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Source: *The Journal of Economic Perspectives*, Vol. 20, No. 1 (Winter, 2006), pp. 133-151
Published by: American Economic Association
Stable URL: http://www.jstor.org/stable/30033637
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Journal of Economic Perspectives—Volume 20, Number 1—Winter 2006—Pages 133–151

The Economy of the Early Roman Empire

Peter Temin

Many inhabitants of ancient Rome lived well. Tourists marvel at the temples, baths, roads and aqueducts that they built. Historians write, "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). Economists also want to understand the existence of a flourishing and apparently prosperous economy two millennia ago. Market institutions and a stable government appear to have been the combination that produced this remarkable result.

The evidence for this assertion unhappily is very limited, and historians who start from different vantage points easily can disagree with one another. Ancient economic history is in its infancy, both because few economists have learned much about the ancient world and because ancient historians have typically not incorporated economics into their analysis. This essay provides an economist's view of the Roman economy that emphasizes the role of markets. Some ancient historians and archaeologists have been receptive to this economic point of view, while others disagree strongly with it.[1]

I focus on the early Roman Empire, which followed the Roman Republic in

[1] 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 counterproductive, but they frequently lapse into one position or the other when pushed. This essay argues that the Roman economy was more market-oriented than the medieval economy. I summarize research reported in Temin (2001, 2004a, 2004b, 2005) and in Kessler and Temin (2005, forthcoming), where fuller documentation can be found. For an archeological refutation of Finley's views consistent with the positions argued here, see Greene (2000).

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27 BCE with the development under Augustus of a monarchy known as the Principate. The early Roman Empire 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 (Goodman, 1997).[2] Most of the surviving Roman literature comes from the late Republic or the early Empire; today's Roman ruins overwhelmingly date from the early Empire. I offer evidence from the late Republic and early Empire of widespread economic prosperity and possibly economic growth.

I begin with some indications that suggest that the standard of living in ancient Rome was similar to that of early modern period of seventeenth- and eighteenth-century Europe, an extraordinary achievement for any economy in the ancient world. I then argue that ancient Rome managed to achieve this high standard of living through the combined operation of moderately stable political conditions and markets for goods, labor and capital, which allowed specialization and efficiency. After surveying the labor and financial markets in turn, I return to the broad questions of how the Romans prospered and the economy appears to have grown.

Before exploring these themes, I need to explain why 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 oblongs about the size of modern roof shingles. This medium was highly perishable, 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, for example, described the character of a prominent Roman by saying that Cato (who died in 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 seventeenth-century merchants never aspired to a partnership of anywhere close to 50 ships. 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 (an important emperor of that time), and historians debate how much of this code was operational during the early Roman Empire.

Direct evidence therefore is exceedingly valuable. It comes in two forms. We

[2] Many historians now use BCE for "Before the Common Era" and CE for "Common Era," rather than the using the abbreviation BC ("Before Christ") and AD or "Anno Domini" ("in the year of the Lord"). BCE and CE are thought to be more descriptive and less rooted in one theological tradition.

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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 has 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. 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 olive 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 that many similar lamps were produced to extend the Romans' days. The volume of Roman shipwrecks and pollution levels in Greenland ice cores dated to the Roman period provide independent evidence of economic activity in the early Roman Empire by providing evidence of peaks in metallurgical activity (like silver and copper smelting) and maritime trade (Hopkins, 1980; Hong, Candelone, Patterson and Boutron, 1996; Saller, 2002).

The Standard of Living in Ancient Rome

A prominent ancient historian estimated that the Italian peninsula was about 30 percent urbanized in the early Roman Empire (Hopkins, 1978, pp. 68–69). Using urbanization as an index of per capita income (as is routinely done in the economic history of recent centuries, including David, 1967; Craig and Fisher, 2000, pp. 113–118; and Acemoglu, Johnson and Robinson, 2002) suggests that GDP per capita in Roman Italy was between that in 1700 in the Netherlands and Italy or Spain, the most advanced European economies a century before the Industrial Revolution.[3] This very rough index is supported by an equally rough calculation of urban real wages, defined as wages divided by the price of wheat (Allen, 2001; Temin, 2005). We of course would prefer to have a broader index of the cost of living, but Roman price data are very scarce.

