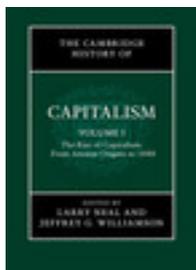


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Chapter

4 - Re-constructing the Roman economy pp. 75-100

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Re-constructing the Roman economy

WILLEM M. JONGMAN

The modern orthodoxy

For the last few decades, the modern orthodoxy on the Roman economy has been a simple one: the vast majority of the population lived at or near subsistence, and that changed little over the lifetime of Roman civilization (Finley 1985; Jongman 1988: 15–62). The wealth that existed was only that of a tiny landowning elite, and the splendor of, for example, Roman public architecture was the splendor of imperialism. The Roman economy was an underdeveloped and stagnant economy without economic growth. This was the ultimate world of the *longue durée* where nothing ever changed, and the explanation for the stagnation was a cultural one: the dominant value-system prevented elite involvement in trade and manufacturing. As a result, these sectors of the economy remained small, and the market remained unimportant. The elite were acquisitive for sure, but failed to develop an innovative economic rationality aimed at profit maximization. Interest in technological innovation was non-existent outside the world of the military. Elite mentality was a landowner mentality, averse to risk, and often more concerned with self-sufficiency than maximizing profit. The market was not the only institution that remained underdeveloped as a result; the same applied to the banking sector or the monetary system. The state failed to develop an economic policy beyond the fiscal one of ensuring revenue, as it could neither conceive of the economy as a concept, nor see a role for itself within it. As a result of all this, the economy did not grow. Analytically, and following in the footsteps of substantivist economic anthropology (and their precursors in the historical school in German economics), modern economic theory was deemed irrelevant for this cultural explanation of Greek and Roman economic stagnation. Thus, ancient economic historians of the last few decades took an altogether different theoretical turn from their colleagues in more modern periods.

From their side of the great divide, historians of more recent periods happily concurred with histories of their own that most often began only around the year CE 1000: before that, “nothing happened.” Change only came with the growth of medieval and early modern commercial cities and a commercial bourgeoisie (or even only with the industrial revolution). Between them, ancient and more modern economic historians thus used a simple model of historical development where movement was in only one direction. Discussion of the ancient economy was mostly limited to what it was not, and why not.

The virtue of this pessimistic model was that it underscored the difference between our modern prosperous capitalist world and the world of a more distant past without modern economic growth. It was the product of the realization that the preindustrial past is indeed a foreign country, and a world we have lost. No one could any longer write what Michail Rostovtzeff once wrote:

I have no doubt that some, or most, modern Italian cities differ very little from their Roman ancestors. . . . We may say that as regards comfort, beauty and hygiene the cities of the Roman Empire, worthy successors of their Hellenistic parents, were not inferior to many a modern European and American town. (Rostovtzeff 1957: 142–143)

The weakness of that contrast between the modern world and the preindustrial past is that it all too easily ignores the possibility of changes within preindustrial society, and the differences between some preindustrial societies and others. Not all preindustrial societies lived close to bare subsistence. Some clearly were far more prosperous and successful than that, even if they did not experience an industrial revolution or modern economic growth (Allen 2009).

Our Renaissance ancestors, for example, were clearly aware of such differences, and viewed classical antiquity (and more particularly ancient Rome) as superior to their own age. In fact, living with, for example, perhaps 35,000 people in the ruins of a city of Rome that had once had a million inhabitants, their admiration and awe were quite understandable. Rome was and for centuries remained a source of inspiration and admiration, culturally, administratively, and economically. This was an admiration that only began to fade when modern Europe for the first time began to surpass ancient Rome during the early phases of the industrial revolution. Roman engineers had set a high standard, and Rome had used more iron and other metals than any previous society (and many subsequent ones), but it had not built an Iron Bridge, or harnessed steam power. The appreciation for Rome’s achievement was thus

squeezed out by liberal optimism about the modern age, and a new Romantic medievalism that denied that the middle ages had been a dark age at all, and instead claimed them as the cradle of the modern world.

Of course modern economies are far more successful than preindustrial ones. On average we live at least twice as long, there are far more of us, and yet our standard of living is much higher than at any time in the preindustrial past. Finally, that standard of living improves virtually every year, by quite a lot, and for more and more of the world population. The past has indeed become a foreign country. And yet that does not necessarily reduce all of the preindustrial past to an unchanging world where life was forever brutish and short. One popular model for preindustrial economic change is the Malthusian: with population growth, marginal labor productivity declines, and thus labor incomes. This was only reversed by positive checks such as famines and epidemics, when reduced populations once again allowed a higher labor productivity. Thus, the long-term trends in population and popular prosperity moved in opposite directions. The historical question is whether this is all there was to it: was there no escape from Malthus?

Actual performance: population and other trends

Interestingly, there was hardly any empirical testing of the pessimistic modern orthodoxy. There was criticism of the thesis that the Roman elite were not involved in trade and manufacturing, but hardly anyone tried to measure actual economic performance: we all thought we knew that the Roman economy did not perform particularly well, and none of us ever imagined how we could actually measure such economic performance empirically. All most of us did was discuss possible explanations for stagnation. Data are indeed an issue, since apart from a few exceptions we have no archival or other documentary records to give us statistics. The biggest exception is Roman Egypt, where the dry desert conditions have preserved some sets of administrative documents written on papyrus. Even those, however, are only a tiny proportion of what an early modern historian would have, although they are indeed enough to demonstrate that in Roman times both public and private written administrations did exist in abundance.

Beyond Egypt, almost the entire modern history of ancient Rome was written on the basis of ancient literary accounts by mostly elite authors. These anecdotal accounts mostly lack any reliable quantitative information, and at the very least require serious deconstruction of their authors' biases. Thus, data on wages and prices are exceptionally thin on the ground. Modern

historians with an interest in ancient Greece and Rome may not realize that, for example, the ingenious reconstructions of Roman GDP are often based on little more than a handful of data points (Goldsmith 1984; Hopkins 1980; Lo Cascio and Malanima 2009; Maddison 2007; Scheidel and Friesen 2009; Temin 2013). It is like reconstructing changes in twentieth-century US GDP on the basis of little more than the price of a hamburger in Kentucky in the 1930s, a car in Virginia in the 1960s, an electrician's wage in San Francisco in the 1990s, and the tax revenue of a village in Louisiana in the 1940s (see Scheidel 2010 for wages and prices). In short, these reconstructions are composites from vastly different regions and periods, and offer little possibility of differentiating through space and time. Growth, as a process of precisely change over time, remains invisible in these reconstructions. Yet there are quite simply too few observations for anything better. Thus, much quantification may look like the real thing, but that is deceptive.

