

Roman Society Research Center

International conference Land and natural resources in the Roman World

Brussels, 2011, Thu. 26th – Sat. 28th May

Introduction

In comparison with other pre-modern empires, the economic performance of the Roman Empire (ca. 200 B.C. – A.D. 600) is impressive: not only were living standards raised for the population at large, but the empire also showed strong resilience and the ability to overcome economic crises. In order to explain this remarkable success, recent work in Roman economic history has placed particular stress on the analysis of economic performance. Yet the economic foundation of any pre-industrial society, namely agriculture and natural resource exploitation, has not yet received the attention it deserves, notwithstanding some important recent work by scholars such as Kehoe, Erdkamp, and Banaji. The conference 'Land and natural resources', to be held in Brussel on May 26th-Sat. 28th, aims at studying in detail the varied ways in which the Romans exploited their land and natural resources, how they reflected on these usages, and how this contributed to the economic development of the empire. We are interested not in performance per se, but in the structures that made this performance possible.

Exploitation of land and natural resources' should be understood in a broad sense, ranging from the exploitation of uncultivated lands (e.g. hunting and gathering), techniques to bring new land under cultivation, all types of farming, mining and quarrying, to the harnessing of the power of wind and water and techniques of irrigation. These cannot, however, be studied in isolation. Wider economic and ideological developments need to be included, in particular changes in agricultural structure (concentration of land, management of holdings, attitudes of landowners etc.), changes in the market (supply, demand, nature of trading channels) of agricultural goods and natural resources, and changes in state structures (local differences, the role of the tax system, the role of large landowners such as the church); it also needs to be asked how these impacted on the exploitation of the land and natural resources. In addition, ideological factors, such as the idealization of agricultural labor in Roman society, may have had a considerable impact on the exploitation of the land. The conference thus does not wish to study the exploitation, processing and distribution of various natural resources (agricultural and non-agricultural) in isolation from each other, but in their interaction with each other. We believe this integrative approach will greatly enhance our understanding of the foundations of the Roman economy.

The conference will focus on the following five topics.

The availability of natural resources

Natural resources (arable land, ores, fishing grounds, ...) are unevenly spread. Did access to natural resources matter in the long run? Were regions rich in resources more likely to experience economic growth or not?

Ownership and Control

Who enjoyed 'rights of exploitation' of natural resources? What were these rights based upon (property rights, political control, custom...)? Did Roman ideas about social status influence definitions of rights of access?

to and exploitation of natural resources (for instance, were sacred properties, public lands, and private lands managed and exploited differently).

Organisation and modes of exploitation

How was the exploitation of natural resources organized. What is the implication of this for investment, productivity and the acquisition of expertise? Is the State directly involved in the exploitation of mines, quarries, forests, salt pans etc. (for instance through the army), indirectly, or not at all? How did all this develop over time?

Exploitation and processing of natural resources

Natural resources are rarely 'ready at hand' or 'ready to use'. Their exploitation requires an amount of know-how and investment in extraction and processing facilities. We are not interested in technology per se, but in whether and how innovations occurred, how technology spread, and how skills were acquired. Who financed the necessary facilities? How durable were they? How much expertise and expense was needed for upkeep?

The fruits thereof ...

Who benefited from the exploitation of natural resources apart from the direct consumers? Did the profits accrue into the hands of private entrepreneurs? of middlemen or the state? Did the latter profit through taxation or as owner farming out the natural riches? What was the role of the market in this process?

Program

Thursday 26th May, 2011

Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten
Atrium & Ockeghemzaal

- 9:00 Welcome
- 9:30 General Introduction (organizers)

Session I. Agriculture & elite wealth: the fruits thereof...

- 9.45 Paul Erdkamp: Agriculture and the various paths to economic growth
- 10.05 Annalisa Marzano: The varieties of villa exploitation, from agriculture to aquaculture
- 10.25 discussion
- 10.55 coffee break

Session II. Availability and accessibility of natural resources

- 11.15 Colin Adams, Moving Natural Resources
- 11.35 Jordan Pickett, Construction and the Roman Economy: Five Logistical Case Studies from Roman and Late Antique Cappadocia in Comparison
- 11.55 Ray Laurence, State and Road Building in the Roman Empire
- 12.15 discussion
- 12.55 lunch

Session III. Organisation and modes of exploitation

Agrarian economy

- 14.00 Daniel Hoyer, Diverse crop harvesting and the Maghrebi agrarian economy
- 14.20 Hilali Arbia, Rome et l'agriculture en Afrique. L'aménagement de l'espace et la gestion des ressources naturelles
- 14.40 Julia Hoffmann-Salz, The local economy of Palmyra – Organizing agriculture in an oasis environment
- 15.00 discussion
- 15.40 coffee break

Animal husbandry

- 16.00 Tony King: Regional factors in production and consumption of animal-derived food in the Roman Empire
- 16.20 Michael McKinnon, Changes in animal husbandry as a consequence of changing social and economic patterns
- 16.40 discussion
- 17.10 end of sessions

Friday, May 27th 2011

Free University of Brussels (VUB)
Campus Etterbeek, auditorium D

Session IV. Ownership and control of natural resources

Elite property

- 9.30 Kyle Harper, Patterns of Landed Wealth in the Long Term
- 9.50 Elio Lo Cascio, The development of imperial property
- 10.10 Rens Tacoma, Imperial wealth in Roman Egypt. The Julio-Claudian ousiai
- 10.30 discussion
- 11.10 coffee break

Law and landed property (I)

- 11.30 Eva Jakab, Property and profit in Roman law and economy
- 11.50 Dennis Kehoe, Property Rights over Land and Economic Growth in the Roman Empire
- 12.10 discussion

12.40 poster presentations / lunch "

- Kim Van Liefferinge (Phd project, UGent) *Water management in the Laurion mines* (click [here](#) for abstract)
- Dimitri Van Limbergen (PhD project, University of Pisa), *Towards a more diversified Roman economy: a working hypothesis for Central Adriatic Italy* (click [here](#) for abstract)
- Patrick Murray (University of Melbourne), *Veteran settlements under Sulla*
- Devi Taelman (UGent), *Ancient Quarriescapes: Stone Supply of Roman Ammaia*

Law and landed property (II)

- 13.45 Peter Temin, *The Terms of Land Tenure in the Roman Empire* (click [here](#) for working paper)
- 14.05 Egbert Koops, *Absentee landowners and bailiffs: the legal framework*
- 14.25 discussion
- 14.55 coffee break

Water (I)

- 15.15 Christer Bruun, Ownership and legislation concerning water resources
- 15.35 Adam Rogers, Controlling waterscapes. A study of towns and water in Roman Britain
- 15.55 discussion
- 16.25 coffee break

Water (II)

- 16.45 Toni Naco del Hoyo & Dario Nappo, When the waters recede. Economic recovery and public policies after the AD 365 tsunami and some earlier precedents
- 17.05 Yuri Marano, Management of water resources in Ostrogothic Italy (end of the 5th - first half of the 6th century A.D.)
- 17.25 discussion
- 17.55 end of sessions

Saturday May 28th 2011 Free University of Brussels (VUB)

Free University of Brussels (VUB)
Campus Etterbeek, auditorium D

Session V. Exploitation and processing of natural resources

Natural resources (I)

- 9.30 Shawn Graham, Areas of logging and agent-based models of resource extraction
- 9.50 Isabella Tsigarida, Salz in der Provinz Asia. Eine Untersuchung staatlicher Interessen an der Ressource
- 10.10 discussion
- 10.40 coffee break

Natural resources (II)

- 11.00 Alfred Hirt, The Roman Army, Imperial Quarries and the Emperor
- 11.20 Fernando Lopez Sanchez, The mining, coining and obtaining of gold in the Roman Empire
- 11.40 Discussion
- 12.10 coffee break

Exploitation of local resources

- 12.30 Saskia Roselaar: The role of Italians in local economies of the late Roman Republic
- 12.50 Sophia Zoumbaki: The exploitation of local resources of Western Greece by Romans and Italiote Greeks
- 13.10 discussion
- 13.40 end of sessions

***Land and natural resources
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Abstracts

Arbia HILALI, Rome et l'agriculture en Afrique. L'aménagement de l'espace et la gestion des ressources naturelles

(Professeur Histoire romaine à l'université de Sfax (Tunisie), membre de l'unité de recherche CRAHAM à l'université de Caen en France)