Incomes were lower outside of Roman Italy, but it is hard to know how much lower. Ancient historians and Malthusian demographers often speak of "subsistence living," but subsistence income is more a range than a discrete level. Lower incomes in this subsistence range lead to slow population growth or population decline, but not extinction unless famine conditions endure for a long time. Archaeological evidence of urban growth indicates that population was growing in the early Roman Empire, suggesting that average provincial consumption was at least in the upper ranges of subsistence living. Provincial incomes in the early Roman Empire then may have been in the range of European inland areas in the 1600s and 1700s.

[3] The percentage urban in 1700 was 22 in Belgium and 39 in the Netherlands. It was around 20 for Italy and Spain and around 10 for England, France and Germany (Craig and Fisher, 2000, p. 115).

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Urbanization rates were lower outside Italy, although Alexandria, Antioch and Carthage were very large. Conventional views set the urbanization rate in the whole Empire around 10 percent, suggesting that average Roman incomes in Italy were about twice those in the rest of the Empire. That is similar to the gap in average incomes and real wages between the high-income and low-income regions in western Europe in 1700 (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 seventeenth century Europe.

Incomes and assets were distributed highly unequally in the early Roman Empire. A very small elite group at the top of society and the economy, composed of several hundred "senators" and a several tens of thousand "knights" in a population of around 50 million, held great wealth—typically in the form of land (Goldsmith, 1984). 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 better considered as skilled workers. Any economic growth may have been captured primarily by the very rich, while poor people may have suffered as 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 only about 25 years, similar to India and China around 1900 (Frier, 2000).[4] 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 marshes south of Rome that were not cleared until the twentieth century to the valleys of the city itself (Sallares, 2002). The apparent cruelty and casual treatment of life that is so typical of Roman life may be in part a reflection of a more pervasive uncertainty of life.

The Romans 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, a prominent proxy for growth-enhancing culture. And they used Roman numerals, which increased the cost of precise calculations.

Explanations for the surprisingly high standard of living in the early Roman Empire cannot rely on any spectacular technologies of that time. Instead, the

[4] The Model West, level 3, life table is considered descriptive of European Rome; Model South, level 2, of Roman north Africa. These models imply mortality rates of 40 per thousand, compared with 35 per thousand in early modern Europe.

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explanation offered in the following pages suggests that markets for goods, labor and capital were relatively well-developed in ancient Rome, which in turn encouraged specialization and efficiency. These markets were able to work well in the environment created by public authorities who provided local public services in cities and a functional rule of law across most of the Empire.

A Mediterranean Market for Goods

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. Exchange is the set of economic transactions in which people voluntarily exchange goods and services either in barter or for money. This tripart 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 combining evidence from both aggregate and individual behavior.

One place to investigate how the economy was organized is with the problem of obtaining food for the residents of Rome. The city's population in the early Roman Empire generally is estimated at about a million inhabitants. Rome therefore needed a lot of supplies—about 150,000–300,000 tons (20 to 40 million *modii*) of grain a year, plus extensive supplies of olive oil and wine. 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, Egypt and Africa. Olive oil was exported to Rome from Spain and Africa.

If the grain was offered to Rome as tribute or had been commandeered directly by Roman authorities, then the movement of grain was redistribution. If the 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 tax obligations were too large for customary or reciprocal actions to accomplish them. Some taxes from Egypt and Africa were paid in kind with grain, and these 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. The bulk of grain imports was privately owned. And grain from far away, even when destined for 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 observe continuous price

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series, for Babylonia in the three centuries before the start of the Roman Empire, we find they moved in a random walk like modern prices (Temin, 2002). Wheat prices for Rome are much rarer and corrupted by the presence of free distribution through 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. However, prices appeared to be roughly stable over this period, which makes it plausible to regress the price difference on the distance from Rome.[5]

As background for this calculation, it's useful to know that 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 twentieth 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 European, Latin set of coins was linked to a Middle Eastern, Greek 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 kilograms) 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*.[6]

Figure 1 shows the six available points and a simple regression line drawn through them. The vertical axis shows local prices less the contemporary Roman price; the horizontal axis shows distance from Rome. Prices clearly were lower farther from Rome. The coefficient on distance is the estimated cost of transporting wheat. Given the roughness of the data, the relatively close fit of this line is surprising. 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 appears to have been a flourishing wheat market across the Mediterranean area in the early Roman Empire.

