The Economy of the Early Roman Empire

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Why should economists be interested in the economics of ancient Rome? The Roman literature we read and the ruins we visit suggest that there was a flourishing and apparently prosperous economy two millennia ago. How did they do it? How was the Roman economy organized? Recent research suggests some answers.

I focus on the early Roman Empire. It followed the Roman Republic in 27 BCE with the development under Augustus of a monarchy known as the Principate. It was followed in turn by the late Roman Empire that began around 200 CE, when the failings of Imperial control led to political and economic instability and the subsequent decline of the Augustan Principate (Goodman, 1997). Most of the surviving literature comes from the late Republic or the early Empire; the ruins we see overwhelmingly date from the early Empire. I use evidence from the late Republic and early Empire, which appear to have witnessed widespread economic prosperity and possibly economic growth.

A prominent ancient historian estimated that the Italian peninsula was about 30 percent urbanized in the early Roman Empire (Hopkins, 1978, p. 68). Using urbanization as an index of per capita income suggests that GDP per capita in Roman Italy was comparable to that in the late 17th century in England and Holland, the most advanced European economies before the Industrial Revolution. This very rough index is supported by an equally rough calculation of real wages, defined as wages divided by the

price of wheat (Allen, 2001; Temin, 2005). It seems extraordinary that GDP per capita could have risen this high in the ancient world.

Roman Italy gained greatly by being at the hub of an empire and a large trading network, as England and Holland did much later. Rome imported food from around the Mediterranean, bringing in wheat, olive oil, and wine from as far east as Iberia and as far west as Egypt and the Middle East. The Roman economy of the first and second centuries CE was integrated enough for areas around the transportation network in the Mediterranean Sea to exploit their comparative advantages. This specialization appears to have promoted operating efficiency in agriculture and in processing industries (Greene, 2000).

Incomes were lower outside of Roman Italy, and it is hard to know how much lower. Ancient historians and Malthusian demographers like to speak of subsistence living, but we have learned that there is quite a range of subsistence income living. Lower incomes in this range lead to slow population growth or population decline, but not extinction unless famine conditions endure for a long time. Archaeological evidence of inhabitation indicates that population was growing in the early Roman Empire, suggesting that average provincial consumption was in the upper ranges of what we call subsistence living. Provincial incomes in the early Roman Empire then may have been in the range of European inland areas in the early modern period.

Incomes and assets were distributed highly unequally in the early Roman Empire. There was a very small elite group at the top of society and the economy, composed of "senators" and "knights" who had wealth—typically held as land—in excess of high limits. At the other end of the distribution were farmers and farm laborers, both free and

slave. In between, closer to the bottom than the top, was a group of skilled and often literate tradesmen and service workers who provided varied goods and services for senators and knights. This middling group was too small to be called a middle class; they are best considered as skilled workers. Any economic growth may have been captured disproportionately by the very rich, while poor people suffered when increased interregional contacts promoted disease.

This speculative comparison of Roman and later incomes does not indicate that the economy of the Roman Empire was an earlier version of early modern European economies. It differed in several important respects. Romans did not enjoy good health, and their life expectancy was far below that of early modern Europe (Frier, 2000). Not all Romans were sick, of course, but they lived in a high-disease environment. Malaria was a constant scourge in Roman Italy, extending from the valleys of Rome itself to the marshes south of the city that were not cleared until the 20th century (Scheidel, 1999; Sallares, 2002). The apparent cruelty and casual treatment of life that is so typical of Roman life may be partly a reflection of the uncertainty of life. The Romans also lacked printing, and information was far more expensive in ancient times than in early modern times. Economic historians have argued that the institutions of "open science" and the Enlightenment were important precursors of the Industrial Revolution (David, 1998, 2004; Mokyr 2002); such a path to industrialization would have been much more difficult without printing. In addition, the early Empire worked on a cash basis; there was no public borrowing. The Romans were not Protestants, and they used Roman numerals.

Nevertheless, it seems to violate our sense of Whig history to find that many Romans lived well. As tourists we marvel at the temples, baths, roads, and aqueducts

built by the Romans. As economists we want to know how they did it. I essay an answer here in several steps, starting with cautions about the underlying data and with the overall operation of the Roman economy. I then discuss factor markets, labor and capital. Finally, I return to the question of how the Romans prospered and the organization of trade.

All statements about the Roman economy are inferences from highly incomplete data. The Romans recorded most of their day-to-day transactions by incising the wax covering of wooden plates about the size of modern roof shingles. This was a highly perishable medium, and we have almost no written records of such transactions after two millennia. We therefore are dependent on four kinds of evidence: casual remarks about the economy in works of literature that have been preserved for other reasons, proclamations or directives important enough to be chiseled into stone, archaeological evidence, and papyri from Egypt that were durable in the dry climate of that land. There is a lot of information, but hardly any of what economists call data.

Our written sources typically are both indirect and late. They are indirect because they seldom are economic documents, but rather indications of economic activities in writings about other matters. Plutarch (*Cato Major*, 21.5-6), for example, described the character of a prominent Roman by saying that Cato (died 149 BCE) would invest in a shipping consortium only if the consortium owned 50 ships and he could take only one of at least 50 shares. This probably exaggerated observation suggests that Roman shipping was organized in shifting partnerships similar to those in colonial American shipping, although the 17th-century merchants never aspired to a partnership of anywhere close to 50 ships (Bailyn and Bailyn, 1959). The sources often are late because only copies or

transcriptions of earlier documents have survived. We know about Roman law principally through a sixth-century code made under Justinian, and historians debate how much of this code was operational during the early Roman Empire (Johnston, 1999).