Avec la conquête romaine, l'ensemble du sol africain est devenu propriété du peuple romain (*ager publicus populi romani*). Ce sol a été distribué en trois parts : la première a été laissée aux autochtones, la seconde a été attribuée aux citoyens romains et la troisième qui constitue de grands domaines (*fundi*) est devenue la possession de membres de l'aristocratie romaine et le patrimoine de l'empereur. Du fait que ces terres continuent en principe d'appartenir à l'*ager publicus*, l'empereur a organisé leur exploitation par des règlements tels que la *lex Maciana* ou la *lex Hadriana*. Le paysage que laissa l'occupation romaine ne fut pas celui que Rome avait trouvé. Les Romains le marquèrent pour des siècles par l'établissement de centuriations plus intenses en Proconsulaire que partout ailleurs en Afrique. Ces opérations d'arpentage ont pour but de partager les terres, de préciser les droits et les limites des propriétaires, d'indiquer leur qualité et d'aménager le territoire. La maîtrise du milieu et le développement de l'agriculture passe par les travaux hydrauliques. Les Romains ont conservé les héritages des Libyens et des Puniens en matière hydraulique ; ils les ont singulièrement rationalisés, amplifiés et perfectionnés. Les ouvrages hydrauliques présentent une extraordinaire variété, qu'ils se trouvent en milieu urbain ou en milieu rural : citernes, captages de sources, aqueducs, barrages, puits, fontaines, etc. La photographie aérienne a révélé l'ampleur des travaux hydrauliques qui ont permis d'étendre singulièrement les zones de cultures. Les régions insuffisamment arrosées furent couvertes par des travaux qui permirent de retenir l'eau et de la distribuer dans des petites parcelles limitées par des murettes et des canaux d'irrigation. Tous ces aménagements ont permis de conquérir de nouvelles terres, d'augmenter les propriétés foncières de l'empereur et de certains grands propriétaires. Enfin, de nouveaux circuits économiques apparaissent pour l'Afrique, de mieux en mieux insérée dans le monde romain, afin de répondre aux demandes de Rome et des provinces en blé et en huile.

Alfred M. HIRT, The Roman Army, Imperial Quarries and the Emperor

(*DPhil* in Ancient History, University of Oxford, 2004) visiting fellow Wolfson College, Cambridge (UK).

The Roman army played a significant role in running imperial quarrying operations. Apart from guaranteeing the security of quarries particularly in the Eastern Egyptian Desert or guarding prisoners/damnati condemned to working at places like Simitthus/mod. Chemtou, soldiers and centurions could acquire experience in operating quarries for military or public building projects; the inscriptions discovered in the Brohltal quarries in Upper Germany or the papyri, ostraka and inscriptions of Roman Egypt regarding military matters tell of numerous occasions where military personnel were involved on different levels of stone exploitation.

This paper aims to outline possible functions and responsibilities allocated to military personnel in quarrying operations at Dokimeion/Bacakale, Simitthus, and the quarries of the Eastern Egyptian Desert (Mons Claudianus, Mons Porphyrites, Tiberiane, Mons Ophiates). It focuses in particular on military 'experts', mainly centurions like Annius Rufus (*I.Pan* 39), Sergius Longus (*ILS* 8717), or Tullius Saturninus and Aelius Antoninus who were transferred from *legio XV Apollinaris* in Carnuntum or *XXII Primigenia* in Mainz to their new postings at Mons Claudianus (Egypt), Karytsos (Greece), or Bacakale/Dokimeion (Turkey), respectively. The administrative procedure of their reassignment is addressed and their possible responsibilities at these quarries are outlined.

The military presence at extractive operations raises the question of their ownership and control; inscribed monuments, labels on quarried stones, ostraka, and papyri implicitly or explicitly point to the involvement of the provincial administration and, ultimately, the emperor and his Palatine bureaux in running and supplying marble quarries under his control. The role of the emperor in the allocation of military quarrying specialists in particular and vis-à-vis marble quarries in general is to be explored.

Julia HOFFMANN-SALZ, The local economy of Palmyra – Organizing agriculture in an oasis environment

University of Cologne (Germany)

The name Palmyra is generally associated with the city's famous caravan trade that took its citizens to the Arabian Gulf and beyond in the quest for Indian spices, Chinese silk and other luxury goods that could be sold with enormous profits on the Mediterranean market. These profits allowed the local elite an impressive building programme that has left the oasis of Palmyra as one of the most spectacular ancient ruins of the entire Mediterranean world.

However, the oasis of Palmyra – and its surrounding hinterland - was also an agricultural system sustaining an increasing population as well as a large number of transport animals. Due to the particular environment of the oasis in the middle of the Syrian Desert, every piece of arable land and especially every water resource available had to be used to achieve this. Although we lack explicit sources, the oasis must have been drawn on as the main production area for fresh fruits and vegetables. Here, a wide variety of agricultural products could be obtained using simple techniques such as growing plants in different layers that offered a perfect use of land, water and shade. But agriculture was also practiced in more remote corners of the surrounding countryside, provided that water could be found. Livestock and especially the transport animals that were essential for the caravan trade and thus ultimately for the livelihood of Palmyra, also seem to have been kept in the hinterland of the oasis. Archaeological surveys of the late 1930s, for example, show what could be interpreted as camel outposts in the today rather barren hills to the Northwest of the city. Thus, the oasis and many parts of its hinterland allowed for an active agriculture in Palmyra and its territory that also testifies to the perfect adaptation of a society to its natural surroundings.

But how was this agriculture organized? How exactly was the oasis and its hinterland used for farming? Which products could be obtained and what sources do we have for them? Can the famous tax inscription be used as a source for local agriculture? Also, how were water resources managed? Was there a difference in management of the oasis spring and other water resources? And what about the soil? Who was allowed to use the land for agriculture and how were land rights organized? The paper will try to answer at least some of these questions by drawing on the ancient sources and also using examples of modern oasis societies and their agricultural organization as comparative evidence.

Daniel HOYER, Diverse crop harvesting and the maghrebi agrarian economy

(PhD Student University of New York)

The Maghreb region of North Africa is widely considered an integral part of the Imperial Roman economy. This is because the area is often seen as one of Rome's 'bread baskets,' namely where a good deal of the grain that was consumed at Rome and other urban centers around the Mediterranean was produced. This view of the Maghrebi economy, moreover, has its roots in antiquity; for many ancient authors, the richness of Africa's grain production and its importance in the diet of Roman citizens was proverbial. Recently, much archaeological work has been conducted in North Africa to test empirically this view. Although this work has, in part, confirmed the traditional account stressing the importance of large-scale, export-oriented grain production throughout the region, signs of olive harvesting and olive oil production appear in greater numbers than would be expected from the literary sources alone. This has had important ramifications for how the Maghrebi economy is conceived, notably in that scholars now tend to focus on the production of olives as much as, if not more than, grain.

While it is unmistakable that a great quantity of grain and oil were produced in the region, much of which was likely consumed in Rome, many studies focus exclusively on these aspects of agricultural exploitation. Doing so, unfortunately, they fail to give a complete picture of the Maghrebi agricultural economy. Crucially, such studies cannot explain how the people who lived in North Africa and worked on land producing goods which were exported and consumed elsewhere themselves attained subsistence. Put simply, our understanding of the diverse agricultural activities conducted in Roman North Africa and how they were integrated into the overall economic structure, activities ranging from large-scale, export-oriented grain and oil production to legume, vegetable, and fruit harvesting for local consumption, remains poor.

In this paper, therefore, I will explore the structure of Maghrebi agriculture in the Imperial period, using archaeological, literary, and epigraphic material in an attempt to discern the different agricultural goods being produced in the region, as well as exploring for what purpose and for whose benefit these resources were exploited. I hope to show that there is ample evidence suggesting that, alongside grains and olives, a significant quantity of other goods, notably legumes and fruits, were also being harvested. Moreover, I wish to suggest that a deeper understanding is needed of the region's overall economic structure in order to explain how this multifaceted agricultural exploitation developed and how the diverse interests of the inhabitants of North Africa were able to coexist. To this end, I will briefly explore some of the ways that the demands of Roman taxation, wealthy landowners seeking profit from the sale of their produce, and the subsistence requirements of peasant farmers and tenants were integrated into a single economic system. This, I believe, offers the most promising way to explain all of the evidence we currently possess concerning the Maghrebi agrarian economy, and will be the focus of my studies in the coming years.

