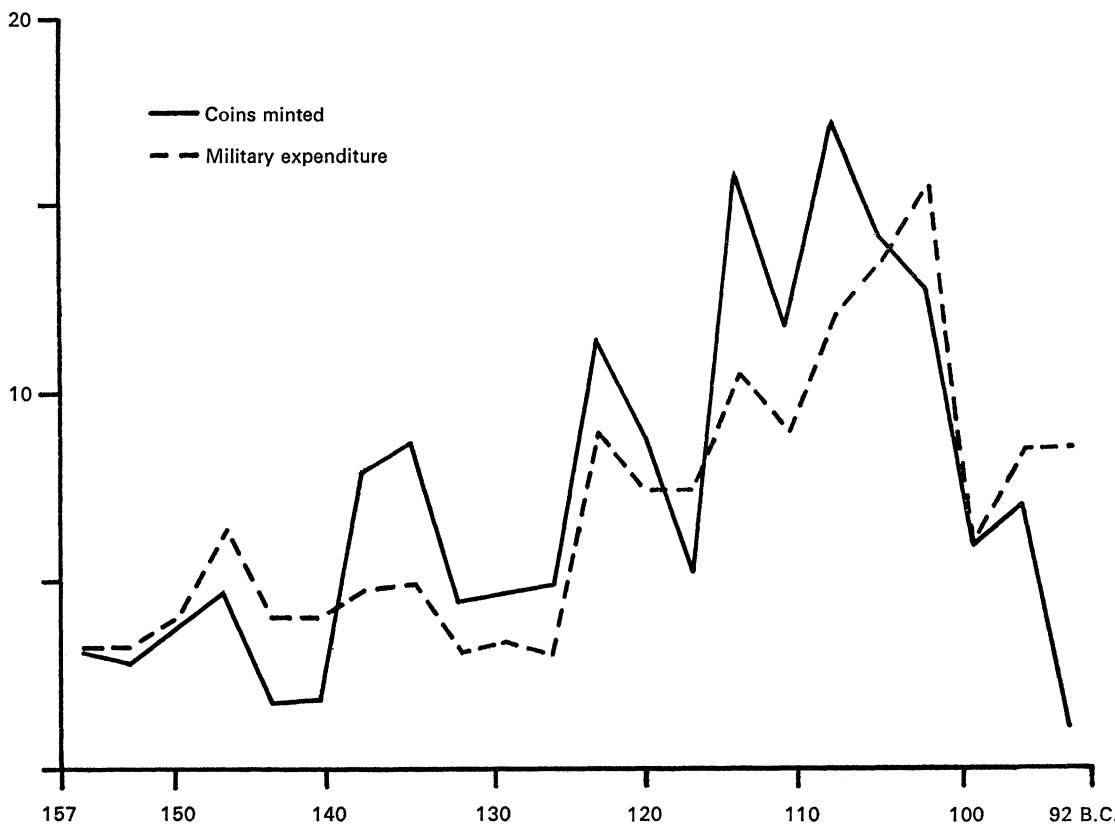

FIG. 3. COINS MINTED AND MILITARY EXPENDITURE 157–92 B.C. (in millions of *denarii*, annual averages of three year periods). Based on M. H. Crawford, *Roman Republican Coinage* (1974), 698 ff.

[29] Crawford, op. cit. (n. 18), 694, cf. 617 and 633. I cannot agree with Crawford's suggestion that soldiers were typically paid with new coin, even in the second century B.C., let alone that minting purposively matched state expenditure on the army. Many soldiers served too far away from the city of Rome to be supplied from there with new coin, and besides the annual mintage of new coins constituted only a small proportion of all the coins in circulation. Why pay in new coins only?

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Formally, a correlation can be defined as a measure (from 0 low to 1·0 high) of the extent to which a factor X co-varies with or predicts a factor Y (such as body weight and height, education and income). The correlation between volume of silver coinage minted and military expenditure between 157 and 97 B.C. works out at ·88. It is so high that it is suspect. At this level, military expenditure purportedly explains over 75 per cent of the variance (variance explained is the correlation coefficient squared) in the volume of silver coins minted. One problem with such correlations is that they do not take time sequence into account; the paired observation (X and Y) could be rearranged at will; the correlation would stay the same. Moreover, co-variation could be the result of other unnamed factors. For example, coinage and military expenditure may both have increased in the same period because of imperial expansion; imperial expansion would then be the explanation of both, rather than one being the explanation of the other.

But the real problem is that the simple correlation of silver coins minted and military expenditure is not the best test of Crawford's proposition. In strict logic, his proposition implies that a change in military expenditure brought about a change in the number of coins minted.[30] We can test that hypothesis by correlating the inter-annual percentage change in military expenditure with the inter-annual percentage change in the number of coins minted. Such a test is demanding; the resulting correlation works out at ·32. The result is still significant, but the correlation is much lower than the first correlation, and explains only 9 per cent of the variance in the volume of silver coins minted. The field is left open for other explanatory factors. I do not know what they are.

At this stage, I should like to make only two brief points. First, in some years very large mintages were associated with heavy military expenditure (91–89 B.C. are obvious examples; but what about 110 and 108 B.C. ?). These exceptionally large mintages had long-term repercussions on the money supply; the large number of coins minted in an emergency stayed in circulation for a long time. In that sense military expenditure was a very important determinant of the volume of silver coins minted. Secondly, the overall pattern was one of steady growth in money supply, as though the senators and their advisers (note Plutarch, *Cato the Younger* 16) had some general idea of the need for money independently of each year's state needs. And besides, as one can see from Figure 2, by 100 B.C. the volume of coins in circulation was so large that fluctuations in the supply of new coins in a single year may not have had a significant impact on economic activity. There were two processes at work: large inter-annual fluctuations and a general trend. I wish I knew how they were related.

I would have more confidence in the idea that the Roman senate knew something of what it was doing, when it ordered how much silver money was to be minted, but for one significant occurrence. Between 75 and 50 B.C., there was a considerable drop in the number of silver coins minted and circulating. For example, the average number of silver coins minted 73–59 B.C. (at about 4 million *denarii* per year) was less than a third of the level of the previous fifteen years. There may have been problems in the supply of new silver from Spain, but no source says so. The drop in the total number of coins circulating was of the order of 15 per cent between 75 and 50 B.C., somewhat more if hoarding reduced the annual loss to more than the 2 per cent annual loss assumed.[31] This drop in the total of coins circulating may not seem serious. But the range of activities funded by silver money in the western Mediterranean continued to expand in these years; Roman coins were beginning to be used in the eastern Mediterranean basin also; and some provincial issues, for example Spanish coins, were no longer being minted. Roman silver coins had to take their place. Therefore, the demand for silver coins was increasing at the very same time that supply was falling.

[30] To be fair, Crawford did not strictly make a proposition; he just drew a conclusion, and expressed it sufficiently clearly so that it could be tested. If he had proposed a general relationship between military expenditure and minting which took time to show, then we could have done a lagged correlation: military expenditure in years 1, 2, 3 with minting in years 2, 3, 4, etc. But that is not what he suggested.

[31] M. H. Crawford, 'Coin Hoards and the Pattern of Violence in the Late Republic', *PBSR* 24 (1969), 79, shows a high frequency of unrecovered hoards in Italy between 75 and 71 B.C., but a low frequency 70–50 B.C. The evidence is suggestive only. I have suggested (n. 21) that the constant loss rate was very probably less than 10 per cent.

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Theoretically, the consequences of a down-turn in money supply should be a shortage of money, a crisis in liquidity, a shortage of credit, a rise in interest rates and falling prices. Interestingly enough, we find several of these phenomena attested in 49 B.C., in what several scholars have called 'a crisis of credit'.[32] Cicero wrote about the 'shortage of money' (*Letters to Atticus* 9. 9); Caesar stated that 'credit throughout Italy was tighter and debts were not being repaid' (*Civil War* 3. 1). I am not claiming that a fall in the money supply alone brought about the crisis of 49 B.C. But the down-turn in money supply seems to have been an important factor contributing to recurrent domestic crises in Italy during the sixties and fifties B.C., which political historians have not known about.