Direct evidence therefore is exceedingly valuable. It comes in two forms. We find the occasional surviving economic document. The Muziris papyrus, for example, records a maritime loan of an amazingly large size for a voyage starting out in the Red Sea. The poor grammar of the record led the document's modern translator to infer that this was a standard form that a scribe was copying rapidly, indicating that maritime loans were common and that large loans were not unusual enough to require separate care (Rathbone, 2001). The second form of contemporary evidence is archaeological; buildings, aqueducts and ports, as well as durable products like glass, metal and pottery. Ubiquitous amphorae that held oil and wine, whose point of origin often can be determined with some precision, give evidence of shipping that spread throughout the Mediterranean, and even more common oil lamps indicate how many similar lamps were produced to extend the Romans' days (Peacock and Williams, 1986; Harris, 1980). The volume of Roman shipwrecks and pollution levels in Greenland ice provide independent evidence of economic activity in the early Roman Empire (Hopkins, 1980; Parker, 1992; Hong, et al., 1996; Saller, 2002).

For ancient Rome, therefore, the dictum that history is a fable agreed upon is more than usually apt. A problem with limited evidence is that historians who start from different vantage points may disagree. Previous generations of ancient historians divided into "modernists," who followed Marx as applied to ancient history by Rostovtzeff (1958), and "primitivists," who followed Polanyi as applied to ancient history by Finley

(1973). Ancient historians today universally argue that these positions are outmoded and counter-productive, but they frequently lapse into one position or the other when pushed. More moderate positions have been introduced by ancient historians with some social-science training, but economics has been neglected, perhaps because it has been hard for economists to learn enough about the ancient world or for ancient historians to learn economics. Ancient economic history is in its infancy.

This essay provides an economist's view of the Roman economy which emphasizes the role of markets. It is a variety of modernist view that argues that the Roman economy was more market oriented than the Medieval economy. It describes urban Rome better than rural and emphasizes the conditions of literate Romans as a result of our sources. It also synthesizes scarce information from across several centuries, implicitly assuming that the structure of the Roman economy was not changing very rapidly in a period longer than the entire history of the United States of America. Some ancient historians and archaeologists have been receptive to this economic point of view. Others disagree violently with it. This is partly training—the simple regression reported below was rejected as a fluke by referees for journals of Roman history—and partly a substantive disagreement about the nature of the Roman economy.[1]

How was the Roman economy organized? Polanyi (1977) asserted that there are three different ways to organize the economic functions of society: reciprocity, redistribution, and exchange. Reciprocity is an informal system in which people aim toward a rough balance between the goods and services they give and receive, with relative values determined by social obligations and traditions that change only slowly. Redistribution is a system in which goods are collected by a central authority and

distributed by virtue of custom, law, or ad hoc decision. It is present in units as small as households and as large as modern states levying taxes. Exchange is the familiar economic transaction where people voluntarily exchange goods for each other or for money. This tri-part schema corresponds also to a division of individual behavior. Customary behavior generally is used for reciprocity, command behavior is typical of redistribution, and instrumental behavior is used in market exchanges (Temin, 1980). We therefore can discriminate between the various kinds of organizations by examining both aggregate and individual behavior.

An obvious place to start is with the city of Rome and with the problem of obtaining food for its residents. The city's population in the early Roman Empire generally is estimated at about a million inhabitants. Rome therefore needed a lot of supplies—20 to 40 million *modii* of grain a year, about 150-300,000 tons, plus extensive supplies of oil and wine (Rickman, 1980, p. 10; Garnsey, 1988, pp. 191, 231.) It was far cheaper to ship food over sea than over land—as it would remain until the advent of the railroad. Grain was shipped across the Mediterranean to Rome from Sardinia, Sicily, Africa and Egypt (Erdkamp, 2005). Oil was exported to Rome from Spain and Africa (Mattingly, 1995).

If this grain was offered to Rome as tribute or had been commandeered directly by Roman authorities, then this movement of grain was redistribution. If this movement resulted from sales of grain by farmers, it was composed of a series of market exchanges even if the grain was purchased from tax revenues. Hopkins (1980) began his often-cited discussion of the Roman economy with the "unexceptional" proposition that most Roman taxes were paid in money. He noted that the obligations were too large for customary or

reciprocal actions to accomplish them. Taxes of grain in kind from Egypt and Africa were used for free distribution in Rome, the *annona*, but only a small part of the grain imported into Rome—perhaps 15 to 30 percent—was for free distribution (Sirks, 1991, p. 21; Erdkamp, 2005). Some grain therefore arrived in Rome as taxes in kind, but the bulk of grain imports were privately owned. Grain from far away, even when part of the *annona*, was shipped in privately-owned ships.

How extensive was the Roman grain market? Economists look first for prices, but they are very hard to find in ancient sources. When we do have continuous price series, for Baghdad in the three centuries before the start of the Roman Empire, they have the time-series properties of modern prices (Temin, 2002). Wheat prices for Rome are much rarer and corrupted by the presence of the *annona*, but occasional price quotations have survived. Given that wheat was grown in many places for both local consumption and shipment to major cities like Rome, prices in outlying areas should have been lower than in Rome, the largest location of excess demand for wheat.

Kessler and Temin (2005) compared prices in various places with contemporaneous prices in Rome. They found only a half-dozen such pairs over two centuries, but that was enough to regress the price difference on the distance from Rome. The apparent price stability for these centuries allowed the use of scattered prices over this long interval. The results are shown in equation 1 (with t-statistics below the coefficients):

Price differential (in *sesterces*) = 1.10 + .001 (distance from Rome) $R^2 = .79$

(2.2) (3.9)

Given the roughness of the data, it is surprising that a simple regression like this can explain four fifths of the variation of price differentials. Figure 1 provides the intuition, showing local prices less the contemporary Roman price; prices clearly were low far from Rome. Not only were there market transactions, but the entire Mediterranean area appears to have been linked together into a single market; the coefficient on distance is the cost of transporting wheat. There must have been times when transport was unavailable or when local harvests failed and various localities were separated from the general market, but we probably never will know how often that happened. In the absence of such impediments, there was a flourishing wheat market in the early Roman Empire.