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Eva JAKAB, Property and profit in Roman law and economy

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Ownership is a 'title' in Roman law, which is sharply distinguished from possession (the fact of holding). Roman *dominium* is considered as almost absolute and highly protected by law. The full private ownership was a strict conception of the archaic *ius civile*. Peregrines (foreigners) could not own anything in this full sense. The most important kind of property in the Roman world was land. In the above mentioned full sense, however, ownership on land was restricted to Italy also for Roman citizens. Thus is the concept of property law highly accepted in casebooks for Roman law. Nevertheless, focusing on legal life and on the social and economic function of property rights we will get a slightly different picture.

To start with an ancient guide, Gaius opens the second book of his *Institutiones* with a complicated treatment of different categories of assets, *res* (3.2-11). At the first glance his system might look like a useless scholarly speculation. However, from the view of exploitation rights it can get a completely new sense.

Res divini iuris, res humani iuris, res communes omnium, res nullius: a lot of assets were susceptible of private ownership but other not at all. There were things belonging to the community and to private individuals, respective. There were goods belonging to all men and hence to no one individually (air, sea, rivers and most harbours, seashore and riverbanks) – thus determining the rights for fishing, towing and transporting on water routes. As we see, the legal concept set the basic limits for the exploitation of natural sources. Property situated beneath the surface of private land went on the vertical principle; this is important for minerals and mining.

Apart from ownership also *servitudes* grant economically important rights of exploitation (e.g. rights of way and water). Further *iura in re aliena* (*usufructus, emphyteusis, superficies*) were essentially to the economic exploitation of landed property.

In the Roman Empire the most important kind of property was land. Every respectable man lived upon the rents of land. Land could be cultivated in own regime but rather it was lent out to tenants. Tenancy never transferred *iura in rem*, but rather it was based on a mere obligation, a contract of letting and hiring. Pliny the Younger let his land to tenants as a matter of course. Since archaic times it was a money rent, laying the whole risk of exploitation upon the tenants. Probably Pliny was among the first persons who taught of putting his tenants on to a metayage system (and sharing the risk of exploitation).

Legal documents on wooden tablets or papyrus, the works of the Roman jurists and the agricultural authors, and the decisions of the emperors can open an interesting view on the legal background of exploitation of land and natural resources in the Roman world.

Egbert KOOPS, *Absentee landowners and bailiffs: the legal framework*

In the late Republic, the Roman agricultural system had become marked by absentee landownership. City-dwelling landlords, so it is held, often did not have the time or the inclination to personally manage their estates, which could be far apart. This made it necessary to leave the supervision of production as well as actual farm labor to others. Two types of agricultural management can be distinguished [Aubert 1994]: tenancy, which is to say leasing the land to a farmer against a rent, usually paid to a representative of the landowner; or agency, the establishment of a bailiff (*vilicus*) to oversee the estate.

The latter mode of management is often identified with the so-called 'slave mode of production', though this has been contested. A *vilicus* may be a freedman or a slave; and he may employ others with a differing legal status. There is, however, a clear difference between a freedman bailiff and an enslaved bailiff from a managerial point of view. An absentee landlord could appoint a bailiff (free or enslaved) as his representative, much like a store owner could appoint a shopkeeper. At law, he was then liable for all contracts concluded within the terms of the *praepositio*. However, he could also entrust a slave with a *peculium*: an earmarked fund that was set apart for the use of the slave, though it technically remained part of the master's patrimony. The *peculium*, as a mode of management, had its advantages. It allowed for a less hands-on approach, as the master was liable only to the extent of the earmarked fund (plus any enrichment to his own patrimony). Moreover, it allowed slaves a measure of freedom since profits would flow into the *peculium*, and could in time be used to purchase liberty.

Aubert presents estate managers as being birds of a feather, agents for the landlord under the terms of a *praepositio*. This seems to be borne out by the available legal and literary sources. But some sources, notably Varro, show that this was not necessarily the case for herdsmen and lesser farm workers such as foremen, who regularly held a *peculium*. The question, then, is why a landowner would choose to appoint a bailiff to oversee agricultural operations, but endow a slave with an earmarked fund to manage animal husbandry. The lesser liability would make the latter course of action seem preferable for *vilici* as well. A possible answer is that absentee landlords were less absent than is often assumed, when it came to overseeing the overseers.

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Kyle HARPER, *Patterns of Landed Wealth in the Long Term*

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In the broad sweep of Roman history, there are a handful of documentary sets which allow finely-resolved study of the structures of landholding in particular landscapes (e.g. the tables from Veleia and Ligure Baebiani, the Hermopolite land registers, the Greek census inscriptions), and these have been well-exploited by modern historians (e.g. Duncan-Jones 1990; Bagnall 1992; Harper 2008). The data provided by these documents are invaluable, but they are unfortunately limited and widely dispersed in time and space. Hence, it has been difficult to move from these detailed “snapshots” of the countryside to a more global image of landholding patterns.

The present paper will argue that important and too often implicit assumptions about the aggregate patterns of land tenure underlie some broadly-held metanarratives of Roman economic history. Consequently, models of Roman economic development contain assumptions about the scale of landownership that need more careful scrutiny. Particularly well-entrenched is the belief that the scale of aristocratic wealth increased under the empire (recently, Lo Cascio 2009). This narrative of linear accumulation is often based on egregious impressionism (a quote from Pliny the Elder, a mention of Melania the Younger). At times, important downstream effects (e.g. the decline of slavery, the impoverishment of peasants) have been attributed to these putative trends. Similarly, the decline of the Roman economy in late antiquity, esp. post-AD 400, has been framed, most recently by Chris Wickham (2005), a reversion to a “peasant mode of production,” in other words the disintegration of Roman-style aristocratic landholding. But no quantitative parameters for this process have been suggested, and it is worth asking at what threshold a “peasant mode” might be considered dominant.

The present paper tries to bring some quantitative discipline to bear on this admittedly vast problem. I will use (1) survey archeology (2) recent models of aggregate wealth (esp. Scheidel and Friesen 2009) and (3) a coded database of discrete individual properties which are known in order to establish plausible parameters for the overall distribution of landed wealth in the Roman empire. This step uncovers the assumptions that lurk in our stories of Roman economic development, and it allows us to test the limits of the possible. What this analysis suggests, I will argue, is that narratives describing long-term dynamism in the Roman economy are focused on a more limited part of the countryside than they have usually admitted. Narratives of progressive “latifundism” are built on particularly fragile foundations. This analysis coheres with a number of disparate indices that suggest smaller units of aristocratic landholding and a generally larger share of “peasant” wealth. The implications of this view are important for understanding the mobilization of resources by the state and the private market alike. An account of aggregate land tenure is a precondition, I will argue, to a robust assessment of Roman economic performance in the long-term, especially urgent now that the “primitivist-modernist” dichotomy has been replaced by more promising, quantitative approaches to the comparative study of pre-industrial economies.

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Fernando LOPEZ SANCHEZ, The mining, coining and obtaining of gold in the Roman Empire

University Jaume I of Castellón (Spain)

The exploitation of the gold mines of north-western Spain from AD 60 to AD 240 was carried out with greater efficiency by the Roman authorities during periods of conflict with the Persian Empire. The fragmented nature of the Roman Empire after AD 240, and the preference of the various imperial houses for obtaining gold where it was available (i.e. temples and public and private stocks) made the exploitation of mines like those in Spain less important than before. The financing of Rome's elite troops and of the numerous client kingdoms was one of the main reasons for seeking gold during the Empire, and the construction of a sole financial system which could stand up to bitter competition with the Persian Empire was another reason for the vast increase in the minting of gold after AD 350. Our paper aims to explore the crucial role played by the Eastern half of the Mediterranean in the increase in the amount of gold minted in the Roman Empire: the flood of gold into the West almost always took place when the Roman authorities had to deal with revolts on the borders of the Empire. These distractions for the Roman authorities in the West did not, however, affect the predominantly Eastern-influenced pattern for the coining and circulation of gold in the Empire.