The last few years have shown the potential of an altogether different research methodology, however. Although we do not have the written records of Roman economic activities, we do have their material remains. Modern Roman archaeologists have moved away significantly from the Indiana Jones stereotype, and are concerned with the wholesale reconstruction of past economic and social life (apart from much else). Their methodologies are sophisticated, and the results can bring us closer to the reality of ancient life. These new methodologies can be grouped into three. The first is that of the increased resolution of modern detailed excavation, including archaeological science. The second is that of settlement archaeology, and field surveys in particular, where surface data from larger areas are collected to reconstruct patterns of habitation and land use. The third is that of the aggregate analysis of classes of finds such as fine table wares, amphoras, or shipwrecks. If one shipwreck is moderately interesting, an analysis of the chronology and geographic distribution of all known shipwrecks is many times more informative. By professional tradition, archaeologists often still focus on the unique and the particular, but influential studies of aggregate data sets are beginning to change that. In particular, many of these data allow the construction of time series, and thus the analysis of economic change over time. With the shift from cultural explanations to actual performance the use of archaeological proxies for classic variables like population or production and consumption is more relevant than ever.

These new categories of evidence and new methods also invited new types of explanation beyond the cultural. Modern economic theory hesitatingly acquired a more prominent role in the debate than before, if only to identify

the relevant variables (Jongman 1988, although substantively more pessimistic; Jongman 2012b). Finally, and again unlike nearly all research of the last few decades, this involved some serious quantification.

The new time series data do indeed contradict the modern orthodoxy that Roman society was one of extreme poverty and stagnation, where nothing ever changed. First and foremost, I will show that many parts of the Roman world witnessed dramatic population growth during the last few centuries BCE, not only in its core areas, but also in many of the newly conquered territories, followed by an equally dramatic decline from mostly the late second century CE (and a temporary late antique recovery in the eastern empire, but not in the western). The chronology of this process is best visible in Roman Italy, where decades of archaeological field surveys have produced a detailed mosaic of changes in settlement patterns and habitation densities from the Iron Age to the early medieval period (Ikeguchi 2007; Launaro 2011). Archaeologists have often emphasized the unique nature of the region they have worked in themselves, but it is now abundantly clear that nearly all regions of Italy followed an underlying pattern of population growth from perhaps the late fourth or early third centuries BC until roughly sometime in the second century CE (Jongman 2009; Lo Cascio and Malanima 2005). After that, demographic decline set in, sometimes dramatically. Clearly, during the Roman period the landscape filled up to an unprecedented extent, to become dramatically depopulated again in late antiquity and the early middle ages. Figure 4.1 juxtaposes recent demographic reconstructions from two regions, Nettuno and the Albenga valley, to demonstrate the remarkable similarities.

Italy, moreover, was by no means unique: other regions also show high population densities in the Roman period. In the Rhineland, for example, detailed archaeological research in some exceptionally well-studied regions has provided what are probably the best estimates for very long-term population trends in Europe. Here, densities in Roman times were massively higher than in the periods before and after (Figure 4.2).

Population densities in many parts of the empire were only surpassed in modern times, and the total population of the empire grew to at least some 60 million people, if not significantly more (according to some scholars up to 90–100 million) (Scheidel 2007a). With the growth of population, cities grew even more in size and number (see below p. 92). The Roman empire became more deeply urbanized than any later society in preindustrial European history, with more and bigger cities, and a critically more urban lifestyle.

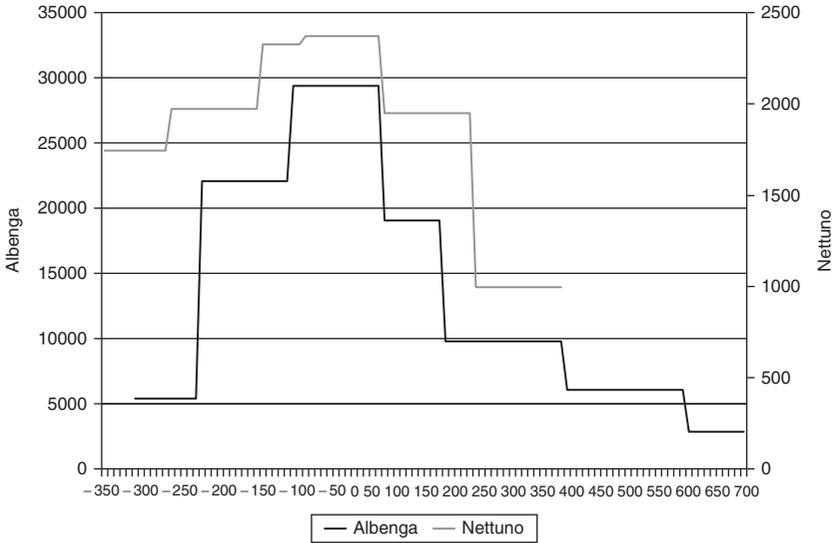


Figure 4.1 Population trends from field survey data, totals per region (De Haas, Tol, and Attema 2010; Fentress 2009)

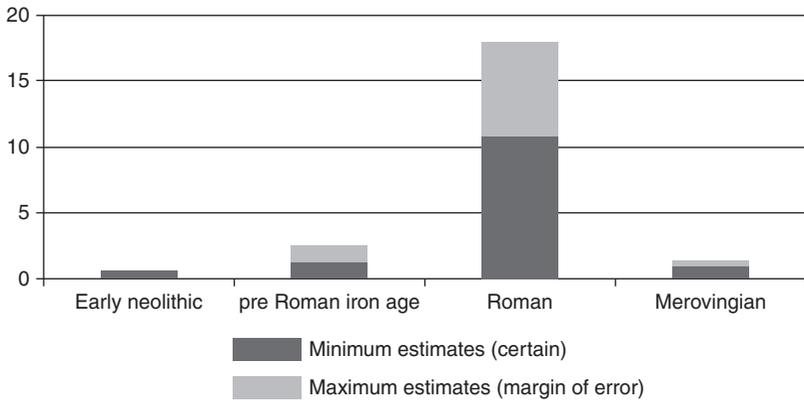


Figure 4.2 Population densities in the Rhineland (per km²) (Zimmermann *et al.* 2009: 377)