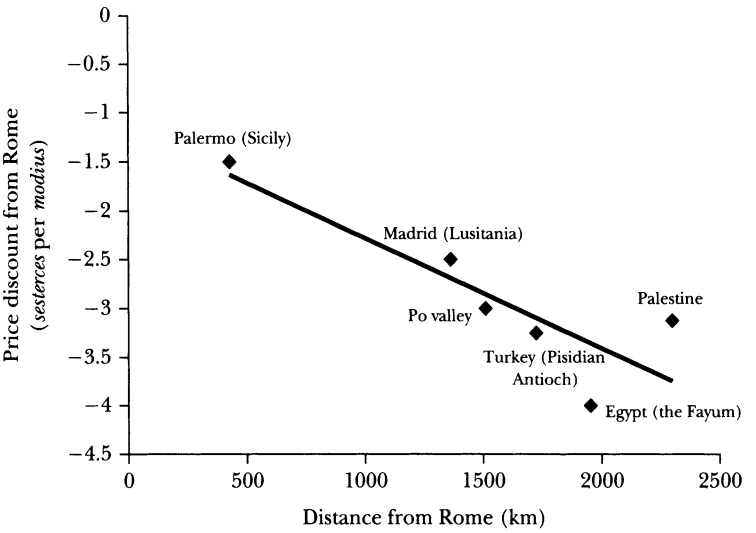
This wheat market was mostly private, although the line between public and private often was far from clear. Wheat merchants and traders made use of agents, maritime loans, a strong legal framework, and provisions designed especially for grain merchants to overcome problems of asymmetric information. Receipts iden-

[5] As one example of the different ways that ancient historians and economists tend to study the world, the regression reported below Figure 1 was rejected as a fluke by referees for several journals of Roman history.

[6] Assuming a return on capital of 6 percent (see below), a senator with minimum wealth had an annual income roughly 100 times that of a fully employed worker at the average wage—about the same gap as today between earnings at the poverty limit and of the CEO of a middle-sized firm ($20,000 versus $2 million).

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Figure 1
Relationship between Distance and Wheat Price Discount



Notes: The specific regression is Price differential (in *sesterces* per *modius*) = −1.10 − .0012 (distance from Rome). The t-statistics for the slope coefficient is 3.9. The 5 percent value of the t-statistic for four degrees of freedom is 2.8. The regression has an adjusted R^2 of .74 and F(1,4) of 15.

tified 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 recordkeeping. Merchants also often 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 degraded in some way, perhaps by adulteration or substituting a cheaper grain. These seals were signed by the granary official and a merchant, with an additional signature from a witness.

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. For example, the primary physical institution for grain information exchange in Ostia (the port of Rome) was a large building with a colonnade surrounded by many small offices that housed numerous types of merchants, promoting casual communication between merchants (Kessler and Temin, forthcoming).

Roman Italy gained greatly by being at the hub of an empire and a large trading network, as Spain and Holland did much later. Rome imported food from

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around the Mediterranean, bringing in wheat, olive oil and wine from as far west as Iberia and as far east 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). Trade also allowed for concentration of other activities like amphora and oil-lamp production in one place. Large workshops may have gained efficiency by sharing administrative costs, since Roman hand-manufacturing methods did not exhibit many economies of scale.

Labor Markets in the Early Roman Empire

Widespread product markets alone do not suffice to establish the presence of a market economy. The economy of medieval Europe had product markets, but only very rudimentary factor markets. Thus, in terms of Polanyi's (1977) three ways to organize the economic functions of a society, we infer that medieval economic life was dominated by redistribution and reciprocity, with urban "islands" of exchange-oriented market activity (Pirenne, 1925; Bloch, 1961; Epstein, 2000). Unlike the medieval period, the early Roman empire appears to have had well-functioning labor and capital markets.

Some Roman rural laborers were paid by piece rates; others, daily wages. There also were salaried long-term free workers in Egypt in the early Roman Empire. Workers in large organizations like mines and galleys were paid wages. 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 labor force that could be diverted from one activity to another. Wages in the early Roman Empire apparently moved to clear markets. For example, Egyptian real wages rose by one-third to one-half after the Antonine plague in 165–75 CE (named after the reigning dynasty) in a clear labor-market response to a sharp decrease in the supply of labor (Rathbone, 1991; Scheidel, 2002).

Employment contracts give evidence of labor-market activity. One such contract from 164 CE shows that workers were paid only for work done:

> 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 that 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

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> 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, volume 2, pp. 106–107).

Indeed, this contract suggests that this worker had more right to quit than many nineteenth-century European workers (Steinfeld, 2001).

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 eighteenth- and nineteenth-century England to create productive incentives. Major risks beyond the tenants' control were borne by the landowners, 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 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 large 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 often built roads and public monuments near where they were stationed. Since the army was stationed at the frontiers of the empire, this construction activity did not interfere with the labor market in Rome or elsewhere in the center of the empire.