The monetary system of Rome was based on the silver *denarius*. This coin became the ubiquitous penny of the Medieval period and survived into the 20th century as the "d" in the abbreviation for pennies in the English pounds-shillings-pence system. The *denarius* was divided into four bronze *sesterces*, which were the common unit of commerce in the early Roman Empire. *Sesterces* were divided in turn into four copper *asses*, and this Western set of coins was linked to an Eastern set by a fixed exchange rate. The silver *drachma* was the equivalent of the *sestertius*, and it was divided into six and later seven bronze *obols*. For calibration, one *modius* (6.5 kg) of wheat cost four to six *sesterces* (on the private market) in Rome during the first century CE, and the daily wage was between three and four *sesterces* (Temin, 2005). Scattered evidence suggests that prices were stable for the preceding century and may have only doubled in the succeeding one.

It is not enough to have widespread product markets to be a market economy. The Medieval economy had product markets, but only very rudimentary factor markets. We therefore infer that Medieval economic life was dominated by redistribution and reciprocity, with "islands" of market activity (Pirenne, 1925; Bloch, 1961; Epstein, 2000). It was, in the traditional distinction, *Gemeinschaft* rather than *Gesellschaft* (Tönnies, 1887). History has progressed to become an account of the shifting balance between them rather than the story of a total transition from one to the other, but the prevailing view is still one of unidirectional change (Bender, 1978). The Romans however appear to have had well functioning labor and capital markets in the early Roman Empire. Extensive factor markets of course promoted economic efficiency.

Some rural laborers were paid by piece rates; others, daily wages; there were salaried long-term free workers in Egypt in the early Roman Empire (Rathbone, 1991, pp. 91-166). Workers in large organizations like mines and galleys were paid wages as in more modern labor markets. Craftsmen sold their wares and also supplied them to patrons in return for long-term economic and social support. The episodic nature of monumental building in Rome was accomplished largely by free laborers and gives evidence of a mobile labor force that could be diverted from one activity to another (Brunt, 1980). Egyptian wages doubled after the Antonine plague in 165-75 CE in a clear labor-market response to a sharp decrease in the supply of labor (Duncan-Jones, 1996; Scheidel, 2002). Wages in the early Roman Empire apparently moved to clear markets, in this case to allocate newly scarce labor.

Employment contracts give evidence of labor-market activity. One dating from 164 CE shows that workers were paid only for work done and that they had more right to quit than many nineteenth-century workers (Steinfeld, 2001):

> In the consulship of Macrinus and Celsus, May 20. I, Flavius Secundinus, at the request of Memmius son of Asceplius have here recorded the fact the he declared that he had let, and he did in fact let, his labor in the gold mine to Aurelius Adjutor from this day to November 13 next for seventy denarii and board. He shall be entitled to receive his wages in installments. He shall be required to render healthy and vigorous labor to the above-mentioned employer. If he wants to quit or stop working against the employer's wishes, he shall have to pay five sesterces for each day, deducted from his total wages. If a flood hinders operations, he shall be required to prorate accordingly. If the employer delays payment of the wage when the time is up, he shall be subject to the same penalty after three days of grace (CIL III, p. 948 no. 10, translated in Lewis and Reinhold, 1990, Vol. 2, pp. 106-07).

Most free workers of course were farmers, typically tenant farmers, and Roman tenancy contracts allocated risks between landowners and tenants in very much the same way as analogous contracts did in 18th and 19th century England (Kehoe, 1997; Garnsey, 1998, p. 139). Major risks beyond the tenants' control were borne by the land-owners, while minor risks were borne by tenants in return for the opportunity to earn more and keep their earnings:

> Force majeure ought not cause loss to the tenant, if the crops have been damaged beyond what is sustainable. But the tenant ought to bear loss which is moderate with equanimity, just as he does not have to give up profits which are immoderate. It will be obvious that we are speaking here of the tenant who pays rent in money; for a share-cropper (*partiarus colonus*) shares loss and profit with the landlord, as it were by law of partnership (Gaius, *D*. 19.2.25.6, quoted in Johnston, 1999, p. 64).

The army must be distinguished from private activities, as it must in modern economies. The wages of the Roman army stayed constant for many decades at a time, and it was staffed by a mixture of attraction and conscription. When the army was not fighting, which was most of the time in the early Roman Empire, soldiers built roads and

public monuments near where they were stationed. This construction activity did not interfere with the labor market in Rome or elsewhere in the center of the empire since the army was stationed at the frontiers (G. Watson, 1969, p. 45; Brunt, 1974).

The chief evidence for the absence of a labor market in the early Roman Empire has been the presence of slaves. Slaves appear to be like soldiers with activities directed by commands and disobedience punished severely, but this is inaccurate for slavery in the early Roman Empire, particularly in cities. Slaves were able to participate in the labor market of the early Roman Empire in almost the same way as free laborers, although their starting point often was less favorable.

To document this assertion it is necessary to differentiate slavery in two dimensions. The first dimension comes from anthropologists, who distinguish between open slavery in which slaves can be freed and accepted fully into general society, and closed slavery in which slaves are a separate group, not accepted into general society and not allowed to marry among the general population when freed. Roman slavery conformed to the open model; freedmen were Roman citizens, and marriages of widows with freedmen were common. By contrast, "American slavery [was] perhaps the most closed and caste-like of any [slave] system known (J. Watson, 1980, p. 7)." Modern New-World slaves came from another continent and were hard to integrate into Euro-centric American society.