Proposition 6: the integration of the monetary economy in the High Empire

At the beginning of this paper, I proposed a model of the Roman economy, in which the imposition of money taxes and of money rents, and their expenditure at a distance from their source, contributed to the gradual creation of complex networks of trade. The flows of money taxes, of trade and of money rents contributed to the integration of the economy of the whole empire. Proposition 6 states that, in the first two centuries A.D., the monetary economy of the Roman empire became integrated into a single system. In the last two sections, I have proposed that there was a huge growth in long-distance sea-borne trade in the western Mediterranean in the period 200 B.C.–A.D. 200, and a huge growth in the supply of Roman silver coins in the period 157–50 B.C., again principally in the western Mediterranean. Evidence on money supply during the first two centuries A.D. does not allow a similar analysis. The sheer volume of Roman imperial coinage has prevented anyone from counting the number of known silver coin types, let alone dies. And besides, progressive debasement from the middle of the first century A.D. onwards must have encouraged massive re-use of old coins to mint a larger number of new, debased coins. Estimates of loss rates are therefore extremely problematic, and guessing the total amount of silver coin in circulation would, I think, be unhelpful. We must try another tack.

Perhaps I can best begin by proposing for the sake of argument a counter-hypothesis: the Roman monetary economy was so primitive and localized that state expenditure in one region had no impact in other regions. Money simply piled up and circulated locally.[33] We then face two problems: first, how did inner-core provinces get silver coins with which to trade and pay taxes? As far as we know, the Roman state had no mechanism for distributing coin, other than by state expenditure. Secondly, did heavy expenditure by an emperor in one area, for example by Marcus Aurelius in the Danubian region during his long campaigns there, leave traces in a disproportionately large deposit of his coins? The evidence which I am going to discuss was not designed to test this counter-hypothesis or proposition 6.[34] But I think it suggests that proposition 6 is correct and that the counter-hypothesis is wrong.

Figure 4 indicates that the whole Roman empire was integrated into a single monetary economy. At least, that is my interpretation. All the lines of the Figure go up, then down, then up and along together. The very fact that it is difficult to distinguish the lines in the Figure from each other supports my argument. Let me elaborate. Figure 4 is based on the analysis of over 90,000 silver coins found in five regions of the Roman empire: southern Germany, northern Italy, Britain and Gaul, the Balkans and a garrison town in Syria. These regions were chosen arbitrarily, because there were easily accessible catalogues or

[32] cf. M. W. Frederiksen, 'Caesar, Cicero and the problem of debt', *JRS* 56 (1966), 131 ff.; cf. M. H. Crawford, 'Money and Exchange in the Roman World', *JRS* 60 (1970), 46; see also Cicero, *Letters to Atticus* 7. 18.

[33] To some extent, this must have happened. And as a result, migrant labourers were attracted to places with high levels of expenditure, such as frontier garrisons (hence the urban development there) and to the city of Rome.

[34] I started by re-analysing Dr. Richard Reece's data, published in 'Roman Coinage in the western Empire', *Britannia* 4 (1973), 227 ff. I am most grateful to him for discussing his data with me, and particularly for reworking his data from northern Italy for the period A.D. 69–96 into two sub-periods, 69–81, 81–96. The patterns which emerged enticed me to see what I would find from other regions or coin collections.

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analyses of coins found there.[35] Each line of the Figure represents the coins found in a particular region (where applicable, by type of find—but more of that in a moment). Figure 4 shows that, for roughly a hundred and fifty years (A.D. 50–200), increases and decreases in the volume of coins, minted by each emperor, were similarly reflected in different and widely separate regions of the empire. Apparently an effective mechanism for distributing silver coins throughout the empire existed, so that several regions (and if these, then surely others also) got roughly the same ratio of coins stamped, for example, with the head of Trajan compared with coins stamped with the head of Domitian. What was this mechanism? We know that state expenditure was concentrated in the city of

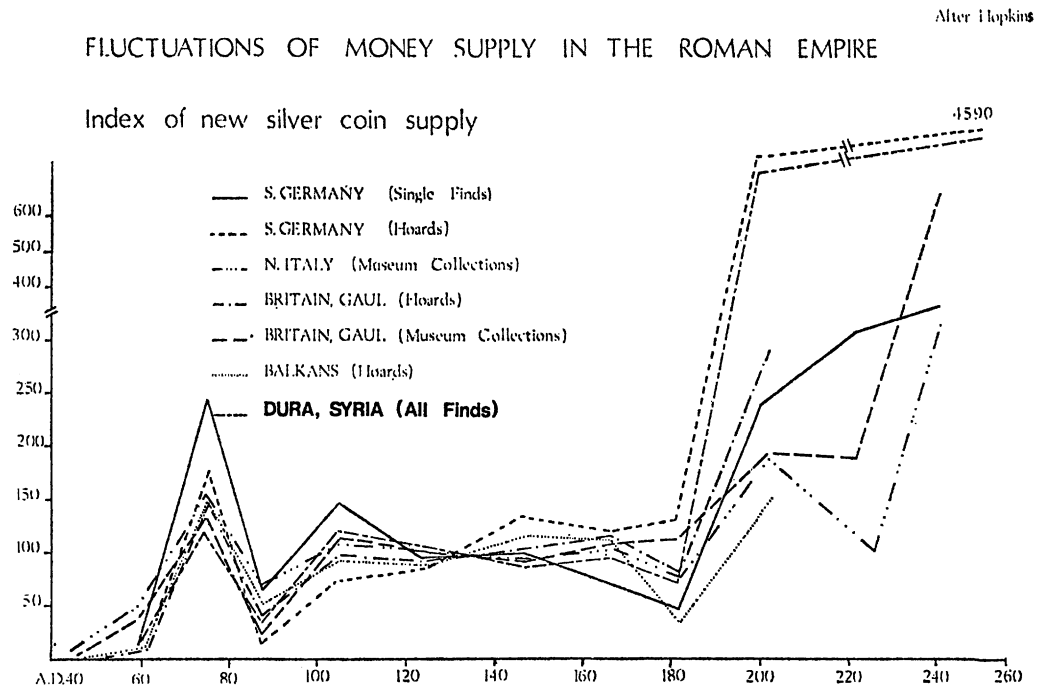

FIG. 4. FLUCTUATIONS IN THE NUMBERS OF SILVER COINS FOUND, BY DATE OF MINTING AND BY REGION OF FIND.

Rome and on the frontiers. I suggest that it was the flow of money taxes and of tax-stimulated trade which redistributed state-issued silver coins throughout the empire. I cannot prove that this answer is correct. But Figure 4 poses a problem which deserves an answer.

Let me now go into the details of Figure 4's construction. The horizontal axis is divided into reigns of emperors, rather than uniform time periods, because coins are easily

[35] In addition to Reece's data, I used six volumes of H. Gebhart and K. Kraft (edd.), *Die Fundmünzen der römischen Zeit in Deutschland* (1961–): Saar, Pfalz, Süd-Baden, Süd-Württemberg, Schwaben, Oberbayern, i.e. a band of adjacent districts in southern Germany. For hoards in the Balkans and in Britain, Gaul and Germany, I used S. Bolin, *State and Currency in the Roman Empire* (1958), appendices; from this collection, I arbitrarily excluded from consideration one enormous Bulgarian hoard of more than 60,000 silver coins, which overwhelmed the other finds, and which seemed different in character from the other hoards. Finally, I used A. R. Bellinger, *The Excavations at Dura-Europus, Final Report* VI, *The Coins* (1949). I should note that the museum collections from Britain, northern Gaul (including some from northern Germany) and southern Gaul cover a large area. I checked before compression of the districts, separately analysed by Reece, to make sure that the patterns being compressed were roughly similar, so that the single line drawn from the collections in Figure 4 reasonably reflects the individual components.

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and conventionally identified by the emperor's head stamped on each.[36] One then has to divide the number of coins found per reign from each region by the length of the reign, to get a standardized index: coins found per year. The first draft of the Figure was based on such raw numbers and it showed what one might have expected (or known), that northern Italy was more monetized than southern Gaul, which in turn was more monetized than northern Gaul . . ., if one can use relative volume of found coins as an index of monetization. I then faced two problems, one tactical, one interpretative: first, the differences in the raw numbers were so great that it was difficult to put the evidence in a single Figure; secondly, there were more coins found in the Balkans than elsewhere, which was, I suspected, a function more of archaeological activity and the discovery of unrecovered hoards, than of relative monetization. I therefore decided to concentrate not on relative quantities of coins by regions, but on relative quantities of coins by time of minting, in each region and between regions.