The chief argument against the presence of an active labor market in the early Roman Empire has been the presence of slaves. But in the early Roman Empire, particularly in cities, slaves were able to participate in the labor market in almost the same way as free laborers, even if their starting point often was less favorable.

Frequent manumission—that is, freeing of slaves—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. (Even though slaves technically could not own property, the *peculium* was protected by law from the slave's owner, and a freed slave kept his *peculium*.) The promise of manumission was most apparent for urban, literate slaves, but it pervaded Roman society. Scheidel (1997) argued that somewhere about 10 percent of slaves in the early Roman Empire were freed every five years starting at age 25. For comparison, Fogel and Engerman (1974, p. 150) reported the manumission rate in the southern United States in the

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1850s as just 0.2 percent of slaves in a five-year period, two orders of magnitude lower than Scheidel's estimate for Rome.[7]

Anthropologists 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, again in sharp contrast to American slavery. Freedmen were granted Roman citizenship; their children could be town councilors, and their grandchildren could be knights (Garnsey and Saller, 1987, pp. 113–114). Freed slaves retained the names of and connections with their former owners and could be identified as members of their owners' family, providing former slaves with a reputation that helped them to operate in the economy. A productive freedman also increased the reputation and income of his former owner and his family. Freedmen could marry other Roman citizens, and marriages of widows with freedmen were common. Children and grandchildren of freedmen were accepted fully into Roman society.

The combination of frequent manumission and open slavery created incentives for slaves to act well and obtain their freedom—to work hard and hasten the day when they would be free workers. Slavery in fact was the most common formal, legally enforceable long-term labor contract in the early Roman Empire. Roman slaves worked in all kinds of activities; rural slave jobs were as varied as the known range of urban or household free jobs. A slave might hold a managerial job, like a *vilicus*, the manager of a Roman farm. Slaves also were at least as valuable as free men for commercial agents because they could act as agents for land owners and merchants in the same way as their sons; there are frequent references to slave agents in the surviving sources. Ancient slave owners often encouraged slaves to be educated to perform responsible economic roles, since education increased the value of slave labor to the owner. Cato educated slaves for a year and then sold them in a sort of primitive business school.[8]

Some ambitious poor people in the early Roman Empire even sold themselves into slavery as a long-term employment contract that offered a greater chance of advancement than the life of the free poor. 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,

[7] An intermediate rate of manumission was found in antebellum Louisiana, although most of the freed slaves were children under ten, and the majority of the adults freed were women—presumably the children's mothers (Cole, 2005).

[8] Plutarch, *Cato Major*, 21. This story illustrates the great contrast with American slavery, where slave education was prohibited to avoid slave revolts. Anyone who tried to educate American slaves would have been jailed and fined: "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).

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p. 835). Roman slavery in some ways resembled the processes of apprenticeship and indenture in early modern Europe, which reveals the integration of Roman slavery into the overall labor market. 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 who was a Roman official in London (Tomlin, 2003, p. 49).

The cruelty in ancient slavery has been vividly described, but the cruelty was more characteristic of Rome as a whole than of slavery alone. For example, 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.[9] As Gibbon (1776–1788 [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." Slaves were interchangeable with free wage laborers in many situations, part of an integrated labor force in the early Roman Empire.

Financial Markets in the Early Roman Empire

Romans loaned money to each other with great frequency. Some of these loans were to finance consumption; others were for production. Columella (who 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's advice shows financial sophistication, and he seems to have been suggesting that loans can be used to promote productive investments. He clearly understood that investors need to think about the opportunity cost of invested funds, whether borrowed or not.

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

[9] Garnsey and Saller (1987, p. 119) used this example to show the conditions of Roman slaves, but Garnsey also recommends *Bread and Roses*, a movie about a Latina janitor in Los Angeles, as a good guide to the conditions of Roman slavery.

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have played a key role in ancient finance as well. For example, 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*, 20 times the size of Columella's hypothetical agricultural investment and seven times the minimum property requirement to be a senator.

Roman merchants and shippers could purchase insurance; they were able to borrow with repayment conditional on a safe return. The interest rate charged was higher than usual and not subject to the normal limitation of 1 percent per month in an explicit acknowledgement that the payment included both interest and insurance. A legal principle stated: "Money lent on maritime loans 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 financial markets in ancient times were far from anonymous. Landowners and merchants were known at least by reputation to moneylenders. Loans were numerous enough for contemporary 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).