The second dimension along which slavery can vary is the frequency of manumission. Frequent manumission was a distinguishing feature of Roman slavery; slaves in the early Roman Empire could anticipate freedom if they worked hard and demonstrated skill or accumulated a *peculium*, money "owned" by slaves, with which to

purchase freedom. Once freed, they were accepted into Roman society far more completely than the freedmen in closed systems of slavery. The promise of manumission was most apparent for urban, literate slaves, but it pervaded Roman society.

We do not know how often Roman slaves were freed, but Scheidel (1997) argued that about ten percent of slaves in the early Roman Empire were freed every five years starting at age 25. The rate of manumission in early 19th-century Louisiana was about one percent of slave sales in each five-year period, an order of magnitude less than Scheidel assumed for the early Roman Empire. Many of those freed slaves were children under ten, and the majority of the adults freed were women—presumably the children's mothers (Hall, 2000; Cole, 2005). Fogel and Engerman (1974, p. 150) reported even lower manumission rates in the southern United States at mid-century: just 0.2 percent of slaves in a five-year period, two orders of magnitude lower than Scheidel's reasonable guess for Rome. American slaves, and particularly male slaves, had little anticipation of freedom.

All people, even slaves, need to have incentives to do their work. These incentives may be classified as positive or "carrots" (rewards for hard or good work) and negative or "sticks" (punishment for slacking off or not cooperating). Negative incentives dominated the hopeless lives of modern slaves in the Americas. By contrast, positive incentives were more important than negative in motivating Roman slaves that had the possibility of attaining freedom and Roman citizenship. Sticks can get people to work, but not to overcome the moral hazard in skilled tasks that require independent work (Fenoaltea, 1984). Consider a managerial job, like a *vilicus*, the manager of a Roman farm. A slave in such a position motivated by negative incentives could claim

that any adverse outcomes were the result of bad luck, not his actions. Exacting punishment would lead to resentment rather than cooperation and—one confidently could expect—more "bad luck." A *vilicus* motivated by positive incentives would anticipate sharing in any "good luck"; he would work to make it happen. An ordinary field hand's effort could be observed directly and slackers could be punished straight away. Since field hands typically work in a group, positive incentives that motivate individuals to better efforts also are hard to design.

Roman slaves worked in all kinds of activities; rural slave jobs were as varied as the known range of urban or household free jobs (Bradley, 1994, pp. 59-65). Positive incentives were needed to elicit effort in these many occupations. In fact, for some poor people in the early Roman Empire, the life of a slave appeared better than that of a free man. Ambitious poor people sold themselves into slavery as a long-term employment contract that promised, however uncertainly, more advancement than the life of the free poor (Ramin and Veyne, 1981, p. 496). This action would have been inconceivable in a closed system of slavery built on negative incentives. It was like the processes of apprenticeship and indenture in early modern Europe, and it reveals the integration of Roman slavery into the overall labor market.

The state set rules for manumission and left the decision of which slaves to free to individual slave owners, who could use this possibility to encourage the most co-operative and productive slaves. Slaves often were able to purchase freedom if they could earn the necessary funds, which served as a tangible measure of slave productivity, and the right of slaves to accumulate and retain assets in a *peculium* was an important part of the incentive structure of slaves. If a slave was sold or freed, he kept his

peculium, even though slaves technically could not own property. Slaves even owned slaves; a document from London around 100 CE reports that a Gallic slave-girl called Fortunata was sold for 600 *denarii* to Vegetus, a slave and also a Roman official in London (Tomlin, 2003, p. 49). As Gibbon (2003, p., 36) elegantly phrased it: "Hope, the best comfort of our imperfect condition, was not denied to the Roman slave; and if he had any opportunity of rendering himself either useful or agreeable, he might very naturally expect that the diligence and fidelity of a few years would be rewarded with the inestimable gift of freedom."

There was cruelty in ancient slavery, as there was in early modern indenture. This cruelty has been described often because it contrasts sharply with our modern sense of individual autonomy, but cruelty was a hallmark of the early Roman Empire as it has been of most non-industrial societies. The miserable condition of slaves working in the bakery overseen by Apuleius' golden ass (*Golden Ass*, 9.2) do not illustrate the harsh conditions of Roman slavery, but rather the dismal conditions of ordinary labor in pre-industrial economies.[2]

Freedmen were accepted into Roman society on an almost equal basis. They were granted Roman citizenship, and the continued association of freedmen with former masters worked to their mutual benefit. Slaves retained the names of and connections with their former owners and could be identified as members of their owners' family (Garnsey, 1998, pp 30-37). When people engaged in trade or made arrangements for production, they needed to know with whom they were dealing to assure satisfactory completion of any transaction. This need was filled partially by identifying people as members of families, with an implicit guarantee of quality by other members of the

family. This identification helped former slaves to operate in the economy, and a productive freedman increased the reputation and income of his former owner and his family. Freedmen could marry other Roman citizens, and children of freedmen were accepted fully into Roman society. Their children could be town councilors (decurions), and their grandchildren could be "knights" (Garnsey and Saller, 1987, pp. 113-14). As a noted ancient historian stated: "The disproportionately high representation of freedmen among the funerary inscriptions from Italian cities reflects the fact that ex-slaves were better placed to make a success of themselves in the urban economy than the freeborn poor: upon manumission many of the ex-slaves started with skills and a business (Saller, 2000, p. 835)."

Education is the key to the nature of Roman servitude. American slave owners relied on negative incentives and discouraged the education of slaves because they were afraid of slave revolts. Ancient slave owners used positive incentives and encouraged slaves to be educated to perform responsible economic roles. Education increased the value of slave labor to the owner, and it increased the probability that a slave's children would be freed. Educated slaves had the skills to accumulate a *peculium*, and they would be good business associates of their former owner. Cato educated slaves for a year and then sold them in a sort of primitive business school (Plutarch, *Cato Major*, 21). Anyone who tried that with modern American slaves would have been jailed and fined. The Virginia Code of 1848 extended to freedmen as well as slaves: "If a white person assemble with Negroes for the purpose of instructing them to read or write, he shall be confined to jail not exceeding six months and fined not exceeding one hundred dollars (*Va. Code* [1848], 747-48)."