For this purpose, the vertical axis of the graph was converted to a ratio scale, based on an index number 100, like a modern consumer prices index or a wage index. For each region, the base index number, 100, represents the average number of coins found per year of the period A.D. 96–180. This period was chosen because it was the most stable period of the Roman imperial economy. We can call this base (100) a second-century index number. The average number of coins per year in each reign (or regnal period) was then expressed as a ratio of this second-century index number.[37] Thus each line for each region is drawn by expressing the average number of coins per year from each reign as a ratio of the average number of coins per year from the central index period. What is amazing about Figure 4 is that data of such varied provenance and composition show such similarities in pattern.

Provenance is a problem which deserves further discussion. In Figure 4, I have drawn some separate lines for singly-found coins, hoards and museum collections. Most silver coins are found in hoards; some silver coins are found singly, dropped by chance in street or home. Many coins are now in modern museum collections with their exact provenance unknown. Although we can make precise, if arbitrary distinctions between these categories, we cannot assign all coins with certainty to one category. Provenance matters, particularly because the composition and the incidence of hoards may seriously bias our evidence; fears on this score have hindered the exploitation of coin evidence by ancient economic historians.

The composition of hoards may have been biased because hoards were compiled, sometimes by several collectors, over long periods during which hoarders tended to hoard the better, i.e. the purer, coins and to spend the worse, debased ones. Thus hoards may not correctly represent the coins in people's purses. Secondly, it is well known that the incidence of hoarding is heavily affected by general economic and political conditions. In times of political insecurity, more hoards are stowed away, or more accurately, more hoards are not recovered by hoarders. After all, what we dig up are, rather sadly, hoarders' unrecovered savings. Their loss is our gain. Thus there are many coins now surviving from the third century A.D., partly because many hoards were not recovered in that period. Paradoxically, and it is a sobering thought, we may have more coins from the very period in which most coins were withdrawn from circulation.

Luckily, we have a check on these speculations: several thousand singly-found silver coins, carefully documented as such in the voluminous catalogue of coin finds in Germany (see n. 35). It is critically important for the conclusions advanced here that the line drawn from singly-found coins from southern Germany is similar in shape to the other lines based on hoards or museum collections, both in southern Germany and elsewhere. The singly-found coins, casually dropped or lost, do represent what was in people's purses.

[36] In fact, following Reece, I collapsed short reigns with adjacent longer reigns (for example, Titus with Vespasian, Nerva with Trajan) to form convenient regnal periods.

[37] For example, there were 3,812 singly-found silver coins listed in the six volumes of German coin finds, which I analysed. Incidentally, this was by far the smallest number of coins used for any line in Figure 4. The average number of coins per year in the period A.D. 96–180 was 5·3; 5·3 is the second-century index number (100) for south German singly-found coins. For the reign of Hadrian, the average number of coins per year was 4·9 which is 92 per cent of the second-century index number, and so on.

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They represent coins in current use. The striking similarity in the patterns presented in Figure 4 encouraged me to use the evidence from hoards also.

Let us take a final look at Figure 4. The general impression, as I have already noted, is that all the lines follow roughly the same path. In the reigns of Vespasian and Titus (A.D. 69–81), there was a huge rise in the volume of silver coins minted, then during the reign of Domitian (A.D. 81–96) there was a considerable fall. During the reigns of Nerva and Trajan (A.D. 96–117) the volume of coins minted rose again significantly, but then levelled out again throughout most of the second century A.D. This was a period of economic stability; by some accounts, it was also a period of widespread prosperity. During the reign of Commodus (A.D. 180–92), five out of the seven lines in Figure 4 fell, but then during the reign of Septimius Severus (A.D. 193–211) most lines rose steeply. After that there was confusion; indeed, the lines for southern Germany should be drawn to a completely different scale; and the other lines show no similarity of pattern.[38] The unity of the monetary economy had broken down.

Let me stress again the considerable difference between Figure 2 and Figure 4. Figure 2 estimated the accumulated volume of silver coins in circulation, deduced from the total number of dies ever used. Figure 4 shows the number of silver coins found in each province, by date of minting (expressed as a ratio of the number of coins found per year in the period A.D. 96–180). Figure 4 indicates that there were some very large leaps in new coin supply, for example, at the beginning of the third century A.D., which would have had implications for total money supply. But the transformation of the graph into a picture of the accumulated volume of coins in circulation is beset with overwhelming difficulties.[39]

That said, the end of Figure 4 is of considerable interest. It implies that new money supply from about A.D. 200 rose, as silver coins were progressively debased. Prices presumably rose, since it seems improbable, even impossible, for a pre-industrial economy to have absorbed such large and sudden increases in valuable coinage without corresponding price increases.[40] Our documentary evidence on this point is inadequate; we can prove price rises only much later. But from the analysis of dated shipwrecks (Figure 1), we have deduced that trade in the third century A.D. declined. From western archaeological evidence, we can also argue that some towns also declined in the third century.[41] The central govern-

[38] *Denarii* and so-called *antoniniani* have been treated equally as silver coins. If we had taken account of the face value of *antoniniani* (at two *denarii*), which were minted in large quantities only after A.D. 238, then the lines at the right end of Figure 4 would have been higher than shown.

[39] In addition to the problems of debasement, of reminting old coins and of loss-rates, which I have already mentioned, coin volume in the High Empire is complicated by the operation of several mints in the eastern Mediterranean. Thanks now to the painstaking and impressive work of D. R. Walker, *The Metrology of the Roman Silver Coinage* I–III, *British Archaeological Reports, Supplementary Series* 5, 22, 40 (1976–8), we can see how Roman provincial mints (for example, in Syria, Asia Minor and Crete) reflected a central Roman monetary policy. The evidence for this central control (which was directive, not reactive) is that the weight and fineness of provincial silver coins were reduced roughly to the same extent as, and sometimes before, silver coins minted in the city of Rome. This co-ordination of imperial monetary policy has important historical implications. But it was imperfect, so that measurement is difficult.

[40] The problem is complicated. Figure 4 implies that the volume of debased silver coins rose considerably after A.D. 193 and that the increase in the volume of coins minted outstripped the rate of debasement. For example, I reckon from Walker's data (see previous note) that the median weight of silver in *denarii* minted in the city of Rome fell by 43 per cent at most, between A.D. 180/9 and 211/17 (2·29 g of silver in 180/9, 1·85 g in 196/211, and 1·31 g equivalent in the debased *antoniniani* minted at the end of Caracalla's reign (face value 2 *denarii*)). But the proportionate increase in the number of coins found is visibly greater than 43 per cent (see Figure 4). Such an increase in money supply might initially have stimulated commerce and production; but the increase in coins was too rapid not to have increased prices also. And in due course there was a downturn in trade; I am not claiming that increased money supply and price rises were alone responsible for the downturn in trade in the third century. Some of these issues are excellently discussed by M. Corbier, 'Dévaluations et fiscalité (161–235)', in *Les dévaluations à Rome, Collection de l'école française de Rome* 37 (1978), 273 ff.; I disagree with Corbier in important detail, while admiring her work in general.

[41] The most obvious index of urban decline is the widespread drop during the third century A.D. in the number of datable inscribed stones, commemorating the erection of new buildings, charitable foundations, statues, gifts, manumissions and deaths. See, for example, the statistical analysis of some evidence by R. P. Duncan-Jones, *The Economy of the Roman Empire* (1974), 352, and B. Laum, *Stiftungen in der griechischen und römischen Welt* (1914). Changes in the fashion for inscribing and giving may account for some of this drop, but surely not for all of it. Yet how sensitive are such inscriptions as an index of prosperity, and of whose prosperity? For other illustrative evidence of urban decline see, for example, P.-M. Duval, *Paris antique* (1961), 277, and, for a fourth-century revival, E. Patlagean, *Pauvreté économique et pauvreté sociale à Byzance* (1977), 232. I cite these isolated illustrations in the absence, as far as I know, of synoptic archaeological reviews.

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ment increasingly resorted to taxation in kind and paid its troops and officials in wheat rations (*annona*, *capita*) instead of in money. This complex of changes provides a corollary to my initial propositions: the decline in the exaction of money taxes brought about a decline in trade. The corollary helps corroborate the basic propositions with which I started.