The million dollar question is, of course, whether all of this was a good thing. Did high population density depress labor productivity and thus popular standard of living (as I once argued and as some still do), or was it in fact the product of economic success and prosperity (as I have argued more recently) (Jongman 1988, 2007b; Scheidel and Friesen 2009). Did population densities get perilously close to a Malthusian ceiling, and is this

indeed the explanation for the subsequent decline, first in the later second century CE and second from the mid sixth century when epidemics ravaged the empire's population? Or did standard of living not suffer under population growth, and was there a non-Malthusian explanation for that subsequent decline? Similarly, did cities grow so large because they drew masses of desperate and destitute peasants driven off their land, as has indeed been argued, or did they grow because of increased and beneficial division of labor between town and country, and an increased demand for urban goods and services, and thus for urban labor (Hopkins 1978; Jongman 2003a)? Did cities grow because of increased prosperity and become engines of further economic growth? Did trends in population and prosperity move in viciously Malthusian opposite directions, or not? Were they perhaps both part of the same economic success story?

I want to argue that crucial performance indicators show dramatic aggregate and per capita increases in production and consumption from the third century BCE, or sometimes a bit later, until the Roman economy reached a spectacular peak during the first century BCE and the first century CE, lasting until perhaps the middle of the second century CE (de Callatay 2005; Hong *et al.* 1994). As I argued earlier, we do not have serious data on Roman wages, let alone over any length of time. With some ingenuity there is one good exception, however. We have a good series of implied slave prices from the Delphi manumission inscriptions (Hopkins 1978: 161). These show that precisely during the period of a massively increasing slave supply in the second and first centuries BCE, the price of manumission, and by implication the price of slaves, was increasing. Since the price of slaves represents the net present value of future labor income above subsistence, this suggests that labor incomes were indeed rising during these centuries (Domar 1970; Jongman 2007b: 601–602).

There is good archaeological evidence that standard of living was indeed rising. An example is afforded by an analysis of field survey data on population and consumption of goods with high income elasticity. Again, we turn to the Nettuno survey, but this time we compare the time series of reconstructed population numbers with the time series of amphoras sherds and fine table ware. Both of these are high-income elasticity goods, and thus good markers of increased prosperity. Simple series of amphoras and fine ware consumption are only moderately interesting, however, because we know population also increased: we want to see changes in per capita consumption. Therefore, Figure 4.3 uses the demographic data for Nettuno in Figure 4.2 as a denominator for the reconstruction of a trend in per capita consumption of amphoras and fine wares.

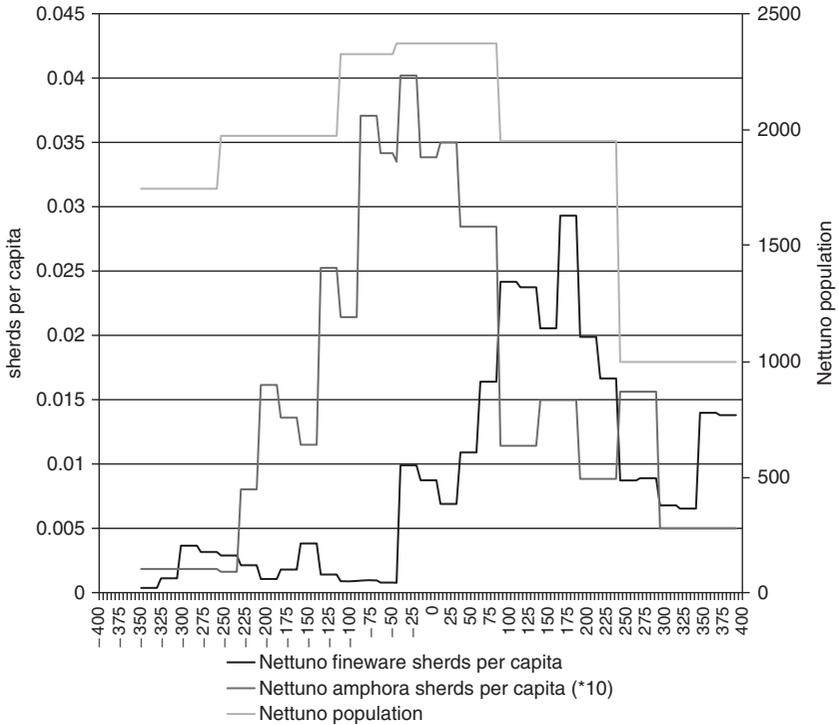


Figure 4.3 Population and per capita consumption in Nettuno. Data from De Haas, Tol and Attema 2010

Similar trends can be found in data on diet. Finds of animal bones on Roman sites used as a proxy for meat consumption show a rapid increase from the later fourth century BCE in Italy, and also in the provinces after they had been conquered by Rome. Figure 4.4 charts these data for the Roman empire as a whole, though some regions are inevitably better represented than others.

The same trend can be seen in the growth of the installed capacity of fish farms and fish-salting installations along the coast (Wilson 2006). There was now a clear demand for expensive traded proteins. Recent data from the main sewer of Herculaneum reveal an exceptionally rich and varied diet in CE 79, and not just for elite households (Rowan forthcoming). Similarly, data on food plants show a fabulous improvement in the range of fruits and vegetables that were consumed in northwestern Europe after the Roman conquest (Bakels and Jacomet 2003). Interestingly, much of this variety did not survive the demise of the Roman empire.