Skilled slaves were valuable to merchants and rich people because they could act as their agents in the same way as their sons. Roman law famously lacked a law of agency; contracts in general only bound the contracting parties. Roman jurists however provided a variety of legal categories in which agency contracts were binding. Sons and slaves from a merchant's household could make binding commitments for a *peculium*, and the law of slavery (and sons) was a framework for agency: "Whatever children in our power and slaves in our possession receive by *manicipatio* or obtain by delivery, and whatever rights they stipulate for or acquire by any other title, they acquire for us (Gaius, *Inst.* 2.87)." Slavery was the most common formal, legally enforceable long-term labor contract in the early Roman Empire. A person with a long-term relation to a principal would be his or her most responsible agent, and slaves were at least as valuable as free men for commercial agents, shown by the frequent references to slave agents in the surviving sources (A. Watson, 1987, p. 7; Lintott, 2002).

We typically do not have wages for slaves, although some slaves must have earned wages to accumulate a *peculium*, but the preceding discussion indicates that slaves were interchangeable with free wage laborers in many situations. While the evidence on monthly and annual wages comes largely from Egypt, and our information on slaves comes mostly from Italy, slaves appear even more interchangeable with salaried workers. In fact, Roman slaves appear to fit Hicks' view of Roman slaves as long-term employees (Hicks, 1969, Chapter 8). Slaves were part of an integrated labor force in the early Roman Empire, with better conditions and more integration for urban slaves.

Turning from the Roman labor force to the Roman financial market, we ask whether Roman investors could make use of financial intermediaries, that is, to what

extent banks were present in the early Roman Empire.[3] I discuss loans in general and progress to banks.

Romans loaned money to each other with great frequency (Kehoe, 1997, pp. 45-54). While some of these loans were to finance consumption, others were for production. Columella (died around 70 CE) advised people setting up vineyards to include the interest on invested money among their costs as a matter of course:

> And if the husbandman would enter this amount as a debt against his vineyards just as a moneylender does with a debtor, so that the owner may realize the aforementioned six per cent. interest on that total as a perpetual annuity, he should take in 1950 *sesterces* every year. By this reckoning the return on seven *iugerum*, even according to the opinion of Graecinus, exceeds the interest on 32,480 *sesterces* (*On Agriculture*, 3, 3, 7-11).

Columella clearly understood that investors need to think about the opportunity cost of invested funds, whether borrowed or not. His advice shows financial sophistication in addition to suggesting that loans may have been used to promote productive investments.

Many loans were made to finance trade. Merchants typically were at the center of European capital markets before the Industrial Revolution, and they appear to have been in antiquity as well. Loans were used extensively to finance maritime trade in classical Athens, and maritime loans appear to have been widespread as well in Rome, albeit not as well documented. The Muziris papyrus was identified as a master contract for a standard maritime loan of the early Roman Empire, as noted above. This particular loan was for a shipment worth seven million *sesterces*, twenty times the size of Columella's hypothetical agricultural investment—and seven times the minimum property requirement to be a senator (Andreau, 1999, pp. 54-56; Rathbone, 2001).

Roman merchants and shippers were able to borrow conditional on a safe return. The interest rate charged was higher than usual and not subject to the normal limitation of

one percent per month in an explicit acknowledgement that the payment included both interest and insurance: “Money lent on maritime loans (*traiecticia pecunia*) can bear interest at any rate because it is at the risk of the lender as long as the voyage lasts (Paulus, *Sent*. II, xiv, 3, quoted in de Ste. Croix, 1974).”

The commercial nature of these loans indicates that they were extended to business associates, not just to friends or relatives, but markets in ancient times were far from the anonymous markets of today. Land-owners and merchants were known at least by reputation to moneylenders. They constituted the kind of loose commercial groups known from other agricultural economies. Loans were numerous enough for commentators to speak of a market rate of interest separate from the rate on any particular loan, which has meaning only if it was possible for people to borrow at this rate more or less on demand. Cicero commented that “interest [rates] went up on the Ides of July from 1/3 to 1/2 percent [per month] (Cicero, *Atticus*, 4, 15, 7).” There also was “a 60 per cent drop in interest-rates after Augustus brought back treasure from Egypt (Duncan-Jones, 1994, p. 21).”

More often we see loans at one percent a month or 12 percent per year. This was the official maximum, and it appears to be the default rate on many loans (Bogaert, 2000). The presence of so many loans at this fixed rate indicates that this market probably was not a totally free market rate, for the random movement of a market rate would not return to any given value so often. It also does not mean the opposite, that interest rates could not vary. We find many examples of interest rates below 12 percent as just noted and even have examples of rates above 12 percent. Livy (*History*, 35, 7) reported that prohibitions against higher rates were evaded in the Roman Republic by

transferring the loans to foreigners who were not subject to rate restrictions. This has a modern ring to it both because of the picture of financiers evading regulations by going "offshore" and because it appears to have been easy to transfer ownership of commercial loans among interested parties.

Loans are one thing; banks are another. Banks in Greece before the Roman conquest continued in operation after the Romans came. The most famous banks were on Delos, where there were both temple and private banks. The Temple of Apollo made loans with houses as security, what we now would regard as mortgages. There can be no doubt that these institutions were what we call commercial banks (Reger, 1992).