Proposition 7: taxes in the High Empire were low

In the last section, I adduced evidence to show that the monetary economy of the Roman empire was integrated into a single system. I proposed, although I could not prove, that taxation in money and the trade which it stimulated were important factors in ensuring the circulation of silver coins throughout the empire. In previous sections, I have proposed that sea-borne trade increased in the period 200 B.C.–A.D. 200, and that the volume of silver coinage minted at Rome and circulating in the western Mediterranean increased, perhaps tenfold, in the period 157–50 B.C. It seems likely, to judge by the volume of survivals, that the volume of silver coinage circulating in the High Empire was considerably larger than in the late Republic.[42] All these arguments, and the evidence from which they are derived, are partial, but they draw strength from their inter-relationship. They back each other up.[43]

In this section, I want to estimate the level of taxation in the High Empire and the importance of taxation in the Roman economy. This is clearly critical for the basic proposition that exacting taxes in money stimulated trade. Unfortunately, no exact evidence of general tax rates in the High Empire survives.[44] Some fragments of earlier evidence serve as a first check. According to a possible interpretation of Plutarch (*Pompey* 45), the Roman treasury's income in 62 B.C. was 340 million HS per year. To this we should add income from subsequent conquests, particularly in Gaul and in Egypt. Frank (*ESAR* v. 7) estimated total state revenue in the reign of Augustus at 450 million HS, with army expenditure at 275 million HS. Both these figures seem serious underestimates.[45] I reckon that an army of 300,000 men (half legionaries, half auxiliaries) cost over 400 million HS per year, once

[42] The silver coin types listed, by obverse and reverse types, in the several volumes of *Coins of the Roman Empire in the British Museum*, ed. H. Mattingly *et al.* (1923–) are a tenuous index of the volume of coins ever minted, since we do not know how many identical dies of the same type were used. But no one can reasonably doubt the increase in the volume of silver coins minted in the Principate. This absolute growth is important, but once it is divided by the size of the population (coins per head) it becomes less impressive.

[43] This is what I have called a wigwam argument, in which weak arguments prop each other up and circumscribe 'truth'; see my *Conquerors and Slaves* (1978), 20.

[44] See particularly A. H. M. Jones, *The Roman Economy*, ed. P. A. Brunt (1974), especially 161 ff.; J. Marquardt, *Römische Staatsverwaltung*[2] (1881) II is still useful. Much more has been written about taxation in the Late Empire; see particularly A. Déleage, *La capitation du Bas-Empire* (1945), and A. Cerati, *Caractère annonaire et assiette de l'impôt foncier au Bas-Empire* (1975). But lengthening a bibliography should not disguise our lack of solid information and of real understanding about Roman taxation. Some Romans knew the size of their own state expenditure. Appian (*Roman History*, Preface 15) promised that, in his last book, he would outline the size of Roman military forces, the revenues collected from each province, the cost of the navy, etc. Unfortunately, this book does not survive. Augustus, the first emperor, left a will in which he detailed 'the cost of the army, revenues, public expenditure, the amount of money in the treasuries . . .' (Dio 56. 33). The conjunction army, revenues, expenditure is suggestive.

[45] Revenues of the Roman State. The major problem in estimating Roman state revenues is the quality of the surviving evidence. The following six snippets have been trusted more than they deserve:

(*a*) Julius Caesar imposed a tribute on Gaul of 40 million HS (Suetonius, *Julius Caesar* 25);

(*b*) '(The Gauls) pay almost as much tribute into the treasury as the rest of the world' (Velleius Paterculus 2. 39);

(*c*) 'Augustus made Egypt tributary, thereby contributing nearly as much revenue to the treasury as (Caesar) had brought to it from Gaul' (ibid.);

(*d*) Herod Agrippa derived from Palestine 'as much revenue as possible, amounting to twelve million *drachmae*' [= *denarii*] per year (Josephus, *Jewish Antiquities* 19. 352);

(*e*) '. . . the tribute which (Egypt) yields to Rome in one month surpasses what you (in Palestine) pay in one year; besides money, (Egypt) sends wheat to feed Rome for months' (Josephus, *Jewish War* 2. 386);

(*f*) 'When the cost had reached seven million (*drachmae*), the procurators of Asia wrote to the emperor that it was a scandal for the tribute of five hundred cities [i.e. Asia] to be spent on one city . . .' (Philostratus, *Lives of the Sophists* 548).

There is not much more than this. Frank seeks to make (*a*) compatible with (*b*), and (*c*) compatible with (*d*) and (*e*), by claiming that they refer to different periods and that tax rates rose in Gaul and in Egypt between the beginning of the reign of Augustus and the middle of the first century A.D. But from 40 million HS to half the revenue of the empire in the case of Gaul? And from less than 40 million HS to more than 500 million HS (12 × 12 million *denarii*) in the case of Egypt? Yet Asia was reportedly paying less than 30 million HS in the second century A.D. (*f*)! That is absurd. See Frank, *ESAR* v, 7 and 51 and n. 49 below on the revenues of Egypt.

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we include the cost of retirement bounties for veterans, and extra pay for privileged soldiers and officers. But there is a large element of uncertainty in any estimate, since we do not know how much auxiliaries were paid or how much the fleet cost.[46] Several ancient authors state that expenditure on the army constituted by far the largest item in the state budget.[47] That is an important observation. It seems intrinsically plausible, and is corroborated by the fact that soldiers, in spite of their political power and participation in civil wars, did not succeed in raising their pay (in terms of silver) above the Augustan level, except for a short period.[48] The state treasury could not afford to pay them much more.

Frank very tentatively estimated total state revenues in A.D. 70 at about 1,200–1,500 million HS; several components of this guess, such as the revenues from Egypt, seem exaggerated.[49] And if the total budget was as high as that, then the cost of the army (at 275 million HS by Frank's estimate, or more than 400 million HS by my estimate) was not the huge element in the state budget which our sources assumed. In sum, Frank's first estimate of the state budget at 450 million HS was too low; but his estimate for A.D. 70 at 1,200–1,500 million HS was too high.

In these circumstances, I thought it would be worthwhile to try a different, somewhat experimental method of overcoming the shortage of direct evidence. Let us deal with relationships between probabilities, rather than with the well-documented 'facts' which are the normal building bricks of conventional history. We can move later from abstract to concrete. In the following discussion, three principles apply. First, the range of probability is finite; for example, scholarly estimates of the probable population of the Roman empire at its peak range only between 50 and 120 million.[50] Secondly, the choice of a value for one variable limits the range of probability for cognate variables; for example, the larger we set the size of the tax-paying population, the lower the amount of tax paid by each, if we also think that the Roman government faced difficulty in paying its soldiers. Put another way, and this is my third point, not only do our choices constrain each other, but the final results must also be compatible with whatever else we want to believe.

Tax can be conceived as a proportion of gross product. Can we estimate the gross product of the Roman empire? At first sight, it seems hopeless. But we can make a

[46] It is impracticable to calculate the total cost of the Roman army thoroughly in a footnote. It is a reflection on scholarly concern with detail, rather than with broad problems, that I can cite no standard estimates of how much the Roman army cost. My tentative conclusion is that the total cost of the Roman army at the beginning of the first century A.D. was 415 million HS, plus or minus 50 million HS. See Appendix I for details.

[47] 'Our present revenues are insufficient to provide for the army and everything else', wrote Cassius Dio (52. 6) in a speech which he attributed to Agrippa in 29 B.C. Another writer (SHA, *Probus* 23) envisaged a dream world in which there would be no soldiers and therefore no tax on land. The jurist Ulpian explained that tax (*tributum*) was what was *attributed* to soldiers (*D.* 50. 16. 27: 'sane appellatur . . . tributum . . . ex eo quod militibus tribuatur'). The sixth-century anonymous author of *Practical Politics* wrote that 'expenditure on the army is the biggest item of state expenditure each year', *Griechische Kriegschriftsteller*, edd. H. Köchly and W. Rüstow (Leipzig, 1855) II.2, 47. None of these sources is earlier than the third century A.D.; indeed their citation may not be convincing. Yet it seems likely that their statements were broadly true, and that the cost of the army dominated the state budget during the High Empire also.