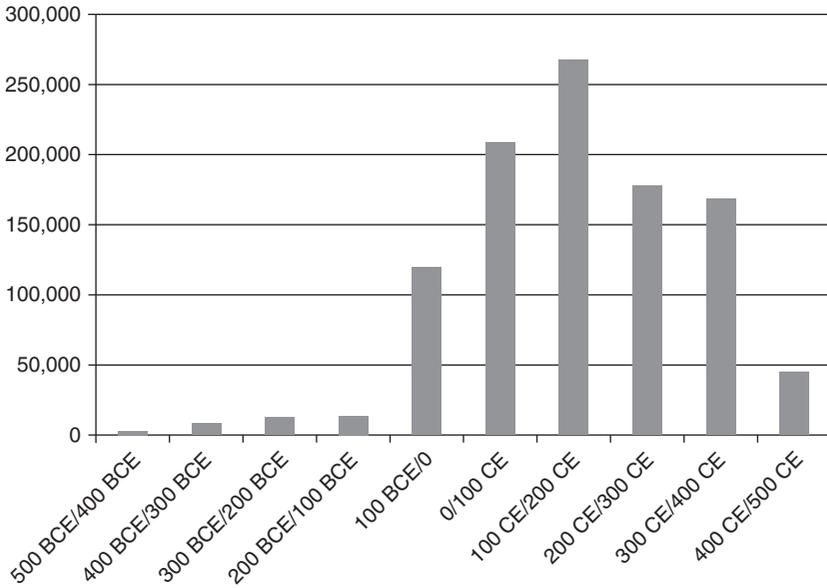


Figure 4.4 Dated animal bones from the Roman empire (Jongman 2007b 613–614, based on King 1999)

Production of raw materials and manufactured goods shows similar trends. Greenland ice core data show significant peaks from the first century BC to the second century CE in metal pollution as a product of Roman mining activity, and the trend in coal exploitation in Roman Britain (Figure 4.5) also shows a rise in the early Roman period, a decline during the third century crisis, recovery in the fourth century, and ultimate collapse with the end of Roman rule (de Callataj 2005; Hong *et al.* 1994; Malanima 2013).

Wood finds from Germany show that building activity had exploded during the Roman period, to decline steeply thereafter. The beauty of wood data is that they are dated by tree rings, and the chronological resolution is, therefore, only one year. Figure 4.6 thus charts the number of wood finds per year.

A recent reconstruction of the chronology of public building construction in Roman Italy (Figure 4.7) shows a steady increase in the volume of theatres, amphitheatres, porticoes, public baths, and the like until about CE 170, a substantial dip thereafter, and major decline from the early third century CE (Heinrich 2010). This, of course, is not just a measure of public purchasing power, but also of elite commitment to civic culture and public life. I write

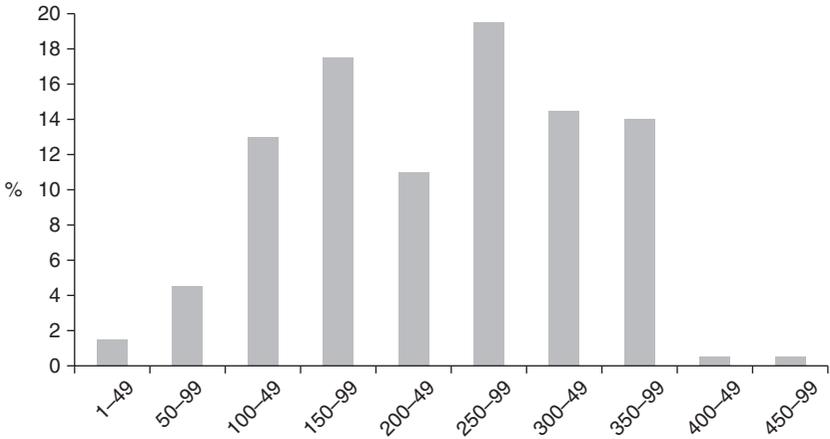


Figure 4.5 Chronology of coal exploitation in Roman Britain (Malanima 2013; Smith 1997: 322–324)

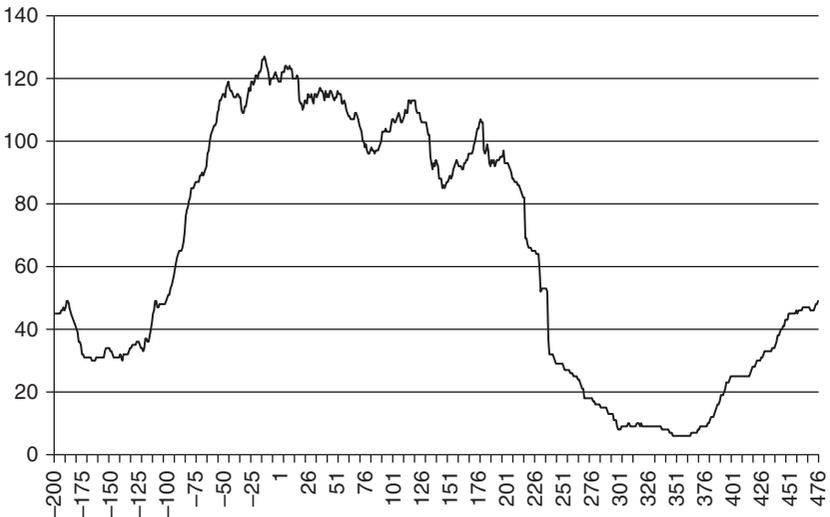


Figure 4.6 Chronology of wood consumption in western Germany (number of dated wood finds per annum) (Holstein 1980). The author is very grateful to Dr. Thomas Frank of the laboratory for dendro-archaeology of the University of Cologne for retrieving a digital copy of these data

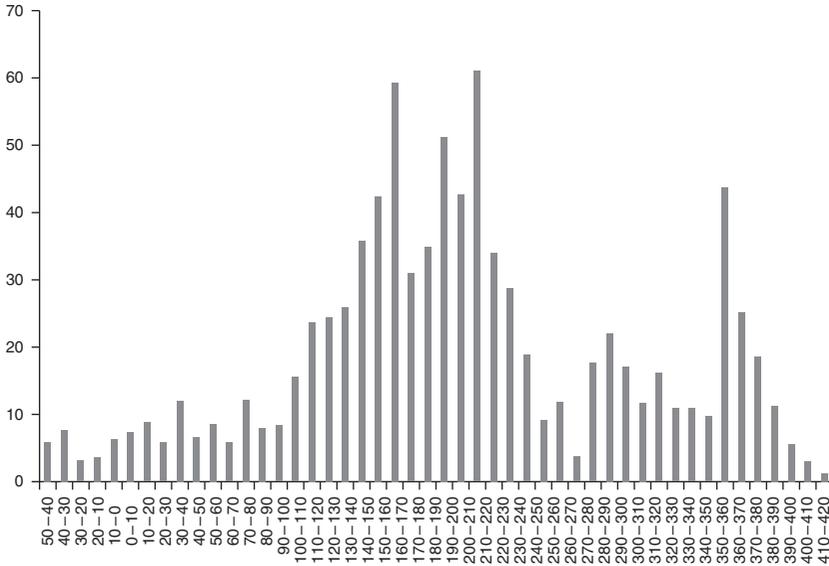


Figure 4.7 Construction of public buildings in Roman Italy (number of buildings) (Heinrich 2010)

elite, because it was the local elite who funded large parts of these building projects.