Argentarii in Rome received deposits and made loans. Some deposits were sealed and did not pay interest, while others were not sealed and paid interest (Andreau, 1987, pp. 538-44). Lucius Caecilius Jucundus may be the most famous Roman banker, since the rapid burial of Pompeii preserved some of his transitory records. He received goods on consignment, made arrangements for their sale, paid merchants when goods were sold, and loaned money to purchasers. Since Jucundus was not a merchant, where did he get the capital to lend money to purchasers? There is only one surviving tablet showing Jucundus holding a deposit, but if he held deposits like other *argentarii*, he was a banker (Andreau, 1974).

Another group of tablets provides a window into the economic affairs of the Sulpicii, businessmen from Puteoli, in the middle of the first century CE. The tablets provide direct evidence of commercial loans extended to facilitate trade through the port of Puteoli. The Sulpicii obtained money to lend from the households of the Emperor and senators, represented by slaves and freedmen; one Imperial slave loaned the Sulpicii

94,000 *sesterces*. The Sulpicii clearly were acting as a financial intermediary, that is, as a bank, since the risks of individual loans were borne by the Sulpicii, not the Emperor (or his slave). Like most other ancient banks, the Sulpicii were what we call a private bank today, composed of a partnership of closely related individuals (Camodeca, 1992; Andreau, 1994).

Cicero noted the interconnection of financial markets around the Roman world, describing conditions in 66 BCE by reference to events twenty years earlier:

> For, coinciding with the loss by many people of large fortunes in Asia, we know that there was a collapse of credit at Rome owing to suspension of payment. It is, indeed, impossible for many individuals in a single State to lose their property and fortunes without involving still greater numbers in their ruin. Do you defend the commonwealth from this danger; and believe me when I tell you—what you see for yourselves—that this system of credit and finance which operates at Rome, in the Forum, is bound up in, and depends on capital invested in Asia; the loss of the one inevitably undermines the other and causes its collapse (*Pro lege Manilia*, 7, 19).

This passage clearly talks of linked financial markets. It is possible that all these connections were made by loans from one individual to another, but it is far more likely that Roman loans to Asia were done by making use of banks like the Egyptian one that reported in 155 CE: "Paid into the bank of Titus Flavius Eutychides by Eudaemon, son of Sarapion, and partners, overseers … for the rent of the 17th year, one talent and four thousand drachmae [10,000 *sesterces*], on condition that an equivalent amount should be paid at Alexandria to the official in charge of the *stemmata*, total of 1 tal., 4000 dr. (*P. Fayum* 87 in Grenfell, et al., 1900, pp. 220-22)."

Tax farmers, *publicani*, often organized into joint-stock companies, *societates publicanorum*, transferred money by means of bank drafts. Taxes collected and not yet spend were the property of the government, and the *societates* of the *publicani* were

obligated to pay interest for their interim use. The Senate however allowed tax farmers to keep the interest, perhaps as payment for the banking services provided. This procedure amounts to the government holding demand deposits in tax-farming companies, interest on which was paid in services rather than cash. Cicero accused a provincial governor of stealing the foregone interest from the tax farmers! Tax farming is well documented in the late Republic. It continued into the early Empire and appears to have been replaced eventually by direct tax collection (Cicero, *Verrine Orations,* 2.3.165-68; Badian, 1972, p. 76-78; Malmendier, forthcoming).

Endowments were not banks, but they extended loans like banks. They received resources that were used to fund various sorts of religious activities. When these resources were in the form of money, as they often were, then the funds had to be loaned out to earn interest and support the activities of the endowment. In one inscription from the reign of Antoninus Pius, the donor gave 50,000 *sesterces* in coin to the Collegium of Aesculapius and Hygeia near Rome with instructions to the 60 members of the association to loan out the funds and use the returns to fund their feasts and other activities (*CIL*, 6, 10234). This explicit injunction must have been a normal, if implicit, one for all endowments financed with a cash donation. Unlike banks in 18th century England, clustered almost exclusively in London, temples and endowments were spread among the minor cities of the early Roman Empire (Sosin, 2001).

Financial systems in early modern England and the Dutch Republic were dominated by government borrowing. Government loans provided collateral which aided a system of credit intermediation to develop. The Roman Empire did not borrow; it ran on a cash basis. In order for the imperial government to avoid borrowing, it needed to

accumulate tax returns for future expenditures. We know these balances were loaned out from an exchange of letters between Pliny the Younger and Trajan in 109 or 110 CE, when Pliny was a provincial governor in Asia Minor. Pliny (*Letters*, 10, 54) wrote that tax revenues were accumulating at the local government, but that they might lie idle because no one wanted to borrow at the offered rate of nine per cent.[4]

Pliny asked the Emperor if he should allocate the funds to town councilors by fiat. Trajan responded, "I see no other method of facilitating the placing out of the public money, than by lowering the interest.… To compel persons to receive it, who are not disposed to do so, when possibly they themselves may have no opportunity of employing it, is by no means consistent with the justice of my government (Pliny, *Letters*, 10, 55)." This interchange reveals that local governments holding government revenues for future uses loaned out this money as a matter of course; Pliny wrote to avoid having the funds sit idle in some strong box. Trajan's response was to choose a market solution over an administrative one, and his imperial directive had the force of law.

Markets of course promote efficiency, and their existence in Roman times suggests that many resources were used well in the early Roman Empire. They however do not indicate how there were enough resources to make Roman incomes comparable to those in early modern Europe. One way to explore this question is to consider various factors that might have enriched the Romans. The usual suspects are technology and education, to which we need to add the spoils from conquest. In line with recent work on more recent economic growth, we progress to consideration of political conditions and legal frameworks.

It is common to disparage Roman technology; they clearly did not have anything resembling the Industrial Revolution. This however is not the relevant question for a comparison with the period before that major change, and the Romans did make many improvements in their technology. Their most impressive innovation was the Roman arch, giving rise to internal spaces like temples and baths, and extensive public works like aqueducts and theaters; Roman cities—almost all on the same pattern—are still a marvel.[5] More important for economic growth was progress in agriculture. Water-power was used on a wide scale and in diversified forms by the first century CE, and the use of mechanical technology to perform economically critical work had an important impact on economic performance in the last century BCE and the first two centuries CE (Wilson, 2002).