[48] This calculation involves multiplying legionary pay by the average weight of, and by the proportion of silver in, coins minted in the city of Rome under each emperor. According to this calculation, legionary pay was for long periods under the Augustan level, and rose by more than 10 per cent above the Augustan level only briefly, in the reign of Caracalla. See G. R. Watson, *The Roman Soldier* (1969), 91 on soldiers' pay, and D. R. Walker, op. cit. (n. 39), for the weight and silver content of coins. To be sure, in so far as coinage was fiduciary, i.e. in so far as its worth did not depend upon its silver content, such a calculation tells us little. I am willing to believe that in small-scale transactions, the silver currency was substantially fiduciary (since testing coins for exact silver content would have been difficult), but, in gross, I imagine that prices were influenced by the increases in money supply which followed debasement.

[49] On the basis of two snippets from Josephus, quoted in n. 45 (*d*) and (*e*) above, Frank (*ESAR* V, 52) concluded that Egypt yielded 576 million HS plus 20 million *modii* of wheat (at say 3 HS per *modius* = 636 million HS total). The population of Roman Egypt is conventionally regarded as above seven million (Finley, *The Ancient Economy* (1973), 97); in K. J. Beloch's view (and I agree completely) that is far too high (*Die Bevölkerung der griechisch-römischen Welt* (1886), 258 and 507: 5 million); even Beloch's estimate is generous. Seven million people would have been paying 200 kg wheat equivalent per person in tax to yield Frank's estimated total. That is again much too high: the claimed total is five times higher in wheat terms than the total tax levied in Egypt by the Ottomans in the seventeenth century (see S. B. Shaw, *The Financial and Administrative Organization and Development of Ottoman Egypt* (1962), 79, 84 and 183. Cf. the implied tax rate in the fourth century A.D. (*P. Oxy.* 3307) which was much lower, and n. 56 below.

[50] J. C. Russell, 'Late Ancient and Medieval Population', *Transactions of the American Philosophical Society* 48. 3 (1958), 7, for literature and for a full discussion of the evidence, and see n. 52 below.

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minimum estimate by multiplying the size of the population by the amount of food necessary to keep that population at the minimum level of subsistence. Let us follow the convention of modern agricultural economists and translate consumption needs into terms of basic grain (kg wheat equivalent). In this way, we can easily take account not merely of food, but also of minimum needs for clothing, heat and housing.[51] Obviously, such a calculation poses problems; needs for food depend on climate, age, sex, body weight, height and energy expended. An average of 250 kg wheat equivalent per person/year is low, low enough to take account of the probable age composition of a population suffering high mortality and suffering from recurrent feelings of hunger. Adult males would, normally, have consumed significantly more than this average; children and old people significantly less. Let me stress that the measure is in terms of wheat *equivalent*. It does not mean that people ate only, or indeed any wheat. Wheat equivalent is merely a currency of cross-cultural comparison, such that all consumption is expressed in terms of wheat. Incidentally, one advantage of this convention is that it gives us a key for translating the meaning of Roman money from HS, which tells the modern reader very little, into subsistence (e.g. enough to feed a family of four for a month).

To this estimate of minimum consumption, we need to add some allowance for seed, so that we can make a distinction between minimum net product available for consumption and minimum gross product, sufficient to allow farmers to plant for next year's crop. This measure, minimum gross product, does not imply that everyone produces what he/she eats; some people consume food grown by others, and some are producing goods in return for which they can buy peasants' surplus food. Our first estimate of minimum gross product (minimum net consumption plus seed) covers all production of food, sufficient to maintain minimum subsistence, but does not include other productive activity, except the production of minimal clothing, housing and heat. It is a minimum estimate of gross product; the actual gross product of the Roman empire was certainly higher. But for the moment a minimum is all we need, because if we add price, we get an impeccable equation:

$$\text{Tax} = \text{Proportion}\left[> \begin{pmatrix}\text{Minimum}\\ \text{Gross}\\ \text{Product}\end{pmatrix} = \text{Population} \times \begin{pmatrix}\text{Minimum}\\ \text{Net}\\ \text{Consumption}\end{pmatrix} + \text{Seed}\Bigg) \times \text{Price}\Bigg)\right]$$

All we have to do now is to fit values to components of the equation. It is not as difficult as it may appear at first sight. We can do it tentatively, without committing ourselves to the correctness of any estimate, simply to see where it leads us. First, population. Beloch estimated the population of the Roman empire at the beginning of Augustus' reign at 54 million. I think it was a very good estimate, and much better than his revised figure of 100 million for the end of the first century A.D.[52] Second, minimum net consumption; we have estimated that at 250 kg wheat equivalent per person/year. Next, seed; to please those who rely on ancient sources, let us follow Columella (*On Agriculture* 3. 3) and think that the normal yield for wheat in Italy was four times seed. Under cover of ancient authority, we can leave aside the question, how did Columella know the normal yield of a country as large and as varied as Italy.[53] Let us now arbitrarily apply the same average figure to the empire as a whole, again without committing ourselves to its truth. Seed therefore constituted a quarter of the total crop.

Fourth, price. The normal price of wheat in the first century A.D. is a matter of contention. It obviously varied between seasons, from year to year and from district to

[51] C. Clark and M. Haswell, *The Economics of Subsistence Agriculture*[4] (1970), 57 ff. and 175. I once did some fancy calculations allowing for body weight (adult males 60 kg at age 25 years), age structure ($e_0 = 20$), climate (at Rome), subsistence at 2,000 calories average per person/day. The result coincided with Clark and Haswell's. I added a bit (15 kg wheat equivalent per person/year) for clothing, and a similar notional amount for heat and housing. The end result (250 kg wheat equivalent per person/year) is obviously rough and speculative (after all consumption depends on energy expended and vice versa); I thought it best to express the result in a round number (250 kg) to underline its vagueness. But the probable margin of error is not great.

[52] Beloch, op. cit. (n. 49), 507 and 'Die Bevölkerung im Altertum', *Zeitschrift für Sozialwissenschaft* 2 (1899), 505 ff. and 600 ff.

[53] Columella wrote: 'We can hardly remember a time when cereals in the greater part of Italy yielded four to one.' On varying yields in one Italian district, see, for example, C. Rotelli, 'Rendimenti e produzione agricola nell'Imolese', *Riv. Stor. Ital.* 80 (1968), 121–3, and M. Aymard, 'L'agriculture dans l'Italie moderne', *Annales* 28 (1973), 475–97.

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district. The city of Rome was much more expensive than a farm deep inland in Asia Minor. But variation in no way precludes the calculation or usefulness of an average. Rostovtzeff considered that, if one had to choose a single price for wheat, which he thought unwise, then 3 HS per *modius* (of 6·55 kg) was the single best estimate.[54] Finally, tax-rates: no single figure is obviously right. Effective tax rates in Egypt were significantly higher than in Italy, where there was no direct tax on land. In the provinces, tithes on main crops were common, but so were other tax-rates; and how are we going to take account of indirect taxes such as customs dues, or of taxes on the transfer of property at death, or of tax evasion?[55] Arbitrarily, let us plump for a tax-rate of 10 per cent on gross product and see where it leads us.

We are now in a position to calculate:

$$\text{Tax} = 10\% \left[> \begin{pmatrix} \text{Minimum} \\ \text{Gross} \\ \text{Product} \end{pmatrix} = \begin{matrix} \text{Population} \\ 54 \text{ million} \end{matrix} \times \begin{pmatrix} \text{Minimum} & 250 \text{ kg} & \text{Seed (a} \\ \text{Net} & \text{wheat} & + \text{quarter} \\ \text{Consumption} & \text{equiv.} & \text{of crop)} \end{pmatrix} \times \begin{matrix} \text{Price} \\ 3 \text{ HS per} \\ 6{\cdot}55 \text{ kg} \end{matrix} \right]$$

$$= 10\% \qquad > \left(54 \times 250 \times \frac{4}{3} \times \frac{3}{6{\cdot}55} \text{ million HS}\right) = > (8{,}244 \text{ million HS})$$

$$\text{Tax} = > 824 \text{ million HS}$$

All the constituents of this calculation are hypothetical and tentative. But the result is curiously plausible. Given the estimated cost of the army, at over 350 million HS per year, and its dominance in the state budget, there is not a great deal of room for manoeuvre. Double the population, and you must halve the effective tax-rate or claim that the cost of the army was only a minor element in the state budget. Claim that most people were producing at twice the level of minimum subsistence, or double the price of wheat, then you must halve the effective tax-rate, if the army dominated the state budget. To be sure, this method cannot establish which answers are right, but the matrix of probabilities makes one aware of the implications of choice.