The Roman economy thus not only witnessed substantial and continued increases in population as well as in aggregate production, but for a while the Roman people also enjoyed higher per capita incomes as demonstrated by improved diets and material culture. I think there are now good reasons to believe that it reached levels of economic performance not achieved again for a very long time to come, and perhaps only in Britain and the Netherlands in the early modern period.

Finally, it is important to emphasize that the prosperity did not remain confined to a small elite of imperial magnates. Roman material reached even modest households in faraway provinces. Terra Sigillata tableware was produced in huge quantities and was exported and subsequently imitated on an imperial scale, to be recovered from urban sites and smaller farms alike. Urban society shows the presence of a large and prosperous sub-elite. Pompeii, for example, may have had a political elite of probably a hundred families, but the city counted at least some five hundred grand and elaborately decorated town houses that could only be inhabited by a well-to-do family with half a dozen or a dozen domestic slaves (Wallace-Hadrill 1994). Outside

the city's freeborn elite of a hundred, many if not most of the other four hundred owners of these grand houses were freed slaves who after manumission had continued the careers they had in fact started when as slaves of their masters they had been secretaries, bookkeepers, business agents, and the like (Jongman 1988; 2007a; Aubert 1994). For these people there were many opportunities for upward mobility. As a result, and perhaps surprisingly, Roman social inequality was perhaps less than in some other preindustrial societies (Milanovic, Lindert, and Williamson 2011). For a while, Roman society was not only quite prosperous, but also relatively inclusive (cf. Acemoglu and Robinson 2012).

What contributed to the success?

If the Roman economy was indeed as successful as I think, there is something to be explained. The most skeptical explanation would be to argue that all this was the product of Roman imperialism, and only lasted for as long as the income from this imperialism had worked its way through the (Italian) economy (Scheidel 2007b). This explanation has three points in its favor. The first is that it draws proper attention to the magnitude of Roman rapacity and cruelty in the formative stages of the empire. Rome's war effort was gigantic, but so was the initial capital transfer (including enslaved human capital) and the subsequent stream of income from extortion and taxation (not always easy to distinguish from each other). The second is that it draws attention to the importance of Rome as a large political and economic unit. Previous research has often only treated the empire as a multitude of cities with their territories, and little more. Size does indeed matter. The third point is that it has an explanation for the subsequent economic decline of the empire.

There is little doubt that huge sums were transferred from the provinces to the imperial center, but the consequences are not so clear. Keith Hopkins came up with an alternative optimistic model many years ago: Roman taxation in rich interior provinces such as Asia Minor and the expenditure of that money in the Italian center and in the frontier provinces stimulated those interior provinces to develop an export industry to earn back the money they paid in taxes (Hopkins 1980, 2002). This then kindled the kind of long-distance economic integration of the empire that benefitted everyone.

To test these models against reality, Italian examples are quite irrelevant as both a growth scenario and an exploitation scenario would show Italian prosperity. The real test is what happened in the provinces: did they prosper

or suffer under Roman rule? In my view, they prospered, and I do think we have enough data to support this. Demographically, there is little doubt that after the initial conquest, population went up in many if not all conquered provinces. It is equally obvious that these provinces became increasingly connected to the imperial economy. They began to produce for distant markets, and they began to consume food and manufactures from other distant lands.

A recent study of Roman Baetica (modern day Andalusia) shows in great detail how that region became connected to Roman markets, and how it benefitted, in part by exporting olive oil to the city of Rome (Haley 2003). In Rome itself, Monte Testaccio, an artificial mound of mostly discarded oil amphoras from Baetica, testifies to the size of this export. It has a volume of 580,000 cubic metres, implying an estimated import of 7.5 million liters of olive oil per annum from this source alone. The Rhine region and Roman Britain are other obvious and well-studied examples of provincial regions that benefitted: as mentioned above, diet in that part of Europe improved enormously with the advent of Rome, and so did housing conditions, or material culture inside the house. As every field archaeologist knows, Roman levels are incomparably richer than what is below or above them. There is more and nicer pottery, there is more and better kitchen equipment, and there is vastly more iron and bronze in tools, locks, hinges, stoves, and many other applications. And there are clear signs of many technological advances in the wake of the Roman conquest. It was good to live in the Roman empire, and it was good to have been conquered by Rome. Why else did barbarians try to enter the empire, but to benefit from it?

If Roman imperialism cannot be the explanation for a prosperity that extended well beyond the imperial center, we need other explanations for that success, and also for the subsequent decline. We shall thus look into classic candidates such as institutions, division of labor, and technology, and we need to distinguish between factors that explain the initial growth and factors that explain the ultimate decline (they can be the same, but they need not be).

If there is one lasting legacy of Roman achievement, it must be Roman law, and more specifically Roman civil law. To this day it remains the foundation of many modern legal systems, and it dealt successfully with many pressing issues that could have harmed the economy. It guaranteed private property, it discouraged dishonesty in business, and it made it relatively easy to enforce contracts, even over longer periods of time. We now know against earlier skepticism that the law was in fact used extensively and knowledgeably, in

both large and small contracts, in litigation, and in administrative documents (Terpstra 2013). These legal documents have survived as wooden writing tablets from the Vesuvian area, from the wet soil along Hadrian's wall in Britain, and in even smaller numbers from a few other regions. They have also survived in larger numbers as papyri from Roman Egypt. The law was used, and made transactions easier.

Thus, Roman law is certainly part of the story of Roman economic success. On the other hand, it is hard to see how it can explain the beginning of that story. It developed relatively late, it would seem, and mostly in response to demand from an increasingly sophisticated society. Finally, its most impressive articulations only occurred in the later empire, precisely when the economy was facing real difficulties. So Roman law cannot explain the original growth, or the final decline.