Michael MACKINNON, Changes in Animal Husbandry as a Consequence of Changing Social and Economic Patterns: Zooarchaeological Evidence from the Roman Mediterranean Context

University of Winnipeg, and American School of Classical Studies at Athens

Synthetic investigations using zooarchaeological data from the Mediterranean context reveal, as a consequence of Roman cultural influence, geographic and temporal changes in the principal domestic livestock exploited—cattle, sheep/goat, and pig—at both quantitative and qualitative levels. First, in terms of quantitative measures, animal husbandry operations escalate due to Roman economic and social demands, notably catalyzed by augmented human population pressures. Greater numbers of livestock are produced, with a push, in some areas, for keepers to specialize in large-scale herding of single species, as opposed to earlier ventures favouring smaller, generalized, farming and herding operations. Second, in a blend of quantitative and qualitative aspects, shifts in the ratios among these livestock taxa occur during the Roman period, with different patterns developing in response to varying cultural and natural factors. The frequency of pigs increases across many areas of the Roman Mediterranean world during the Imperial period, likely due to the key role pork fulfilled as a marker of “Romanized” and elite diets. Roman urban centers appear to advance this pattern most prominently, with sizeable jumps in the frequency of pigs seen at a variety of cities, even those in areas where pigs are not best adapted to local geographic and environmental conditions, such as towns in North Africa and the Eastern Mediterranean. Finally, on a more qualitative basis, Romans are instrumental in developing and manipulating, not to mention, importing and exporting, a vast array of ‘breeds’ of domestic livestock. General “improvements” and height increases occur among cattle, sheep/goat, and pig, but neither equally nor simultaneously across areas of the Mediterranean. Some regions, such as Italy, see larger gains in these measures, and from earlier times. Broader examination of these zooarchaeological metric data, however, reveals more complex and specialized patterns as regards animal ‘breeds’, with the Romans variously manipulating individual physical traits, such as height, weight, stamina, strength, among other characteristics, in their quest to breed livestock which best catered to the social and economic demands of various regions of the Empire. Zooarchaeological data underscore the shrewdness, efficiency, and innovation of the Romans, as regards animal husbandry and breeding tactics.

Yuri MARANO, Management of water resources in Ostrogothic Italy (end of the 5th - first half of the 6th century A.D.)

Literary and archaeological evidence attest for the period a great interest of Theoderic and his successors to the maintenance and restoration of aqueducts, and the exploitation of natural springs and sources. Water was used for a wide range of uses, from the provisioning of towns and public baths to the grinding of mill. This required the mobilization of significant financial and technical resources, and the involvement of secular and religious authorities. Moreover, ancient authors (Cassiodorus in first place) do reveal the survival of a juridical tradition in the management of water resources dating to the imperial period and having a strong parallel, in the 5th/6th century, also in the eastern legal evidence, as the Codex Theodosianus and the Codex Justinianus

Antoni ÑACO DEL HOYO & Dario NAPPO

When the waters recede. Economic recovery and public policies after the AD 365 tsunami and some earlier precedents.

ICREA and Universitat Autònoma de Barcelona

Dario Nappo, Oxford University

According to several historical sources a 'big wave', consequence of a rather colossal earthquake probably striking mainland Greece, Asia Minor and Crete, swept away some shores of the Eastern Mediterranean on July 21st AD 365, carrying its destructive effects at least to Alexandria in Egypt, and perhaps to some Aegean islands, Syria and reaching even the coasts as far as Italy (G.Kelly, 'Ammianus and the Great Tsunami', *JRS* 94, 2004, 141-167). Such a huge natural disaster left behind not only immediate damage for the people and towns directly hit by its most surprising arrival, but it may have also carried severe consequences for the next economic development of wider areas within the region. Surely, the invading waters got an immediate effect on crops and pasture lands, water technology such as draining systems and dams, fishing boats, maritime trade, and some other activities, all of them suddenly disrupted and perhaps discontinued enough time to jeopardize the economic evolution of an entire region of the Roman Empire. Precisely, the study of natural catastrophes has been a popular topic of modern scholarship of the Antiquity so far, particularly after the coincidence of similar disasters at present (A.M.Gunn, *Encyclopedia of Disasters. Environmental catastrophes and human tragedies*, vol.1, Westport, Conn. – London 2008). However, this paper will not deal with the impact of tsunamis themselves. Having primarily in mind the AD 365 tsunami, we want to analyse on the one hand the measures undertaken by the public authorities, from local town councils to the imperial and provincial administration, both on the short-term and long-run basis. And, on the other, we will deal with the consequences faced by the affected regions regarding their eventual economic development, particularly focusing on the difficulties of access to the natural resources after the strike of the wave, but also the disruption of subsistence economy and spread of diseases, famine and social disorder. In order to do so, we will take into account some other relevant examples of Ancient tsunamis and earthquakes from the historical record of the Classical Antiquity, in which common features on the public policies eventually implemented to restore daily life and economic recovery might be compared with our primary study case. Last but not least, this paper proposal has its roots in two current research projects, funded by the Catalanian and Spanish governments, to undertake the study of the political management of humanitarian crises in the Antiquity.

Jordan PICKETT, *The construction and the Roman Economy: Five Logistical Case Studies from Roman and Late Antique Cappadocia in Comparison*

(University of Pennsylvania)

Well-studied and –preserved architectural remains offer under-utilized avenues for quantitative, integrative approaches to the investigation of the Roman economy in action. While textual sources describe or prescribe general conditions of patronage, ownership, wages, and contractual relationships, buildings themselves exist as specific instantiations of realized economic potentials, preserved in directly measurable physical fabrics; they are unique products of human action which have the potential to reveal distinct priorities and capacities for the organization and exploitation of resources and labor across a landscape. This paper presents a logistical analysis of five structures from across Late Antique Cappadocia, in order to compare the material needs and outlays of different classes of patrons, forms, functions, and styles of construction: masonry-built and rock-cut Roman tombs from Comana (3rd-4th centuries), a rock-cut basilica from Göreme (5th-6th c.), fortifications at Keçikalesi (4th-6th c.), and a masonry-built pilgrimage church at Güzelyurt (6th c). Comparison of the categories and quantities of construction materials and processes in different buildings expose a wide range of patterns of material demand and exploitation across Cappadocian landscapes in the Late Antiquity.

Janet Delaine famously (if with little attribution) borrowed an idea developed by New World anthropologists in the 1960s-1990s, “architectural logistics” or “energetics”, to investigate labor and construction at the Baths of Caracalla in Rome.¹ This method entails the literal deconstruction of a building into its constituent volumes, in combination with anthropological and pre-industrial rates for the completion of various construction-related tasks, in order to estimate figures for labor and material/temporal cost in a structure. Given the comparatively rich documentary evidence for the economy of ancient Rome, Delaine was little interested in parsing out the social or economic consequences of building the Baths of Caracalla – her work is instead important for demonstrating the deep link between design and construction in the building process. Yet logistical case studies, particularly in dialogue with more American-style methodologies characterized by their attention to task- and land-scapes,² present an opportunity for buildings to be fit into conversation with broader frameworks of knowledge concerning activities and processes constituted in Roman economies and ideologies: rather than treat activities in isolation, logistics compels us to see that construction triggered and directed not only architects and artists, but also quarrymen and masons, brick and tile bakers, foresters, livestock-suppliers, farmers, and unskilled laborers.

Using AutoCAD models to determine the volumes of building materials, it becomes possible to project the time required for their extraction or production, processing and installation, in addition to requisite quantities of labor and the supplies and rations required for their maintenance.³ The articulation of these activities with local conditions (topography, agriculture and demographics) can also be considered, through the GIS integration of building data with identified or hypothetical sites for materials extraction, as well as models for regional agricultural potentials (aided by the recent publication of detailed, palaeo-ecological data from annually laminated varves at Nar Gölü in central Cappadocia).⁴ Comparing data worked up from individual buildings allows us to assess variable patterns of organization and exploitation; to weigh costs for patrons, workers, and their originary landscapes; and to measure such costs against practical and ideological returns in the form of finished buildings.

1 J. Delaine, *Baths of Caracalla: a study in the design, construction, and economics of large scale building projects in imperial Rome* (Portsmouth, 1997).