Can we go further? In reality, the gross product of the Roman empire must have exceeded our estimated minimum gross product considerably. Many peasants and non-peasants consumed more than minimum subsistence; many non-peasants produced goods (as did peasants) over and above subsistence needs. But if military expenditure was a very large element in the total state budget—this is the anchor of our calculations—then the budget was probably not much larger than 800 million HS in the early first century A.D. Therefore, the higher our estimate of gross product, the lower the probable tax-rate. Discussion of these variables could be endless. Let me finish with some speculative and

[54] See M. I. Rostovtzeff, *RE s.v. frumentum*, 149; cf. R. P. Duncan-Jones, 'The Price of Wheat in Roman Egypt under the Principate', *Chiron* 6 (1976), 251–3, who lists eighteen wheat prices from lower Egypt in the first century A.D.; the median and modal price was 8 *drachmae* per *artaba* of 32 kg, which Duncan-Jones approximates to 2½ HS per *modius*. By the end of the second century A.D., lower Egyptian wheat prices had more than doubled to 18–20 *drachmae* per *artaba*, but only four prices are known and exactly dated A.D. 191–220. In Asia Minor at the end of the first century A.D., in a small town (Antioch in Pisidia), the normal price of wheat was 2¼ HS per *modius* (*AE* 1925, 126). In the city of Rome, market prices were obviously higher, perhaps 8–10 HS per *modius* (cf. R. P. Duncan-Jones, *The Economy of the Roman Empire* (1974), 345–7). Prices fluctuated both within and between years; fluctuations do not preclude an average, but they should induce caution in its use.

[55] No attempt was made to impose a uniform tax-system or a single tax-rate on crops and land throughout the empire, though some taxes (inheritance tax on citizens, customs dues) were raised across the empire. Some lands in Roman Germany were called *agri decumates*, tithe lands, and tithes had been raised during the Late Republic in Sicily and Asia Minor, by tax-farmers. But Hyginus, who wrote in the early second century A.D., mentioned tax-rates of one-fifth and one-seventh (ed. K. Lachmann (Berlin, 1848), 205); these rates may have been due to local variations, or the result of a rise in tax-rates (perhaps under Vespasian, see n. 68). In Syria, the tax-rate was 1 per cent of the assessed value of the land (Appian, *The Syrian Wars* 50). These were the main taxes, to which we should add indirect taxes. But for the moment I am taking no account of illegal exactions and squeezes. I am concerned only with what the central government and its agents took officially, in whatever form and wherever spent. I have not touched the problem of how and when a tithe of a main crop, such as wheat, was transformed into money. I can only stress the great difference between a declared tax-rate (say 10 per cent) on a main crop, and my first estimate of government revenues as 10 per cent of all produce. The survey by V. Cuinet, *La Turquie d'Asie* (1891) I–IV, gives a detailed analysis of taxes raised in Asia Minor and Syria by the Ottomans at the end of the nineteenth century, and suggests the different contributions from land taxes, cattle taxes, customs which could be raised in a still undeveloped economy.

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tentative conclusions: in my opinion, the population of the empire was never much larger than Beloch's estimated 54 million (I exclude temporary acquisitions); gross product averaged out at less than twice minimum subsistence; the effective tax rate was significantly less than 10 per cent of gross product. My reasons for these conclusions are simply that, if either population or gross product had been much larger than these estimates, then effective tax-rates were unbelievably low compared with declared tax-rates (such as tithes, fifths). Finally, I conclude that the annual tax exacted by the Roman state was in the region of 33 kg wheat equivalent per person (10 per cent of 250 kg minimum subsistence plus 83 kg seed), about 15 HS per head. This is more than was raised in France or in England in the sixteenth century, but much less than these kingdoms raised from about 1700.[56] Such measures and comparisons are obviously crude, but they indicate roughly where we should put the Roman state on a scale of social evolution.

Conclusion: low taxes and their consequences

The Roman state was supported by many millions of small contributions. Why were Roman tax-rates low? The end of a long article is not the best place to embark on an answer to this question. But a sketch may help place taxes and trade in a wider political context, and link this essay to recent discussions of the great debasement of Roman silver coinage in the third century A.D. This link is important, because in conclusion I shall suggest that the collapse of taxation in money in the middle of the third century A.D. and its replacement by taxation in kind were closely connected to the contemporary decline in trade. This is a corollary of the propositions with which I started.

Originally, in the early phase of imperial expansion, there had been a gradual progression from the exacting indemnities to pay for past wars, to levying taxes to pay for current, mostly military expenses. But the concept of empire, and of administration, remained simple, because provinces were originally conceived primarily in terms of military conquest and of exploitation. Provincial governors and their aides had only a limited time in charge of a province in which to recover their previous expenses in their political career at Rome and to get rich. These origins were important because they fixed the framework of the later imperial system. The Roman emperors succeeded in restricting some of the worst abuses in provincial administration, without ever eliminating them.[57]

Tax rates could be low principally because the services offered by the Roman administration were rudimentary. By this I do not mean to underestimate the benefits of Roman peace, prosperity and justice—although they have often been exaggerated. One telling index is the extremely sparse presence of élite administrators in the provinces

[56] I shall first state the results, then the elements in the calculation, then the sources.

Results: State budget expenditure per head of population (in kg wheat equivalent)

dates	U.K.	France	dates
1660–4	12	7	1600
1701–10	64	47	1713
1781	96	122	1815

Elements:

United Kingdom				France			
dates	Budget (million £ sterling)	Wheat Price (£) (per quarter) (211 kg)	Population (millions)	dates	Budget (millions)	Wheat Price (per 100 kg)	Population (millions)
1660–4	1·1 (income)	2·24	8·4	1600	5 (ducats)	4·5	16
1701–10	5·1 (expenditure)	1·76	9·5	1713	163 (livres)	18·2	19
1781	13·1 (expenditure)	2·23	13·1	1815	900 (francs)	19·3	25

Sources: United Kingdom: B. R. Mitchell, *Abstract of British Historical Statistics* (1962), 5, 386–91, 486–8; C. D. Chandaman, *The English Public Revenue 1660–1688* (1975), 208; C. M. Cipolla, *Before the Industrial Revolution* (1976), 4. France: F. Braudel, *The Mediterranean* (1972) I, 395–421; R. Baehrel, op. cit. (n. 4), 535; H. See, *Histoire économique de la France* (1948) I, 157 ff.; II, 111–22; C. M. Cipolla, op. cit., 4; E. A. Wrigley, *Population and History* (1969), 153. Needless to say, the results are crude and should be treated with the utmost caution.

[57] P. A. Brunt, 'Charges of Provincial Maladministration under the early Principate', *Historia* 10 (1961), 189 ff.

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outside Italy. Contrast, for example, the Roman empire with the Chinese. In the second century A.D., to govern a population estimated at 50–60 million people, there were only about 150 senatorial and equestrian administrators in the Roman provinces, that is one élite administrator for every 350,000–400,000 persons. In southern China, in the twelfth century, with a population of a similar size, there were 4,000 gentry officials working in about 1,000 administrative areas outside the capital (compared with forty-five Roman provinces), that is one Chinese élite administrator for roughly every 15,000 people.[58] The scale of difference outweighs any quibbles about the difficulties of comparison. The Chinese government had twenty-five times as many élite administrators at work in the provinces as the Roman government.