The upper classes were educated in Rome, as were many urban slaves, as noted above. We of course do not have literacy data, but the prevalence of written records suggests that literacy was widespread enough to be assumed by participants in economic transactions (Harris, 1989). Literacy rates in 18th century England were not high by contemporary European standards, and we do not know how much literacy was needed to promote growth in agrarian societies. Literacy appears to have been universal for any Roman in a managerial role, and may have extended to skilled workers as well. Graffiti on the walls of Pompeii confirm this view. They range from political plugs ("The goldsmiths unanimously urge the election of Gaius Cuspius Pansa as *aedile*.") to small business notices ("A copper pot is missing from this shop. 65 *sesterces* reward if anybody brings it back.") to a prostitute's sign ("I am yours for 2 *asses* cash.") to what we now think of as graffiti ("Take your lewd looks and flirting eyes off another man's wife, and

show some decency on your face!").[6] Rome was a literate society, and that undoubtedly helped raise incomes.

The city of Rome was the center of a large empire, and the Romans managed to bring a lot of the empire's assets to Rome, whether as booty, slaves, or taxes. This concentration of assets explains why Roman Italy was richer than other parts of the Roman Empire, but it cannot explain why the Empire as a whole was productive. If we assume that the wealth was held by senators and knights, while other Romans in Italy and elsewhere earned the same, then average Roman incomes in Italy were just under twice those in the rest of the Empire (Goldsmith, 1984). That seems like a bigger GDP gap than between England and continental Europe in 1700, although not greater than the range of urban real wages between London, Antwerp and Amsterdam on the one hand and other continental cities on the other (Maddison, 2001, p. 264; Allen, 2001). The evidence is sparse, but not inconsistent with the view that incomes in the early Roman Empire were comparable to those in late 17th century Europe.

The early Roman Empire also had political institutions that promoted economic activity. Primary among these assets was security for private individuals. When there is no state and violence is endemic, economic progress cannot take place. When one group acquires power over the others, the first form this is likely to take is of a simple protection racket. Economic progress at this time is likely to be better than under Hobbesian chaos, but still not good. Over time, however, the original rulers may be replaced by more pacific ones, as the increasing order lets non-violent leaders emerge. At that time, serious economic growth may take place. Greek city states had created political conditions that promoted local stability, but the Romans were the first to

establish a wide area within which business could be transacted relatively safely. The Roman Republic expanded what would become the *Pax Romana* as its conquests mounted, and it cleared the Mediterranean of pirates in 67 BCE. Ensuring the safety of economic actors is the first step in creating an environment conducive to economic growth. The power of the Roman government was exercised at the street level by a series of local officials like *aediles* and magistrates (Nippel, 1995).

The next step is to have a legal framework for business. Roman law is well known; it was the basis for many modern European legal systems. It originated in the Twelve Tables in the fifth century BCE and grew largely as common law during the Roman Republic. The "classic period" of Roman law is roughly the period of the early Roman Empire, and I have cited Roman laws repeatedly in this description of the economy. Roman lawyers, known as jurists, appear to have been more like modern judges in their interpretation of received law and its application to specific circumstances. Roman law was used throughout the early Empire, undoubtedly mixed with local laws. Roman law however appears to have had primacy in the provinces, both because of the influence of Roman governors and other administrators and because it was considered to supersede local customs (Johnston, 1999).

These observations are general and impressionistic. They are being used to explain a very imprecise measure of Roman income. The rough income measures suggest that per capita income in Roman Italy was near that of Western Europe in the early modern period. These observations on underlying causes do not contain any metric, and we do not have precise comparisons. Yet it seems clear that prosperity was widespread in the early Roman Empire and that these factors must have contributed to it. The serious job

of comparing Roman institutions and practices to those of early modern Europe has just begun.

To set these general observations of the Roman economy in context, I return briefly to the organization of the wheat trade whose results were shown earlier. As noted above, the wheat market was mostly private with a healthy mixture of government involvement; the line between public and private often was far from clear. Wheat merchants and traders clearly made use of agents, maritime loans, and the legal framework described already; other legal and financial provisions appear designed for various kinds of merchants. *Actiones institoriae* and *actiones exercitoriae* allowed ship captains and agents to commit principals. *Actiones adiecticiae qualitatis* provided a legal basis for more complex delegation of authority and responsibility (di Porto, 1984; Aubert, 1994; Johnston, 1999).

There were in addition practices specific to the wheat trade, both public and private. Receipts identified to whom a wheat cargo belonged, to whom it was being shipped, and specific attributes of the grain, such as the year of harvest and the quality of the product. Some receipts existed in triplicate and were sent to different offices, providing evidence of a system of quasi-permanent record-keeping. Merchants also used other alternatives, such as the labeling of cargo, to assist them in controlling the behavior of agents. In addition, grain merchants sent sealed pots or pouches containing a sample of the grain cargo on trading ships throughout the late Republic and early Empire. When the cargo arrived at its destination, the recipient could open the sealed container and test the grain in it against the grain in the ship's main hold; any difference suggested that the bulk of

the grain had been doctored in some way. These seals were signed by the granary official and a merchant, with an additional signature from a witness (Rickman, 1980, pp. 121-22).

Informal Roman institutions also proved useful in addressing problems of incomplete information. Agents and principals typically came from the same elite social groups, and their informal relations supported and aided their commercial transactions. The primary physical institution for grain information exchange in Ostia was a large building with a colonnade surrounded by many small offices that housed numerous types of merchants, promoting the casual communication between merchants (Meiggs, 1973, pp. 284-88). This public coordination could be found among the Maghribi traders a millennium later (Greif, 1994, pp. 923-24).