We can also see that both the state and private enterprises used extensive administrations to keep track of their affairs. For each assessed person a tax collector in Roman Egypt kept records of previous years together with those of the present, in order to check for consistency, and army units kept extensive records of pay and other financial affairs: soldiers received much of their pay as entries in a savings account with their unit's administration. We have the administration of one large estate in Roman Egypt, and again we see extensive record-keeping (Hopkins 1991; Rathbone 1991). The grain distributions (about 400 kg in twelve monthly rations of 33 kg each) to some 200,000 adult male citizens in the city of Rome were only practical because the recipients had to present a personalized token on a specified day and at one specified counter out of the forty-five at the Porticus Minucia, and where lists were kept of the 150 or so recipients of that day and at that counter (Jongman 1997). Precise land registers were also kept, for taxation purposes, but also to record ownership and mortgages. Similarly, Rome's central administration kept records of all individual soldiers (300,000 or even more at any one time), and their entitlements. From its early days, Rome had held a census of people and property every five years. After all, before the introduction of a professional army from 107 BCE it needed to record who could serve in the army, and it needed to record citizens' worth, because political status and voting rights largely depended on wealth (Nicolet 1976). Thus, the empire critically depended on written records, and on a sufficiently wide-ranging literacy to exploit them to the full (Hopkins 1991). However, there is no indication that, apart from the census, written records were used in the earlier stages of Rome's economic expansion. Of course, writing existed in Egypt before Roman times, but in Italy itself writing and

most written administrations seem to have followed rather than initiated the economic boom.

This brings me to the wider issue of government and bureaucracy. Roman emperors of the first and second centuries CE repeatedly insisted on the importance of good government. We may cynically dismiss the pretension, but Roman rule was by the law. Roman emperors were advised by lawyers to insure that their decisions followed legal precedents. Under Augustus, the earlier privatized system of provincial tax collection was brought under central control, if only to avoid the excesses of the previous period. From the time of Augustus again, a system of imperial bureaucratic administration evolved, with separate departments such as the treasury, and staffed by imperial slaves and freedmen (Millar 1977; Weaver 1972). Nothing like it had existed before, even though Augustus in typical style used the preceding model of Roman senior magistrates who used their private servants for state business. The difference was one of scale, and it was a big difference.

This central government provided infrastructure such as roads for the empire, harbors, and enormous warehousing complexes such as those in Ostia and Portus, or frightfully expensive aqueducts that would often remain the main urban water supply until modern times, or benefits for the city of Rome and elsewhere (Hodge 1992; Keay *et al.* 2005; Laurence 2002; Rickman 1971; Robinson and Wilson 2011). Romans of the republican and early imperial period were citizens rather than subjects, and were entitled to the benefits of that citizenship. Thus, citizens in Rome were sometimes given large cash handouts. Each month they were given generous rations of grain to cover about half a family's calorific requirements. Each day some seven thousand Roman men could be seen carrying home their monthly 33 kg of wheat, a graphic reminder of the benefits of imperial rule. In the second century CE inhabitants of the cities of Italy received a similarly valuable benefit in coin (*alimenta*) (Jongman 2002). Gladiatorial games provided magnificent entertainment in Rome and many other cities of the empire (Hopkins 1983). In Rome these were staged by the emperor so no one could upstage him, but elsewhere they were mostly paid for by local magistrates.

One benefit of Roman rule was internal and external security. From the age of Augustus the *pax Romana* provided more security than a typical preindustrial state could afford, and certainly during the peak of its economic success in the early imperial period piracy and brigandage were much reduced. In those days, Roman cities did not need or have defensive walls. The same applied to external security during these years. Rome's professional armies not only rarely lost a battle, but often the mere presence of their overwhelming fighting

power was intimidating enough for potential enemies to not even contemplate a fight (Campbell 1984). Roman legions were better trained, better paid, better led, and better equipped than any opposition. Until the later second century CE they undoubtedly paid for themselves economically by the peace that they maintained.

Money is another important institution for an advanced economy, and again there is no doubt that Rome's achievements were impressive. In the early empire Rome had essentially (though with some exceptions) created one integrated monetary system that covered most of its territory with a stable monetary system and supplied denominations to cover the entire range of transactions, from fiduciary small change in bronze, to silver *denarii* and all the way to high-value gold coins (*aurei*) worth almost a year's subsistence food for one person (Burnett 1987). Recent research has shown that this coinage was widely used. Per capita monetary stock was exceptionally large by the standards of a preindustrial economy, and there is now ample evidence for extensive monetization of small transactions in even remote districts (Duncan-Jones 1994; Harl 1996; Harris 2006; Howgego 2009; Jongman 2003b). The system also worked well in the sense that there was little or no inflation until the late second century CE, and rampant inflation only raised its head much later. The successful creation and maintenance of this monetary system during the most successful four centuries of Rome's economic history is thus testimony to Rome's achievement, but again, it is hard to imagine how it can be used to explain either Rome's early growth, or Rome's ultimate decline.

Compared with other powers in the region Rome was relatively late in producing its own coinage, and even then it did originally only in southern Italy where at the beginning of the third century BCE it had to compete with the southern Italian Greek coinage. In 211 BCE, during the Second Punic War, Rome finally introduced the system with a lighter silver *denarius* that was to remain the foundation of its monetary system until the middle of the third century CE. The (silver) money stock increased during the second and first centuries BCE, with the increase in population, the size of the empire, and production and consumption per capita (Hopkins 1980:109). The growth of the silver coinage tailed off in the later first century BCE, when Rome began to mint golden *aurei* as well. From that moment onwards, to estimate the total money stock, these gold coins have to be added. As mentioned above, the per capita gold, silver, and bronze money stock was probably larger per head than in even the most advanced early modern European economies (Jongman 2003b).

The system began to disintegrate in the later second century CE. In earlier centuries Rome had debased its coinage only rarely and not by much, and mostly in response it would seem to years of bad harvests and thus disappointing tax incomes (in the absence of public debt this is all the state could do). This did indeed begin to change in the 160s, but only slowly at first. The cause seems to have been a combination of disappointing tax returns in the wake of the Antonine plague, increased military spending to cope with military unrest at the frontiers, and problems in mining districts such as Spain that made it much harder to strike new coins to pay for public expenditure. For the first time prices also began to rise during this period. In Egypt, the only region where we have some half decent data, many prices seem to have roughly doubled in the wake of the Antonine plague (Scheidel 2002; but see Bagnall 2002). After the death of so many, the per capita money stock had increased dramatically. Since the aggregate stock of money (M) had remained roughly the same, and also the velocity of circulation (V), the reduction in the number of transactions (T) from a lower population must have pushed up prices (P) in the classic equation $MV = PT$. This rather than any still quite minor debasement must have caused the late second-century inflation. The monetary system responded to the crisis, and did not cause it.