2 For the idea of the taskscape, see T. Ingold, "The Temporality of the Landscape", *World Archaeology*, 25.2 (1993): 24-174. For a critical review of the “energetic” method developed by American scholars, see E. M. Abrams, “Architecture and Energy: an Evolutionary Perspective” in *Archaeological Method and Theory* vol. 1 (Tucson, 1989): 47-87. See also, more recently, John Haldon’s Medieval Logistics Project which has been concerned with the generation of quantitative data in order to refine issues of historical agricultural carrying capacities and land yields, the impact of moving troops across a landscape, and historical population densities. I have appreciated his guidance and support throughout this project. Cf J. F. Haldon ed., *General Issues in the Study of Medieval Logistics* (Leiden, 2006).

3 My studies of Late Antique and Medieval building logistics are, to my knowledge, the first such investigations to integrate digital modeling of building processes and originary landscapes via GIS and AutoCAD.

4 A. England, W. Eastwood, J. Haldon et al., “Historical landscape change in Cappadocia (central Turkey): a palaeoecological investigation of annually-laminated sediments from Nar lake” in *The Holocene* 18 (2008): 1229-1245.

Adam ROGERS, Controlling waterscapes: a study of water and towns in Roman Britain

(Postdoctoral Research Fellow, School of Archaeology and Ancient History, University of Leicester)

There has now been considerable and important study of the exploitation and transformation of rural wetlands in the Roman period in Britain (e.g. Rippon 2000 *The Transformation of Coastal Wetlands*). In Roman Britain coastal wetlands were drained and the land reclaimed for agricultural purposes. Other wetlands such as the East Anglian Fenland, the largest wetland in Britain before modern drainage, were used partly for agriculture and partly as pasture for keeping cattle (Fincham 2002 *Landscapes of imperialism: Roman and native interaction in the East Anglian Fenland*). Many of the towns of Roman Britain also developed within or near wetlands and other watery contexts which has not received so much attention. This paper will consider the way in which towns adapted to, controlled, exploited and transformed the landscapes in which they were situated paying particular attention to water. It will examine evidence of the drainage of wetlands, the reclamation of land and the redirection of rivers for the purposes of developing and expanding the towns. Rivers were also increasingly controlled through timber revetments, embankments and wharfs (e.g. Milne 1985 *The Port of Roman London*), representing growing command of the landscape.

This exploitation of water in association with towns marked a significant contrast from the way in which these places were used before the Roman conquest. Many of the sites in which towns developed, such as Lincoln and Winchester, were already important in the late Iron Age (Stocker 2003 *The City by the Pool*; Qualmann 2004 *Oram's Arbour: Iron Age Enclosure at Winchester*). In these cases the rivers, lakes and marshlands formed integral and meaningful parts of the settlements and they were not apparently altered in any major way by human action. Watery places were also imbued with religious meaning which would have had an impact on the importance attached to these sites. Transforming these locations through Roman urbanism would also have altered the way in which the landscapes were viewed, exploited and experienced and may well also have had religious connotations. It is possible that in some cases towns were deliberately placed in difficult areas that had to be transformed. This may have been as an act of domination over these pre-existing special places or as a sign of imperial power altering and exploiting the landscape.

Some of the landscape changes appear to have taken place at an official level, such as cases of river diversion around towns (as at Cirencester; Holbrook 1998 *Cirencester: The Roman Town Defences, Public Buildings and Shops*), whilst others were smaller in scale and may have taken place at an individual level, such as the gradual reclamation of land in wet areas for building purposes (e.g. Southwark, London; Cowan *et al.* 2009 *Roman Southwark: Settlement and Economy*). Through this evidence we can examine the organisation of land and water exploitation and the different motives connected with the actions that people took. The paper also has implications for considering changing attitudes to landscapes and the exploitation of natural resources and landscape features in Roman Britain over time.

Saskia T. ROSELAAR, The role of Italians in local economies of the late Roman Republic

(Newton International Fellow at the University of Manchester, working on a project called 'Integration and economy in republican Italy')

In scholarship on the economy of late Republican Italy the Italian peoples are often neglected. However, recent studies have indicated that they may have played a much more important role in the economy of Italy than is usually assigned to them.

On the one hand, it has been suggested that Italian allies were admitted into colonies founded by the Romans throughout Italy. Whereas the traditional reconstruction of colonization assumed that local inhabitants were expelled from their lands when a colony was established, archaeological and linguistic evidence has suggested that in many cases, such as Brundisium, Luceria, and Aesernia, Italians may have lived in colonies. Their legal status, however, is not clear; if Italians were admitted as official colonists and received a plot of land, this means that they were considered valuable citizens for the colonies. If, on the other hand, Italians were only allowed to live in colonies as unofficial inhabitants (*incolae*), and were not assigned land, their economic and social position was below that of the Romans living here, and they may have experienced difficulties in gaining access to land.

Furthermore, it is clear that Italians played a crucial role in overseas trade; Italian merchants are widely attested throughout the Mediterranean. Nevertheless, at the same time the idea that many areas of Italy in the late Republic suffered economic decline is still often repeated. It is difficult to reconcile these two assumptions: if Italians were active in trade, they must have gained considerable benefits from this, and it is likely that they invested this in Italy. Only recently it has been recognized that many cities and sanctuaries in Italy, such as Tibur and Pietrabbondante, were monumentalized in the late Republic, and it is suggested that much of the wealth to finance this came from overseas trade.

However, Italian investment in land has not yet received similar attention. On the one hand, most areas of Italy experienced unprecedented economic growth, instead of decline, in the last two centuries of the Republic; on the other, many local elites held on to their dominant local positions. If we combine these two developments, the conclusion presents itself that many local Italian elites invested their new-found wealth in Italian land, some of which they may have received when they were admitted officially into colonies founded by the Romans, while other land may have been Roman *ager publicus*.

In this paper I intend to shed light on Italian access to land in the late Republic and its correlation to overseas trade. I will study five colonies for which we have a reasonable amount of evidence, namely Aesernia, Ariminum, Brundisium, Luceria, and Paestum. I will investigate the evidence for the presence of locals in these colonies and trace their economic development throughout the late Republic. Thus it will become clear that the Italians played a crucial role in the Italian economy in the late Republic – indeed, the economic growth in this period could not have been achieved without the know-how of the Italians, who participated in long-established overseas merchant networks and had long played a dominant role in the exploitation of land and natural resources in Italy itself.

Laurens TACOMA, Imperial wealth in Roman Egypt. The Julio-Claudian *ousiai*

Universiteit Leiden

The fact that Roman rulers were extraordinarily rich is abundantly clear and hardly needs substantiation. But how rulers obtained and used their immense wealth is often less easy to determine. Obviously, the acquisition of the wealth of their predecessor, either through legitimate inheritance or through simple appropriation normally provided the basis of their fortunes. Once in possession, additions and alienations could be made in various ways. But the details of the process are hardly documented and the general trends are therefore difficult to discern. If, as is often thought, the process was a cumulative one by which emperors acquired ever more property, why are the emperors by Late Antiquity only in possession of roughly one fourth to one fifth of all property, and not of much more?⁵

Thanks to the survival of numerous references in the papyri, the documentation of imperial wealth in Egypt is fuller than elsewhere. Of course, as always in papyrology the evidence is fragmentary, and raises a host of technical problems about categories of land. The sources consist of scattered references to individual pieces of property and they are unevenly distributed geographically and chronologically. Nevertheless, the possibilities for an analysis of the way rulers acquired and passed on their property are much better than elsewhere.

The possibilities for analysis have not gone unnoticed, and a number of studies have been devoted to the subject. In particular the *ousiai*, the large estates of the Julio-Claudian period, have been studied. What has attracted most attention is the fact that the way these *ousiai* were treated by the Roman emperors seems to show similarities to the way the Ptolemaic kings handled the *doreai*, the gift-estates the Ptolemies handed out to their administrators. Quite naturally, this has sparked a debate over the question of continuity. The traditional interpretation held that the Julio-Claudian *ousiai* were gift-estates which the emperor handed out to family members and loyal friends, and which eventually would revert to the emperor. However, forceful reservations have been made against this view, in particular based on the argument that Roman attitudes to property were quite different from Ptolemaic ones. *Ousiai*, in this view, were nothing more than privately-owned estates, some of which happened to be owned by the emperor and other members of the imperial house, who owned them in a private capacity.

The debate what the Roman *ousiai* are and how they relate to Ptolemaic *doreai* has been unresolved. Although there is much that points in favour of private ownership of the Julio-Claudian *ousiai*, the problem remains that in the *ousiai* an element of redistribution seems to be at work. Many of the *ousiai* that were in non-imperial ownership eventually ended up in imperial hands. The known owners of *ousiai* belong to a fairly limited circle of friends and family of the emperor. In consequence, radically different opinions about the nature of the estates and the question of continuity have been given.