The consequence of low penetration by the central government was local autonomy. From one point of view, the Roman administrative system was efficient and cost effective: the ratio of net tax returns to central administrative costs was high. But the ceiling of tax-raising capacity within this system was low and the taxes were maldistributed. These were the costs of local autonomy. Let me elaborate. Because the central government had few representatives of its own in the provinces, it devolved the collection of taxes and the distribution of the tax-load on to intermediaries, who were typically prosperous land-owners and local town-councillors (*decuriones*). The central government in the High Empire had no direct relationship with individual tax-payers. As I understand it, the central government simply fixed the total amount of tax which each town and its surrounding area should pay; local town-councillors then arranged who should pay what, on the basis of a public declaration of the value of each property.[59] There was ample room for abuse, since political power was concentrated in the hands of those who could benefit most from a maldistribution of the tax-load.[60] The oppressed could and occasionally did appeal successfully to the emperor for help in securing justice.[61] But local leaders must often have had friends in the entourage of the provincial governor or at Court, who could be bribed to block an appeal or to present it in an unfavourable light. As a consequence, there was little to stop poorer peasants from paying a disproportionate share of taxes; taxation was regressive. And we should expect there to have been substantial differences between (*a*) what peasants paid in tax and (*b*) what rich land-owners paid on similar land, and between (*c*) what tax-collectors collected and (*d*) what they transmitted to the central government.[62] The basic problem was not merely one of injustice, but rather, in the

[58] B. E. McKnight, *Village and Bureaucracy in Southern Sung China* (1971), 7; cf. D. Twitchett, *Financial Administration under the T'ang*[2] (1963), 11 and 217.

[59] The system is clear from *IG* V (1), 1432–3, convincingly dated by A. Giovannini (*Rome et la circulation monétaire en Grèce* (1978), 115 ff.) to A.D. 35–44. My interpretation of this important inscription is that the Romans levied a tax of 100,000 *denarii* on the town of Messene in southern Greece. The town then divided the tax due by the total declared capital value of property including agricultural holdings (which the inscription lists by district totals) and thereby arrived at a tax-rate, so much per 100 *drachmae* or *denarii* (in fact 8 obols = 1·3 per cent). It is noteworthy that outsiders, *xenoi* explicitly including Romans, had the highest rate of non-payment, at the time the inscription was carved. Cf. A. Wilhelm, *JOAI* 17 (1914), 1–120, for a detailed and interesting commentary with which I reluctantly disagree in part.

[60] I imagine such techniques as collusively low valuation on the élite's own property, early collection of other people's taxes, and late payment of taxes by the rich; loans by the rich to the poor against the surety of their land. My main appeal is to the logic of the situation, and to comparable data from other societies (W. Hinton, *Fanshen* (1966), 39; J. D. Spence, *The Death of Woman Wang* (1978), 43 ff.; R. Huang, *Taxation and Governmental Finance in Sixteenth Century China* (1974). But Roman evidence also exists; see, for example, A. H. M. Jones, *The Later Roman Empire* (1964), 467–9.

[61] A famous plea survives from the tenants of an imperial estate in North Africa; they had already appealed to the emperor's local agent (*procurator*), but he was in cahoots with the administrator or lessor (*conductor*) of the estate: '... a collusion which he has practised uninterruptedly not only with Allius Maximus, our oppressor, but also with almost all the lessors, against the law, to the detriment of your treasury. The result is that he has refrained from investigating, for many years, our petitions, supplications and our appeals to your divine rescript; more than that he has yielded to the wiles of the said Allius Maximus, lessor, ... to such an extent that he has sent soldiers into (our estate) and given orders that some of us be seized and tortured, and others ... be beaten with rods and cudgels although they are Roman citizens' (*ESAR* IV, 98 = *CIL* VIII.10570, cf. 25902 and 25943).

[62] The logic of the situation and comparative evidence both suggest what we should expect. The explicit recognition of this tactic in research violates the implicit rule or convention among ancient historians that the surviving testimony provides both the building bricks for our history and its authentication. But by what logic do we decide whether the surviving testimony is true, or representative, and how do we decide between conflicting sources? These are not just problems of historical philosophy; they are recurrent problems of historical interpretation.

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present context, that any attempt to increase taxes threatened the privileges of the prosperous intermediaries upon whom the central government relied.

My general argument is that the Roman state provided a carapace under which relatively low levels of taxation made possible high private profits. The extent to which Roman private individuals grew rich in the conquered provinces (especially during the period of imperial expansion) is *prima facie* evidence of low rates of taxation. The lower the rate of taxation, the greater the private profit which could be exacted from a finite surplus.[63] And the lower the rate of taxation, the less effective was state supervision of private profiteering from public office. One special case of private profit-making was tax-farming. The Roman government auctioned the rights to collect taxes in the provinces; in this way, the government secured its revenues in advance and cut out some of the fluctuations caused by bad harvests. It transferred both the risks of tax-estimating and the administrative costs of tax-collection to private enterprise. Private investors speculated that, in spite of government supervision, they could nevertheless get more out of provincial tax-payers than they had themselves paid to the central government.[64] Tax-farming was a mechanism of transferring some of the profits of empire to investors, who belonged to the Roman élite and sub-élites, who were not directly involved in conquest (as soldiers) or in government (as senators).

Two developments deserve special attention. First, at the very end of the Republic and in the early Principate, the dominance of tax-farming as a method of tax-collection ended; tax-farming persisted, but in a subordinate role. This demise of tax-farming is almost universally considered as a symptom of moral progress under Roman imperial rule. Ironically, in post-feudal European economic history, the growth of corporate financing and private money-lending to kings is considered a fundamental element in economic growth. The collapse of private finance corporations in Rome meant that there were no institutions which could voluntarily offer private wealth as a buttress for state finances in an emergency. In contrast to post-feudal European economic history, it is worth noting that, as far as we know, the Roman state never borrowed from private individuals or institutions.[65]

A second development of even greater importance was the expansion of land-owning in the provinces by the Roman élite. This was a two-way process: Italians owned more land in the provinces, and more provincial land-owners entered the Roman élite.[66] One result was that members of the Roman élite in the High Empire were typically much richer than they had been in the Late Republic, as their average wealth increased to a level commensurate with the aggregate wealth of the enlarged empire.[67] It was a symptom of the integration of the imperial economy that rents, mostly money rents, were transmitted long distances from provinces, principally to the imperial capital where the élite consumed most. Transmitted rents and taxes had a similar impact on trade, but they were competing for a limited surplus. The higher rents were, the lower taxes had to be.

In an emergency, caused by a rebellion or by barbarian invasions or by an emperor's extravagance at Court, the government had to meet extra demands on resources by getting more money. Several solutions may seem obvious: spending stored reserves, confiscating the estates of the rich, increasing taxes, or debasing the dominant silver coinage. It is

[63] Not that the surplus was fixed in size. Indeed, the imposition of money taxes and rents probably made peasants increase the size of the surplus produced. But the potential for growth was narrowly finite. Private profit therefore competed with public exactions. I should stress that the concept surplus is 'objective': what was produced over and above minimum subsistence. Peasants may have wanted to consume it themselves; they probably did not regard it as surplus to their needs.

[64] Tax-farmers' charges presumably reflected their administrative costs, plus their risks, plus their interest charges on the capital which had been advanced to the Roman government, plus overcharging (loss). E. Badian, *Publicans and Sinners* (1972), in a sympathetic account, rightly stresses how difficult it would have been for the Roman state to administer its large new empire without private entrepreneurial help.

[65] Early in the reign of Vespasian, the senate voted to accept a loan of sixty million HS from individuals, but it was never taken up (Tacitus, *Histories* 4. 47).

[66] Senators in the early second century A.D. were formally required to hold one-third of their fortunes in Italian land (Pliny, *Letters* 6. 19); the proportion was later reduced to one-quarter (SHA, *Marcus Aurelius* 11).

[67] According to Pareto's law, the proportion of total wealth held by the wealthy minority in pre-industrial states is constant (see V. Pareto, *Cours d'économie politique* (1897), 964). Subsequent research has cast some doubt on the strict universality of the law. But it remains suggestive. We should expect the total wealth of Roman senators and knights to grow commensurately with the growth in the size and wealth of the empire.

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striking that Roman emperors in the High Empire, as far as we know, either never or only once raised the general rate of taxation.[68] But the silver coinage was repeatedly debased.[69] Recurrent debasement of the silver coinage was a tactic used to solve a recurrent dilemma: how to meet rising government expenditure, especially expenditure on the army, without a corresponding increase in government revenue. In the middle of the third century A.D., barbarian invasions and civil wars induced a headlong reduction in the silver content of coins from about 40 per cent in A.D. 250 to less than 4 per cent in A.D. 270 (compared with 97 per cent in the mid-first century A.D.). The volume of coins minted increased correspondingly. Rapid debasement brought with it a spiral of inflation, which particularly affected soldiers and government officials who were paid salaries in money. The exact sequence of events is obscure since our sources for the period are thin and unreliable. But the main outlines are clear.