Apart from coinage, Rome also had a banking sector. Traditionally, Roman banking is seen as relatively crude: it could not create money, and bankers were insufficiently rich to cope with the demands at the top of the social and economic scale (Andreau 1999; Finley 1985). For that, private deals between members of the landowning elite remained necessary. For lack of good evidence it is hard to see what Roman bankers could and could not provide. Importantly for such a large empire, money could be and was transferred on paper from one part of the empire to another. Large public projects were completed, and complex business ventures like sailings of big ships to India were financed, even if we do not quite know how. The Roman economy was not constrained by a lack of capital.

Monetary integration is but one aspect of the larger story of economic integration over the empire's huge territory. People, goods, and services could and did travel over enormous distances, connecting markets into one large system. The Mediterranean was the hub, of course, facilitating cheap sea transport in the core, and helped by a high-quality infrastructure of good harbors and warehousing (Robinson and Wilson 2011). Maritime shipping increased enormously in the second century BCE, when Rome became the dominant power in the Mediterranean, first in the west, but soon also in the east, with commercial nodes such as Rhodes and Delos. The most visible sign

of the booming shipping business is the massive increase in the number of dated shipwrecks (see this volume, p. 49). But it was not just the Mediterranean that showed an increase in long-distance trade. The Red Sea and its harbors witnessed a booming trade with India (Nappo 2007).

Harbors were connected by river and land transport to inland markets. The Rhine and other rivers in France and elsewhere connected the Mediterranean economy with northwestern Europe and England. The empire's expensive network of well-built roads, with bridges and tunnels where necessary, would remain unsurpassed until modern times. Of course, the original impetus was military, but from the very beginning the roads were also used for private travel and transport.

The benefits were such that a new and much larger and more integrated "global" economy emerged where more advanced technologies could spread rapidly, and where goods could now be traded over much longer distances, adding greatly to the quality of life for even quite ordinary Romans. The empire became increasingly integrated by a network of long-distance communication and transportation. In its most mature form, when the market had become large enough, this was then sometimes followed with increased local production of imitation wares.

At the very local level, Roman villas were often located precisely along roads, to facilitate the transport of their produce to urban markets, and to make personal travel more comfortable. A good example is the Via Appia from Rome to Capua, built in the later fourth century BCE. It followed Rome's conquest of that city, but it was also part of a larger scheme to drain the fertile Pontine marshes. It stimulated the construction of new villas and more commercial agriculture along its route, and both responded to and further stimulated the urban growth that took off in precisely this period. If we look at the chronology it is thus apparent that the globalization of the Roman economy and the growth of long-distance trade followed upon an earlier urban growth and a growth of market agriculture. That seems to be where the story actually begins.

At the peak of its economic success the Roman empire was indeed an exceptionally urbanized society (Hanson 2011). There were perhaps 2,500 cities in the Roman empire, of which more than 400 were in Italy alone. Roman society at its height was an urban society. Cities played a pivotal role in the economy. Unlike in the medieval world, there was no economic, social, or legal divide between town and country. The landowning elite lived primarily in cities, drawing rents from their agricultural estates. Thus, and unlike in the feudal world, the urban economy was founded on the largest sector of the

economy rather than living at its margin. Cities were the connecting nodes in the network of local rural–urban exchange and in the system of long-distance transport and communication. Thus, the empire was administered from cities, and Roman culture was urban culture. Even small Roman towns had some public buildings such as temples, a forum, porticoes, or a public bath. These were all recognizably Roman, whether in Britain or in the Syrian desert.

Roman cities were not only more numerous than for a long time afterwards, but many were also much larger. There were numerous cities with a few tens of thousands of inhabitants, and at least half a dozen in the range 100,000–200,000. On top of that there were really large cities such as the world had never seen, and would not see again for a long time. Roman Carthage, Alexandria, and Antioch each had 200,000–500,000 inhabitants for a combined population of a million or so. Finally, there was the city of Rome itself. During the last two or three centuries BCE its population had grown to perhaps one million inhabitants by the time of Augustus, a size that would not be equaled again until the Chinese cities of the Sung dynasty, or until London around 1800, during the early stages of the industrial revolution (Jongman 2003a). In the early imperial period perhaps 5 percent of the empire's population lived in cities with more than a hundred thousand inhabitants.

The importance of these larger cities is that even though the vast majority of cities were indeed, as many have said, small, the majority of urban inhabitants lived in large or even very large cities, and much more so than in medieval or early modern Europe. Economically, socially, and culturally, theirs was a true big city life. This is not often recognized, but it has important consequences. The Roman urban experience was truly urban, with a complex and sophisticated market for specialized urban goods and services, and advanced division of highly skilled labor. This applied to the manufacturing or building industry as much as to the food trade or financial services. Elite purchasing power was huge, and so was demand for goods that had to come from far afield. Romans in the provinces could expect to be supplied with ceramics or food produced in distant parts of the empire, and could communicate with relatives at the other side of their known world.

In a preindustrial economy there is always one condition that has to be met for such urbanism to be successful: agrarian productivity growth. Supporting a large nonagricultural sector is only possible if agriculture is productive enough. This is all the more important under conditions of high population density. After all, the problem of such agricultural systems is that of declining labor productivity in agriculture under population pressure. In the Roman empire, and in its core regions in particular, population densities were indeed

comparatively high. Thus the Malthusian specter of declining labor productivity and low labor incomes was looming. It would have pushed the economy into the Jan de Vries peasant model of adaptation to population pressure: peasants avoid the market and try to produce all their needs for themselves (de Vries 1974: 4–17; Boserup 1965). What were the possibilities for Roman farmers to avoid this grim scenario, and avoid declining labor productivity?

As we saw, the early urban growth in late fourth and early third centuries BCE Italy went hand in hand with the rise of a new agriculture of wine and olive oil production on rather larger farms (Hellenistic villas is what they are often called, but the term is rather grand for a larger farm) (Terrenato 2001). The output of these farms was quite evidently too large for their own consumption, and not surprisingly they were often located near good transport opportunities. Their market was in the newly founded or expanded towns. This invites scrutiny of their business logic: how did they escape from the dismal prospect of declining labor productivity? The crop choice is revealing: with wine and oil it was possible to produce about five times more calories per hectare than with cereals (Jongman 2007b). Thus, if Romans drank enough wine and consumed enough olives and olive oil, the often quoted demographic ceiling was lifted in one stroke. These market crops permitted much larger populations, in both towns and in the country. It was also economically attractive to produce these crops, because these were expensive calories. The few prices that we have from early imperial Italy suggest that wine was perhaps five times more expensive per calorie than wheat, and oil at least twice as expensive. So with these crops revenue per hectare could be ten to twenty-five times higher. Of course, these were also labor-intensive crops, so costs were also higher, but not nearly as much. The partial switch to wine and oil averted the nightmare of declining agricultural labor productivity, made good use of the growing population, and was highly profitable (Jongman forthcoming).