In my paper, I will argue that all these views are partially correct. The Julio-Claudian imperial *ousiai* were private estates, but they circulated in what might be called an indirect redistributive system. This need not cause surprise. Many systems in which a ruler redistributed property to loyal supporters occur in history, and the distribution of privileges and wealth is a recurrent characteristic of any autocratic regime. The crucial and more interesting fact is that the forms of such redistribution might differ substantially. Rather than focussing on the question of continuity between Ptolemaic and Roman practice the main question is how such a redistributive system worked in the case of the Julio-Claudian *ousiai*. I will argue that their circulation can be explained within the principles of Roman property devolution and imperial *liberalitas*. This created a system of indirect redistribution where property circulated with a relatively high frequency between a limited number of people around the emperor. Although much property eventually ended up in imperial hands, the process was neither one-sided nor automatic.

⁵ As MacMullen (1976) rightly asked.

Peter TEMIN, *The Terms of Land Tenure in the Roman Empire*

See full working paper below

Isabella TSIGARIDA, Salt in Asia Minor. An outline of Roman authority interest in the resource

Universität Zürich

Under the premise that the prosperity of pre-industrial societies strongly depended on agricultural productivity and access to natural resources, the question arises whether the Roman state or the emperor fostered exploitation of land and resource through targeted economic policies. Such political and administrative setting may have well stimulated economical thinking and acting in ancient Roman society.

This paper analyses the exertion of influence on the vital resource salt by Roman authorities exemplarily for the province Asia. It also outlines structural indications of potential links between politics and economy pertaining to salt including relevant state regulations, state interests, property rights and administration of salt mines and deposits.

Sophia ZOUMBAKI, The exploitation of local resources of Western Greece by Romans and Italiot Greeks

Romans and Italiot Greeks are attested to have been active in various areas of the Western part of the Greek peninsula and on the islands of the Ionian Sea as early as the 3rd c. BC, long before the formation of the provinces of Macedonia and Achaia. If we ignore Roman magistrates and a few *proxenoi* of Greek *poleis*, whose exact relationship with the *poleis* -beyond conventional diplomatic contact- is in most cases unclear, it is obvious that the motivation that drove these Westerners eastwards was economic. The nature of their activity is to be either seen in the context of commercial interchange between both sides of Adriatic, which is regularly attested as early as the Geometric period onwards, or it is to be connected with the exploitation of local resources, which were different in each of these regions. Yet tangible professions or occupations of these individuals are not often mentioned in the sources. Terms defining such occupations are sometimes more or less concrete, such as *unguentarius*, *engaiountes*, but in other cases they are general and include various capacities related to certain activities, as, for example, the term *negotiatus* or *negotiator*. There are also cases in which the activities of the foreign settlers are totally unknown or have to be guessed at through indirect references in the sources. Furthermore, we attempt to trace possible occupations in the light of the economic opportunities available in each locality. All these cases are to be considered when studying the evidence from the area in question, that is, Western Greece from the Ambraciot Gulf to Cape Tainaron, including the adjacent islands. Research into such matters might function as a basis for a further study of the role of Roman and Italiot entrepreneurs in the economic and social life of the Greek *poleis* in the area in question and of their role in the economic network of western entrepreneurs located in the Eastern Mediterranean.

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Dimitri Van Limbergen (PhD Student University of Pisa)
Towards a more diversified roman economy: a working hypothesis for Central Adriatic Italy

The Roman economy was both a well-integrated economic system as a link between a series of regional – essentially agrarian – economies, and it needs to be studied from that perspective. While common characteristics for the whole of Roman Italy cannot be denied, different reactions of indigenous populations, local environmental conditions and specific commercial circumstances hinder the application of a single economic model that could work for the whole Italian peninsula. By accepting the existence of these various regional realities, this research project wants to define the economic position of the ‘peripheral’ region of Picenum and the Ager Gallicus – today’s Marche and Northern Abruzzo – within the wider geographic and commercial frame of Late Republican and Early Imperial Roman Italy and the Mediterranean. The region forms an excellent study case for developing models of local economic and agrarian behaviour within the context of a Mediterranean valley-landscape defined by the presence of small local urban centres in a predominantly rural area. This research project in particular tries to dissect the balance between intra-regional consumption, extra-regional export and extra-regional import in an Adriatic coastal region, whose geographic position favoured commercial contacts with the Eastern Mediterranean and the Northern Adriatic region, but where rural populations and small towns were more likely to have relied upon regional supplies than upon extra-regional import.

Kim Van Liefferinge (Phd project, UGent)

Water management in the Laurion mines

This poster presents the preliminary results of the 2010 excavation campaign focusing on Cistern no.1 in Thorikos. The site is located in southeastern Attica (Greece), more specifically in the Laurion region. The cistern had been part of a silver processing workshop, of which dozens existed, scattered over the area. The Laurion knew a long history in silver mining; the first traces of these activities even go back to the late Neolithic period. The mines continued to be exploited until the late Roman period, with a peak in Classical times.

To guarantee a smooth progress of the industrial activities, careful water management was crucial, especially since large amounts of water were required both for ore processing and for the people living and working in the workshops. Given the dry climate and resulting water shortage in the Laurion, this has been a major issue throughout the area's history, influencing not only the level of water technology but also the evolution of silver metallurgy in general. Despite the importance of water for analyzing the complex society based in the area, scholars have not devoted any attention on this issue yet.

This situation especially relates to Thorikos. Up till now, water supply at the site was described as a mystery by many scholars. The current research at Thorikos aims at getting a better understanding of this topic by investigating the largest water cistern of the site.

Devi Taelman (UGent)

Quarryscapes of Roman Ammaia (Portugal): a Geoarchaeological Approach

The quarry research of the Roman town of Ammaia (Alentejo, Portugal) studies mainly the provenance of the stone building material, the organization and nature of the extraction and transport, and the use of the stone in the town's architecture. For this purpose, a geoarchaeological approach was used and several new methodologies were developed to efficiently study the different aspects of the quarry and building process. These methods include the application of different stone sourcing techniques, GIS-based approaches to the stone transport, and the development of a low-cost method to accurately map complex archaeological quarry sites. This contribution presents the result from the study of the ancient extraction sites of the two principal stone types of Roman Ammaia: granite and marble.

Initial macroscopic and thin section petrographic study of the stones used in Ammaia, combined with a detailed geologic and geomorphologic assessment of the town's environment, permitted to identify potential source quarries of the Ammaian stones. These quarryscapes were further approached from an archaeological, geomorphologic and geologic point of view.

For the granite rock, a local source was identified, c. 10 km east of Ammaia. The large quarry complex is implanted on the western slope of a semi-circular hillside that is composed of irregularly distributed granite boulder outcrops. Remains of ancient quarrying are numerous and consist mainly of quarry faces, abandoned roughed-out blocks, wedge holes and spoil heaps.

As no marble outcrops are present in the vicinity of Ammaia, the marble had to be imported into the territory of Ammaia. In an initial phase, the study zone was limited to the nearest marble zone, the geologic unit of the Estremoz Anticline (c. 65 km south of Ammaia). Research in this marble complex focused on the geologic and archaeometrical characterization of the area, as well as the Roman exploitation of the marble resources. Despite intensive modern quarrying, several ancient extraction sites were located and studied in relation to their archaeological, geomorphological and geological background. Historical quarrying was characterized by a very standardized and systematic extraction, using the wedging and trenching method.

Patrick Murray (University of Melbourne)
Veteran settlements under Sulla

t.b.a.

The Terms of Land Tenure in the Roman Empire

Peter Temin

MIT

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The Terms of Land Tenure in the Roman Empire

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I argue in this paper that the market for land in the Roman Empire worked approximately like the land market today. We can buy and sell land today with few impediments and use it as we wish; we own land as a *freehold*. The Oxford English Dictionary defines a freehold as “Permanent and absolute tenure of land or property with freedom to dispose of it at will.” The dictionary continues that the term originated in the fifteenth century and “was originally used to denote the holding of an estate in land with the rights of a free man, as opposed to a villein, and was taken to include the holding of an estate or interest in fee simple, in fee tail, or for term of life.” These terms—villein, fee simple, fee tail—post-date the Roman Empire, and the use of these terms to indicate current conditions illustrates how hard it is to understand the distant past. In the United States, land legally is still held in fee simple.