A common rate for loans seems to have been 1 percent a month or 12 percent per year, which was the official maximum and also the default rate. The presence of so many loans at this fixed rate indicates that this market probably was not totally free, but alternative interest rates did exist. We find many examples of interest rates below 12 percent, often at 6 percent, and even have examples of higher rates. Livy (*History*, 35, 7) reported that prohibitions against higher rates were evaded in the Roman Republic by transferring loans to foreigners who were not subject to rate restrictions—which means that it apparently was easy and common to transfer ownership of commercial loans among interested parties.

Banks were in operation in Greece before the Roman conquest and continued after the Romans came.[10] The most famous banks were on Delos, where there were both temple and private banks. Apollo made loans with houses as security (what we now would regard as mortgages) through his temple, a free-standing religious institution. *Argentarii* in Rome received deposits and made loans; they clearly were

[10] Ancient historians and modern economists fortunately employ the same definition of a bank, which makes it relatively straightforward to discuss to what extent loans and banks were present in the early Roman Empire.

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commercial banks. Some deposits were "sealed," that is, preserved physically intact, and did not pay interest, while others were not sealed and paid interest. Lucius Caecilius Jucundus may be the most famous Roman banker visible to us, since the burial of Pompeii in the eruption of Mount Vesuvius in 79 CE 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 financial intermediaries, because the risks of individual loans were borne by the Sulpicii, not the Emperor (or the slave). Like most other ancient banks, the Sulpicii were what we call a private bank today, composed of a partnership of closely related individuals.

Cicero noted the interconnection of financial markets around the Roman world, describing conditions in 66 BCE by reference to events 20 years earlier:

> 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. . . . 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).

It is possible that these linked financial markets were connected 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 such as 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, Hunt and Hogarth, 1900, pp. 220–222).[11]

[11] "Tax farming" is well documented in the late Republic, before the period that is the main focus of this paper. Tax farmers, *publicani*, often organized into joint-stock companies, *societates publicanorum*. They bid on the right to collect taxes in an area, which meant that they in effect gave a loan to the government. They then collected taxes, often in-kind, and converted them to cash. Tax farming continued into the early Empire and appears to have been replaced eventually by direct tax collection (Badian, 1972, p. 76–78; Malmendier, 2005).

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Various sorts of religious activities received resources to serve as endowments. These endowments were not banks, but they extended loans like banks. When the resources were in the form of money, as they often were, the funds were 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 then to use the returns to fund their feasts and other activities (*CIL*, 6, 10234). Unlike banks in eighteenth-century England, which were clustered almost exclusively in London, temples and endowments were spread among the minor cities of the early Roman Empire.

In government finance, the Roman Empire differed greatly from financial systems in early modern England and the Dutch Republic, which were dominated by government borrowing and in which 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. For the imperial government to avoid borrowing, it needed to accumulate tax revenues 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, 54–55) 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 9 percent.[12]

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." Local governments holding government revenues for future uses apparently 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.

From Markets to Growth

Given the widespread use of markets in goods, labor and financial capital in the early Roman Empire, there is reason to believe that resources were used relatively efficiently. However, the discussion of markets does not indicate how

[12] To give the flavor of the difficulties of researching 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 percent a month, or 9 percent annually, for a loan of 100 *denarii*; or it might mean 12 *asses*, one a month, indicating the maximum legal rate of 12 percent 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).

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there were enough resources to make Roman incomes comparable to those in western Europe around 1700, assuming the speculative calculations reported earlier are reliable. 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 work on more recent economic growth, we progress to consideration of political conditions and legal frameworks.

Roman technology clearly did not resemble the Industrial Revolution. However, by the standards of the time, the Romans did make many technological improvements. Their most impressive innovations were concrete and 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. The purpose of many surviving structures, however, was not just for consumption. The Pont-du-Gard, to take only the most famous of examples, was not only a structure to bring water for the residents of Arles to bathe in, watch in fountains and drink, it also was part of an agricultural irrigation system tapped at several points for irrigation and even power for milling grain (Greene, 2000). Water-power was used on a wide scale and in diversified forms by the first century CE, and archeologists are discovering ever more evidence of the widespread use of new technologies in the early Roman Empire. Both horizontal and vertical water wheels were used widely to power grain mills, saw mills and grain pounders. Hydraulic mining techniques using water to sluice, crush and sort ores "remained unsurpassed again until the nineteenth century" (Wilson, 2002, p. 31).