Since these were more expensive calories, the switch was dependent on a preceding increase in prosperity, of course. This in turn could then provide the positive feedback for further growth. In principle we have two candidates for this. The first is the prosperity brought about by Roman imperialism. The late fourth and early third centuries BCE were the time when Rome conquered Italy. The puzzle is that the switch not only occurred in Roman territories, but also elsewhere in Italy, and before Roman conquest (Terrenato 2001). Rising prosperity was not just a Roman phenomenon. The second candidate is to look at climate. This was, after all, roughly the beginning of the so-called

Roman warm period (McCormick *et al.* 2012). Analytically a more beneficial climate can be seen as technical progress: the production function itself shifts because the same quantities of land, capital, and labor now produce more than before. It is an attractive explanation, even though the data are not yet as good as one would like.

What were the limits to growth?

The imperial economy was thus a high-level equilibrium, where total factor productivity could be high because prosperity was high, and because a system of state institutions and public services was maintained that could only be afforded because the empire was successful. The system seems to have declined from the later second century CE when the so-called Antonine plague ravaged the empire's population, inaugurating a period of increased oppression and military turmoil (Jongman 2012a; Lo Cascio 2012). In the west that was the end of the story, but in the east there was a big recovery, until at least the Justinian plague of the sixth century.

Everything else being equal, a dramatic epidemic such as the Antonine plague should have increased labor productivity, and labor incomes. That was what happened after the Black Death of the fourteenth century. However, this does not seem to have occurred in the second or early third century. There are a few contested indications from Egypt that real wages in the immediate aftermath of the Antonine plague improved, but the overwhelming bulk of the evidence points to not only economic contraction, but also to a decline in prosperity for ordinary people (Bagnall 2002; Scheidel 2002). Cities were hit hard, and urban elites in many cases retreated to their estates in the countryside. Thus, in the cities the fabric of civic culture began to disintegrate. Fewer gladiatorial games were given, public building came to a stop (Figure 4.7), and prominent citizens no longer acted as civic benefactors (Figure 4.8) as they had done before. Part of their role would begin to be taken over by Christianity, with its ideal of charity for the poor and the indigent.

Long-distance trade was interrupted in many regions, and so was manufacture of traded goods (Erickson-Gini 2010). The sea trade to India that suffered a similar economic crisis was virtually abandoned (Nappo 2007). In the countryside we not only witness the signs of dramatic demographic contraction, but also of a concentration of properties (Duncan-Jones 2004). The smaller farms seem to almost disappear, and so do even the smaller estates. In many regions this is the period when the landscape began to be

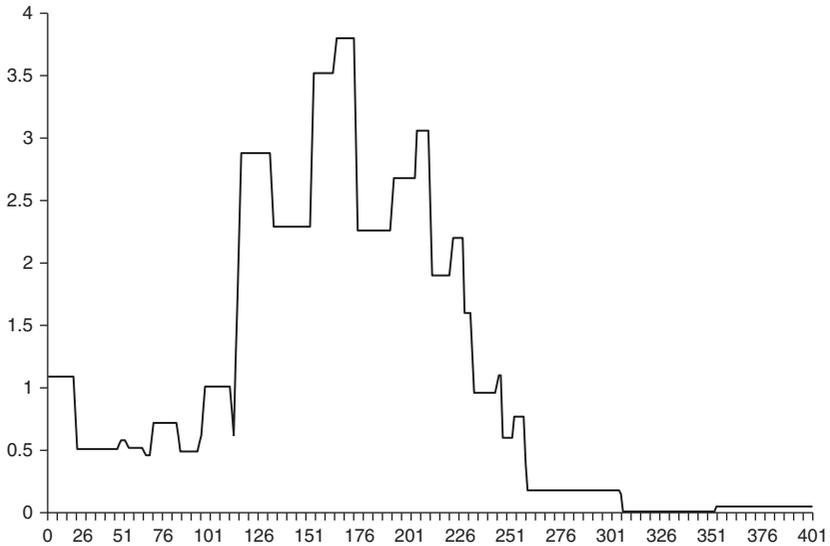


Figure 4.8 Benefactions in (part of) Asia Minor (Zuiderhoek 2009: 18).

dominated by truly large and increasingly fortified estates. In the legal system this increased inequality is expressed in the erosion of the value of citizenship, and the rise of the new social and legal distinction between *honestiores* with status and property and *humiliores* within citizenship who could be beaten tortured or crucified as punishment (Garnsey 1970). So altogether it would seem that the Roman world took a different turn from that of Europe in the fourteenth century, and a turn that looked more like eastern Europe's second serfdom. Rome had changed from an inclusive society to a more extractive one (Acemoglu and Robinson 2012). The high-level equilibrium was destroyed.

One explanation for this turn of events could be that the period of favorable weather had indeed come to an end (McCormick *et al.* 2012; Jongman 2012b). As in the years preceding the Black Death, the years before the Antonine plague had witnessed some of the worst weather for a long time, and those were only the beginning of a centuries-long period of much less favorable climatic conditions (Campbell 2010).

The demographic and economic collapse of the late second century took a while to translate into other fields, and the achievements of the Severan emperors of the late second and early third centuries are truly impressive in this respect; but the inevitable had to happen with the military and political troubles of the half-century between 235 and 284. After that, the story took a

different turn, with the great divergence between the eastern and western Roman empires: the west steadily declined, but the east showed miraculous recoveries, with substantial population growth, an explosion of commercial agriculture in for example Judaea, a resumption of the trade with India, and a reinvigorated urban life in many areas. One reason may have been that this was indeed a colder and wetter period, harming the northwest, but benefitting precisely the Levantine regions. In the east, this new prosperity lasted until the reign of Justinian, when a new epidemic, this time of the real plague, killed off huge numbers. Interestingly, it is now apparent that this epidemic too was preceded by a major climatic event. The eastern economy never really recovered.

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