Nothing about land is quite what it seems, and land owned in fee simple or a freehold is subject to many constraints. There are zoning laws in most parts of the United States that determine what you can build on land and for what purpose. There are building codes that determine many of the details of any structure you construct on your land. And governments reserve the right of eminent domain, that is, the right to confiscate your land if they choose to do so. In the complex federal system of the United States, these restrictions on land ownership are imposed by localities, state governments and the federal government.

The problem of course is that land is immobile. As the old saw goes, the properties that determine the value of land are location, location, location. If your neighbor is doing something you don't like, you can move away but you cannot take your land with you. Many of these neighborly impacts do not go through markets and therefore are called *externalities* by economists. The presence of so many externalities complicates the functioning of any land market from Roman times to today.

Even today, there are large transactions costs in conveying ownership of land and houses from one person to another. Since land does not move, brokers need to be hired to arrange for putative buyers to come to the land. The title of the land must be searched to make sure that the seller has the right to sell the property to the buyer. Then the buyer has to register his or her ownership of the property in a government register to be taxed and in order to be able to sell it again at some future time. The cost of these operations can be considerable. These transaction costs often are close to ten percent of the price and more than ten percent for cheaper properties.

These problems indicate that the land or housing market can never work as well as the market for grain or even for labor. I suggest that there are three attributes of land ownership that indicate a functioning market for land. First, there is a price for land that can change freely when conditions change. Second, people can buy and sell land at this price without reference to many outside authorities, that is, they can make their own decisions rather than reflecting the decisions of people not directly involved in the land sale. And third, there are few restrictions on or obligations from most land holdings and land transfers other than the payment of taxes.

Direct evidence of the latter two attributes, that land can be sold without too many strings attached, has been compiled by Myrto Malouta (in progress, 2011). There are papyrus records of many land sales in Roman Egypt during the first century of the Principate. The properties were both rural, often vineyards, and urban, including houses and land. Many sales were listed with accompanying mortgages, typically at twelve percent. A few examples suggest the nature of these transactions. One third of one fourth of a three-story house was sold in 30; three-quarters of an old house and courtyard were sold in 40 with a mortgage of 72 drachms of minted silver, at 1 drch/mna interest a month (P. Mich. V 257, 329).

These records indicate a thriving land market, but they cannot show that prices moved because they are isolated observations lacking price information. They consequently need to be supplemented by anecdotal evidence that indicates land prices were flexible in the late Republic and early Empire. For example, Columella (*On Agriculture*, I. 2. 1) said, “I am of the opinion, therefore, that land should be purchased nearby.” This is the kind of advice that one gives quite naturally in modern surroundings and seems no more remarkable to Columella then. Varro (*On Agriculture*, I. 4. 2-3) was even more explicit: “For any man would rather pay more for a piece of land which is attractive than for one of the same value which, though profitable, is unsightly. Further, land which is more wholesome is more valuable, because on it the profit is certain.” He not only revealed that land could be purchased freely but that land values reflected aspects of the land that ordinary people find attractive, ranging from attractiveness—that is, favorable externalities—to productivity.

The well-known biography of Marcus Crassus by Plutarch describes the ease in buying and selling urban land and buildings that echoes the agricultural writers:

“Marcus Crassus, observing how extremely subject the city was to fire and falling down of houses, by reason of their height and their standing so near together, he bought slaves that were builders and architects, and when he had collected these to the number of more than five hundred, he made it his practice to buy houses that were on fire, and those in the neighborhood, which, in the immediate danger and uncertainty the proprietors were willing to part with for little or nothing, so that the greatest part of Rome, at one time or other, came into his hands.

“Later in life he was suspected to have been too familiar with one of the vestal virgins, named Licinia, who was, nevertheless, acquitted, upon an impeachment brought against her by one Plotinus. Licinia stood possessed of a beautiful property in the suburbs, which Crassus desiring to purchase at a low price, for this reason was frequent in his attentions to her, which gave occasion to the scandal, and his avarice, so to say, serving to clear him of the crime, he was acquitted. Nor did he leave the lady till he had got the estate.”

These are anecdotes, but their uniformity indicates that the process of purchasing and selling Roman land was not particularly difficult. Even in only few examples, we have reference to rural, urban and suburban land being sold freely at prices agreed upon by the buyer and seller. A final anecdote reveals how flexible Roman land prices were. There was a credit crisis in 33 CE in which land prices apparently fell rapidly, like stocks and houses in a modern crisis.

According to Tacitus (*Ann.* 6.16-17), the crisis originated with a conflict among the ruling class. One group accused the other of violating old usury laws that limited the interest rate to one percent a month or 12 percent a year. The Senate was divided as most senators apparently were extending credit to others in some form, and the emperor, Tiberius, gave the senators 18 months bring their affairs into conformity with the law.

Tacitus describes the implications of these events as follows. “Hence followed a scarcity of money, a great shock being given to all credit, the current coin too, in consequence of the conviction of so many persons and the sale of their property, being locked up in the imperial treasury or the public exchequer. To meet this, the Senate had directed that every creditor should have two-thirds of his capital secured on estates in Italy. Creditors however were suing for payment in full, and it was not respectable for persons when sued to break faith. So, at first, there were clamorous meetings and importunate entreaties; then noisy applications to the praetor's court. And the very device intended as a remedy, the sale and purchase of estates, proved the contrary, as the usurers had hoarded up all their money for buying land. The facilities for selling were followed by a fall of prices, and the deeper a man was in debt, the more reluctantly did he part with his property, and many were utterly ruined. The destruction of private wealth precipitated the fall of rank and reputation, till at last the emperor interposed his aid by distributing throughout the banks a hundred million sesterces, and allowing freedom to borrow without interest for three years, provided the borrower gave security to the State in land to double the amount. Credit was thus restored, and gradually private lenders were found. The purchase too of estates was not carried out according to the letter of the Senate's decree, rigor at the outset, as usual with such matters, becoming negligence in

the end.”

In these turbulent times of 2011, we can translate Tacitus’ statements into our current framework. The crisis may have originated in the deflation of a housing boom (Frank, 1935). Creditors were suing for relief, and senators were selling land to raise money. This led land prices to fall, and the fall was intensified by two processes familiar from the Great Depression. First, many senators hoarded their money to remain safe in these troubled times, reducing the purchasing power to buy land. Second, as land prices fell, the burden of senators’ debt rose in relation to the value of their property and reduced spending even more. The first of these was called the Paradox of Thrift by Keynes (1936); the second, the Debt-Deflation-Theory of the Depression by Fisher (1933).

In addition, the fall in land prices was sufficiently rapid to lead to a potentially dangerous destruction of private wealth, causing Tiberius to step in to stop the panic. Again, he used a technique that we still use two millennia later, known since 2000 as the “Greenspan put.” The important point here is not the panic, but rather that land prices were uncontrolled and capable of changing rapidly. This is consistent with Crassus sweet-talking Licinia to get a good price for her land. While we cannot observe actual land prices directly, we can see the process of price changes in these stories.

Hopkins (1978) generalized these descriptions to propose a wholesale transfer of Italian land from small to large land owners by the same kind of purchases as recorded for Crassus. The operative change however was not the immediate crisis of an urban fire, but rather the new-found wealth of high-ranking Roman military men. Hopkins thought of the relationship between land ownership and conquest as interactive where each

affected the other. My interest here is with the land market, and I do not need to evaluate or even explore the whole model. Let me therefore describe the one-way process that is at the key of Hopkins' synthesis. Rome expanded greatly in the last two centuries of the republic, the last two centuries before the current era. This expansion was made possible by Roman military prowess which overcame all opponents. (The organization of the Roman army may have been the independent event that started the interactive system in motion. To understand why an independent change is needed to start such a process, see Temin, forthcoming.) The result was a great inflow of booty into Rome in the form of both precious objects and slaves.