The traditional fiscal system broke down. Debasement and inflation had not been matched by an equivalent increase in taxation; indeed, debasement had been used as a method of avoiding an increase in tax rates. As a result, the central government had insufficient money to meet its traditional obligations at current prices. The central government was no longer able to control the empire as a single political system; the spider's web of cash flow was broken (see Figure 4). Soldiers and government officials, at the local level, increasingly took it upon themselves to secure their own supplies, in kind. The central government, as a result, could no longer control local rates of taxation, although it continued to fulminate against abuses. And finally, as currency became the less valuable part of government revenues, the central government could no longer transfer significant amounts of money (which gave command over distant resources) from one end of the empire to another. The breakdown of central control over taxation, that is over the distribution of a large part of the surplus, was reflected in the formation of separate rival governments under a rapid succession of emperors, generals and kings in France, Britain, Egypt and Syria, as well as in Rome.

The collapse of the fiscal system left much economic behaviour untouched. Those with land, peasants and landlords alike, continued to get income from it. Peasants consumed much of their own produce themselves, while landlords could soon adjust rents to current prices, or express them in the more stable forms of wheat or gold or silver (by weight).[70] There was no general reversion from a money economy to what has been called a 'natural' economy. Mostly people traded in local markets in current coins, although we do hear of banks in Egypt more than once closing their doors and refusing to exchange the imperial currency at face value.[71] That said, the mid-third century was almost certainly a period of economic depression. General insecurity probably reduced the volume of inter-regional trade (see Figure 1); the Persians, for example, captured Antioch, while the Goths (Heruli) sacked Athens. In provincial towns, the number of charitable foundations and of incised tombstones dropped; so too did the number of new public buildings, except for defensive town-walls.

In spite of temporary fragmentation, the Roman empire survived as a single political system. The strong government of Diocletian and Constantine (A.D. 284–337) restored central control; they also institutionalized the changes of the previous half-century, notably, for the present discussion, the predominance of taxation in kind. The imposition of taxes in kind throughout the empire had far-reaching implications. First, food raised as

[68] So A. H. M. Jones, *The Roman Economy* (n. 44), 177; Suetonius, *Vespasian* 16: 'he increased tribute from the provinces'; and see n. 55 above. Silence is of course not proof.

[69] Emperors and their advisers do not seem to have realized the consequences of their repeated decisions to debase coins. But then in post-feudal Europe, when the consequences of debasement were roughly known, debasements still occurred, because of their short-term advantages. Cf. C. E. Challis, *Tudor Coinage* (1979); on Roman debasements see J.-P. Callu, *La politique monétaire des empereurs romains de 238 à 311* (1969) and A. H. M. Jones, op. cit., 187 ff.

[70] G. Mickwitz, *Geld und Wirtschaft im römischen Reich* (1932), 120 shows that the proportion of Egyptian land rents (N = 301) expressed only in natural produce rose considerably in the fourth century A.D. compared with previous centuries. And in northern Italy ritual fines for violators of graves, threatened on tombstone inscriptions, were in the early fourth century A.D. expressed in weights of silver and gold, instead of in coin as previously (*CIL* V, 8721 ff.); on which see T. Pekáry, 'Studien zur römischen Währungs- und Finanzgeschichte', *Historia* 8 (1959), 462.

[71] *P. Oxy.* 1411; cf. M. I. Rostovtzeff, *Social and Economic History of the Roman Empire*[2] (1957), 470 ff.

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tax cannot easily be transported as far as money; therefore, distances between tax-payers and tax-consumers had to be shortened. In the Late Empire, the establishment of a strategic military reserve stationed behind the frontiers and the reduction in the size of tactical units so that they were smaller than a legion made it easier to supply the army with taxes in kind raised locally. Secondly, the collection of taxes in kind involves more supervision than the collection of money taxes; there are, for example, more problems over quality, quantity and delivery.[72] We should therefore expect, and we do find, an increase in local bureaucracy, which incidentally helped to consume the taxes without transporting them too far. Thirdly, taxes in kind require no transformation of local surplus of food into goods of lower volume and higher value in nearby towns; so we should expect a lower level of artisan and trader activity in a regime relying on taxes in kind. And that is what we find. In the third century, there was a decline in trade and in towns, and by the fourth century there was a definite drop in the volume of silver currency in circulation. In my view, the changes which occurred in the third century A.D. help corroborate my hypothesis, that taxation in money in the High Empire stimulated trade.

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APPENDIX. THE COST OF THE ROMAN ARMY

Frank (*ESAR* v, 5) estimated the total cost of the Roman army in the reign of Augustus, excluding auxiliaries, at 245 million HS. Some details, such as the number of praetorians, the total pay of privileged soldiers (*duplicarii*) and of officers (centurions) and the cost of the navy are disputed. But two problems stand out: the pay of auxiliaries and the total cost of retirement bounties.

I am persuaded by M. Speidel, 'The Pay of the Auxilia', *JRS* 63 (1973), 141 ff., that auxiliary pay was probably five-sixths of legionary pay. Speidel cautiously reserved his position, and conceded that auxiliary pay was perhaps only two-thirds of legionary pay. But his is the most sensible explanation of two important papyri recording pay to soldiers in Egypt and is compatible with the third (see R. O. Fink, *Roman Military Records on Papyrus* (1971), 68–70). In general terms, auxiliary pay must have been at a level high enough to secure the recruitment of over 150,000 soldiers under arms, enlisted for twenty-five years' service. This level of recruitment precludes a rate of pay as low as one-third of legionary pay. In the rough calculation below, I have entered auxiliary pay as five-sixths of legionary pay, without making any complicated adjustments to allow for the fact that a large minority of auxiliaries were cavalrymen, paid at premium rates.

Secondly, retirement bounties: I mention them because it is not unknown for scholars to estimate the cost of retirement bounties by dividing the number of legionaries by the normal length of service (16, 20, and later 25 years) and multiplying by 12,000 HS. Did no Roman soldier die during military service? Did none receive promotion and so extra bounty? If we boldly assume that all soldiers were recruited on their seventeenth birthday, that no more died than would have died naturally (at $e_0 = 25$ years), then in an army of 150,000 men, 8,200 would survive after sixteen years' service, 6,000 after twenty years' service and 4,400 after twenty-five years' service. These figures from UN model life tables can only be rough estimates, but they reveal the fiscal pressure towards lengthening military service. The increase from sixteen years' service to twenty-five years' service almost halved the total cost of retirement bounties. At twenty years' service, with an army of 150,000 legionaries and with retirement bounties at 12,000 HS, the total annual cost was 72 million HS. Incidentally, are we sure that auxiliaries received no retirement gratuity? No source says so. Was it really possible to recruit equal numbers of troops to each branch of the army (auxiliary and legionary) with marked discrepancies of reward especially in the second century A.D., when many auxiliary recruits were already Roman citizens?

[72] For theoretical and comparative works, see Ardant, op. cit. (n. 28); R. M. Bird, *Taxing Agricultural Land in Developing Countries* (1974); see also S. N. S. Cheung, 'Private Property Rights and Share Cropping', *J. Pol. Econ.* 76 (1968), 1107–22, and C. Issawi, 'Farm Output under Fixed Rents and Share Tenancy', *Land Economics* 33 (1957), 74–7, for similar problems in relation to rent. The most sophisticated ancient discussion of taxation is in the speech attributed to 29 B.C. but written in the early third century by Cassius Dio (52. 28 ff.). One should also note the early Arabic treatises on taxation, dating from the eighth century A.D. onwards, which probably in part derived from lost Byzantine texts or from Byzantine practice. See Ya'qub ibn Ibrahim *alias* Abu Yousouf Ya'qoub, *Le livre de l'impôt foncier*, trans. E. Fagnan (1921), esp. 74–5, and A. Ben Shemesh (ed.), *Taxation in Islam* (1969) III, 100–1.

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However that may be, on the stated assumptions, in the first century A.D. the total cost of the army on Frank's estimate, with my two revisions, was:

	million HS
140,000 legionaries (126 million HS) plus officers, etc. (34 million HS)	160
150,000 auxiliaries at five-sixths legionary pay	133
Retirement bounty for 5,600 legionaries per year	67
Praetorians, urban cohorts (including bounties), ordnance, transport, navy	85
	445 (± 50) million HS

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