One way to evaluate the impact of technological change is to look at the extent of consumption over subsistence it allowed. The extensive urbanization of the early Roman Empire, particularly in Italy, has been noted already. Senators and knights lived well, as a small elite can do even in poor societies, but they were not alone. The poor were helped by the free distribution of food (the *annona* mentioned earlier) and the public provision of water, streets and even recreation. In addition to the public provisions for urban residents, the government also supported a standing army of about 250,000 men. Mostly idle, these soldiers were to dispel internal dissent more than external enemies. They were maintained and used for local construction activities by moderate taxation (Goodman, 1997, pp. 82–83).

The upper classes were educated in Rome, as were most urban slaves. Literacy appears to have been universal for any Roman in a managerial role and may have extended to skilled workers as well. We 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). Graffiti on the walls of Pompeii confirm this view (Lewis and Reinhold, 1990, volume 2, pp. 237, 277–278). 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

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face!"). Rome was a literate society, and that undoubtedly helped raise incomes. It's worth remembering that literacy rates in eighteenth-century England were not high by contemporary European standards, and we do not know how literacy promotes growth in agrarian societies.

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 taxes, booty or slaves. The agrarian tax rate was only about 10 percent of output, and much of it was spent on the army outside Rome (Hopkins, 1980). Booty, in the form of landholdings outside Italy, and slaves were more important. Such transfers explain why Roman Italy was richer than other parts of the Roman Empire, but transfers cannot explain why the Empire was productive.

The early Roman Empire had political institutions that promoted economic activity. Primary among these assets was security for private individuals. When a society moves from rulers who demand money in exchange for protection (and under implicit threat of violence) to nonviolent rulers who charge taxes in a framework of law, the stage is set for economic growth. Greek city states had created political conditions that promoted local stability, but the Romans were the first in the West 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.

A related 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, a list of private rights and judicial procedures that were engraved on tablets and publicly posted.[13] During the Roman Republic leading up to the early Roman Empire, the legal code grew largely as common law. 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 seems to have had primacy in the provinces, both because of the influence of Roman governors and other administrators and because it superseded local customs (Johnston, 1999).

A variety of social and informal institutions complemented both law and markets. Families, extended households of slaves and freedmen, and friends were used to reduce the extent of adverse selection and the opportunity for moral hazard. Agents and principals typically came from the same elite social groups, and their informal relations supported and aided their commercial transactions. Some ancient historians have presented an economy of friends as a substitute for a more formal market, but in fact they are complements. One ancient historian concluded,

[13] A translation can be found at ⟨http://www.unrv.com/government/twelvetables.php⟩.

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"Little of what we have found can be considered unique for the Roman economy" (Verboven, 2002, p. 351).

These observations are general and impressionistic. 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.

Around the start of the third century CE, the early Roman Empire came to an end under the pressure of a number of problems: several emperors who were exceptionally autocratic and excessive and a series of revolts by the army which in turn led to Rome being ruled by a series of short-term emperors.[14] The disruption manifested itself in many ways, including increased inflation in the third century CE that is visible to us through debased coinage and occasional price quotations. Inflation was less than 1 percent in the first and second centuries CE, but prices doubled after the Antonine plague of the late second century and doubled again soon thereafter. The *denarius* began to be progressively debased at this same time (Harl, 1996).

Banks were the canaries in the Roman market economy, and they disappeared in the course of the third century. *Argentarii* had little reason to puzzle out the difference between real and nominal interest rates before 200; they apparently were unable to do so fast enough to survive. Diocletian's *Price Edict* (Lewis and Reinhold, 1990, volume 2, pp. 422–426), 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 in about the fifth century CE, there were still markets, but no longer a market economy. Roman agricultural technology and city planning were abandoned, education decreased, and long-distance trade in bulk commodities vanished. The *Pax Romana* ended, and Roman law was forgotten in Europe for close to a millennium.

All societies organize their economic functions through a mixture of redistribution, reciprocity and market exchange. From an economic point of view, the important characteristic of the early Roman Empire was the relatively large role played by market forces, certainly as compared to the medieval economy that would follow. Large-scale production and movements of resources in the early Roman Empire were dominated by markets. This mode of organization promoted the exploitation of comparative advantage, helped by political stability, personal security, and widespread education. It also promoted a modest rate of economic growth that resulted in the prosperity of the early Roman Empire, which was not to be equaled in the West for almost two millennia thereafter.

[14] The literature on the fall of the Roman Empire, starting with Gibbon (1776–1788 [2003]), is large and inconclusive.

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