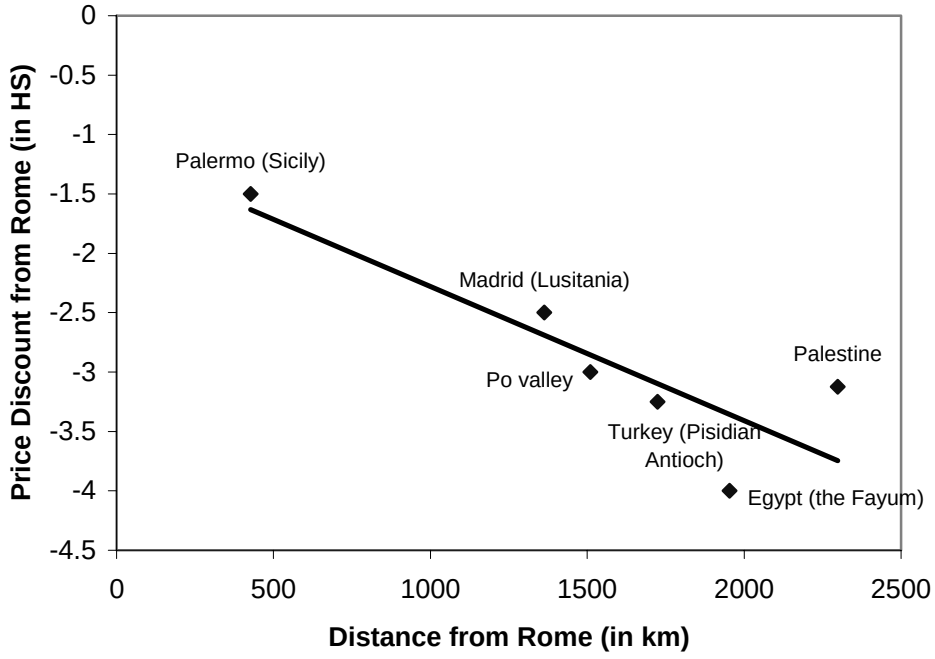
Various authors have presented an economy of friends as a substitute for a more formal market, but in fact they are complements. As noted earlier, families, extended households of slaves and freedmen, and friends were used to reduce the extent of adverse selection and the opportunity for moral hazard. A legal historian concluded, "These were relations that never reached the inside of a courtroom. Their entire tone precludes contract and suit, action and liability; yet they were most effective in fulfilling the roles and needs lawyers associate with agency (Kirschenbaum, 1987, p. 180)." An ancient historian added, "Little of what we have found can be considered unique for the Roman economy (Verboven, 2002, p. 351)."

Even though the Roman economy differed from early modern European economies in many respects, it appears more similar to our economy than the Medieval economy. Large-scale production and movements of resources were dominated by markets, although redistribution and reciprocity were present as well. This mixture of modes is

present even today; the important characteristic of the Roman economy was its market orientation. This mode of organization promoted trade and the exploitation of comparative advantage, helped by political stability, personal security, and widespread education. All this undoubtedly contributed to the prosperity of the early Roman Empire, at least for the upper classes, which was not to be equaled in the West for almost two millennia thereafter.

Inflation accelerated in the third century CE, visible to us through debased coinage and occasional price quotations (Harl, 1996; Rathbone, 1997). Prices may have doubled in the second century, possibly in a discrete jump after the Antonine Plague in the late second century; the rate of inflation after 200 CE appears to have been far higher. Banks were the canaries in the Roman market economy, and they disappeared by the start of the third century. *Argentarii* had little reason to puzzle out the difference between real and nominal interest rates before 200; we infer that they were unable to do so fast enough after then to survive. Diocletian's *Price Edict* (Lewis and Reinhold, 1990, Vol. 2, pp. 422-26), one of several attempts to stem the inflation, reveals that many markets still were operating around 300 CE, but taxes in kind multiplied, and command economies grew. By the time of the Dark Ages, there were still markets, but no longer a market economy (McCormick, 2001). Roman agricultural technology and city planning were abandoned, education decreased, and long-distance trade in bulk commodities vanished. Roman law was forgotten in Europe for close to a millennium, and the *Pax Romana* ended with the early Roman Empire.

Figure 1: Relationship between Distance and Wheat Price Discount



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Notes

[1] I summarize research reported in Temin, 2001, 2004a, 2004b, and 2005; Kessler and Temin, 2005, and forthcoming.

[2] Garnsey, and Saller, 1987, p. 119, used this example to show the conditions of Roman slaves at one end of the spectrum of slave experience. Garnsey (in conversation) recommends "Bread and Roses," a movie about a Latina janitor in Los Angeles, as a good guide to the conditions of urban Roman slaves.

[3] Ancient historians and modern economists fortunately employ the same definition of a bank (Cohen, 1992, p. 9; Mishkin, 2003, p. 8).

[4] To give the flavor of research in the ancient world, I note that the interest rate in this letter is unclear from the Latin: *duodenis assibus*. This might refer to 12 out of 16 *asses* to a *denarius*, meaning ¾% a month, or 9% annually, for a loan of 100 *denarii*; or it might mean 12 *asses*, one a month, indicating the maximum legal rate of 12% for a loan of 100 *asses*. The lower rate appears more likely because it fits with the normal practice of quoting rates on a monthly basis. See Billeter, 1898, p. 105.

[5] "The Rome of 100 A. D. had better paved streets, sewage disposal, water supply, and fire protection than the capitals of civilized Europe in 1800 (Mokyr, 1990, p. 20)."

[6] These examples come from the collection of translated evidence in Lewis and Reinhold (1990), Vol. 2, pp. 237, 277-78.