The objects must have been for sale, and returnees found that they had money in hand. They used this money to buy land in Italy, land being the only large asset that could be held by rich Romans. The purchasing of land does not seem to be a problem for Hopkins, and it forms a critical part of his interpretation of late republican Rome. If he is right, the inflow of cash into the Italian land market must have inflated the price of land. The countryside at this time therefore must have looked different from the variety of points of view we can imagine. From the point of view of the wealthy, land must have gone from being cheap to being expensive. From the point of view of the small land owners, the rise in price must have been a windfall. Hopkins ignored this aspect of the land sales and assumed that many small farmers went into the army.

It is reasonable to divide the common farmers into two groups. Some of them owned small farms while others were farm laborers without any land ownership. Landowners must have gained from the sale of their land—otherwise why did they sell—and most probably went to towns (Geraghty, 2007). Landless farm workers were

displaced in this model by the slaves that were the other part of wartime booty. They enhanced the army and allowed more conquests to take place. They did not benefit from the riches brought back from conquest; they probably lost as the addition of more slaves increased the Italian labor force and decreased their incomes and wages.

This is the result if there was a Roman labor market, as I have argued (Temin, 2004). Scheidel (2002) tested the effect of exogenous changes on wages in Egypt. He showed there were observable effects, but he unfortunately did not convince all ancient historians of their existence (Bagnall, 2002). The booty therefore increased inequality in Rome in two ways, by increasing the riches of those who had a claim on wartime booty and by decreasing the incomes of those who did not and suffered from greater competition as a result of the imports of slaves. This according to some was the beginning of the end of the republic (Tainter, 1998).

We need to be cautious about Hopkins' views since he asserted that, "slavery also allowed the rich to recruit labor to work their estates in a society which had no labor market (Hopkins, 1978, 14)." A labor market however is not necessary for the analysis of land ownership, as opposed to large questions about the fortunes of Rome. Duncan-Jones (1990, 126) argued that, "The usual processes of transfer of wealth appear to have been by inheritance, by bequest and by marriage." He added that the comments of Columella and Varro do not indicate that most property was acquired by purchase, but he argued in the context of the Tiberian crisis of 33 that the preference of the upper classes "for land rather than cash was probably a deliberate economic choice (Duncan-Jones, 1994, 24)."

These comments appear confused. The issue here is whether there was a market for land. It is not necessary that all land or even most land be bought and sold in some time period to make a market. It is only needed that enough land be bought and sold that we can speak of the price of land in general, as Tacitus did. If Duncan-Jones is right that wealthy Romans made an economic decision about the assets in which to hold their wealth, they must have considered the price of these assets. That is the essence of economic decisions.

The law of 111 BCE converted much the public land in Italy into private. In other words, the law made more land available for purchase and sale. Both public and private land was available after the legislation, but the Italian and civil wars made it made it “easy to acquire, either by unauthorized occupation or by legal purchase, large quantities of private land, especially land seized from the Italian enemies of Rome or proscribed Romans (Lintott, 1992, 58).” Lintott, differing with Hopkins, argued that the growth of large Italian estates was due more to civil wars rather than the conquest of new territories.

The Roman Republic financed its army from captured booty and from operating silver and other mines during its period of expansion. The Romans instituted a poll tax to mark personal subjection to Rome and a land tax to indicate Roman control of land. Without a large bureaucracy to assess these taxes, the republic farmed the taxes to people known to us as *publicani*. We know a lot about the operations of *publicani*, but less about which taxes were most important for revenue (Badian, 1983; Malmendier, 2010). Revenue from the mines and tax farmers apparently was sufficient to maintain the highly effective Roman army.

Augustus reorganized this system to account for both the advent of the new empire and the cessation of major territorial expansion. He split the revenue into two streams, the traditional taxes controlled by provincial governors as in the republic and a new stream of revenue controlled by the emperor, the *fiscus Caesaris*. “Uniform, if not universal, criteria for counting subjects and assessing their wealth were extended first of all to the *provinciae Caesaris*, the provinces under the direct control of the emperor, and later to the *provinciae populi* as well (Lo Cascio, 2007, 631).” It is necessary to unpack this summary statement to understand the complexity of this change.

Wealth in this context was land. The Romans adopted a scheme for surveying land that indicated its extent, starting from a central point. The process of *centuriation* imposed a grid onto land that did not appear to take much account of natural features like streams and hills. Land surveys were incised on a bronze map, one copy of which was kept locally and another in Rome. Surviving surveys suggest strongly that these maps were used as a basis for tax collection as the tenants of taxable land, *ager vectigalis*, were listed while the private land—presumably untaxed—was not allocated to owners (Crook, 1967, 148). Given the tiny bureaucracy in Rome until the end of the fourth century, it is not clear who kept track of what must have been a large number of bronze land maps in Rome. Land *centuriation* was slated to be done by censors every five years, but we have too few surviving maps and surveys to know if this schedule was binding.

Lo Cascio stated however that the land tax was related to “the monetary value of estates (Ibid.)” rather than an index of their physical size. We know how this is done in the modern world; assessors survey land and house prices as revealed in land sales and estimate—recently by regression analysis—the value of a particular parcel. Rome lacked

the personnel to operate such a system. The emperor must have delegated this operation to someone else. Given the large size of the empire, he must have delegated assessing to people on the ground far away from Rome. He phased out the *publicani* to get more control over his revenue. Instead this task fell to censors who served for five years and conducted periodic land surveys. We know about censors in Rome but not how they conducted these censuses in the provinces. Goffart (1974) suggested that taxes were levied on total wealth and only transformed into a true land tax in the fourth century.

The tax rate was about one percent of the value which amounted to about ten percent of the revenue. If the tax was indeed leveled on the value of the property, there must have been land sales to indicate this value. If it was leveled on the value of the produce, some person or agency must have been observing it. If it was levied on the quantity of produce, again someone must have been observing this sharecropping (Crook, 1967, 148; Lo Cascio, 1971, 640). In any case, there must have been a lot of market activity for land and grain underlying the assessment of the land tax.

As Hopkins (1980) famously argued, this process spurred the monetization of the Roman Empire as well as trade within it. He imagined that taxes were levied in the provinces and spent in Rome, but much of the revenue went to the army that was billeted in the provinces. Since soldiers ate the products of farms, much of the tax collection and disbursement could have been made locally and in kind. The sources however do not indicate a kind of share cropping on land owned by the emperor rather than a monetary tax on the value of privately held land.

The army may have consumed up to three-quarters of the tax revenue, and the remainder was used for various expenses in Rome. The emperor had to maintain his

household, which was extensive even if not a bureaucracy. He had to support continued construction in and around Rome for urban and religious purposes as well as to maintain the city. Nero received a bad press for his extravagant expenditures, but the bulk of them were to rebuild Rome after the disastrous fire of 64 (Griffin, 1984). And emperors distributed coin and food to the urban poor in Rome and later smaller towns as well to keep the peace. We know that a large amount of grain was shipped from Africa and Egypt to Rome to feed the populous, but it is hard to know if this was taxation in kind or monetary taxation and purchased grain (Erdkamp, 2005).

Lo Cascio asserted that the assessments underlying the land tax were uniform, but even this cursory survey of Roman tax administration casts doubt on that conclusion. The rules for assessing land may have been uniform, but their administration must have varied provincially and as personnel changed. There is little evidence of resistance to paying the land tax; there is much more evidence of corrupt provincial governors—of which Verres was the exemplar according to Cicero—than of hostile taxpayers. This suggests that the tax rate was low and its administration uniform enough for Roman times.

The argument so far has developed two points. There was a market for land in Rome that allowed there to be market prices and assessed values for tax purposes. Prices could vary, and land could be sold quickly and easily. In addition, land taxes in some form sustained the Roman Empire. These points in turn raise two questions that now need to be answered. Who actually owned Roman land, individuals or the emperor? And what happened to this land and tax system under later emperors?

The jurists and legal commentators described a complex two-part law of land tenure. There were two sets of rules, one for what has been labeled ownership and one on possession. The line between these categories is not clear, and one puzzle for modern observers is to know which set of rules was applicable in any particular case.

Ownership in ancient Rome was a concept distinct from possession of an object. Called *dominium*, ownership conveyed certain rights; namely the right to receive damages from a theft, and most importantly *vindicatio*, which was a legal action taken by the rightful owner of a piece of property to recover his property from the current possessor. The difficulty here lay in actually proving oneself to be the true owner, and something like a modern title search often was used in the process of a *vindicatio* (Johnston, 1999, 53-60.)

Ownership could be acquired in two ways, *ab initio* and *usucapio*. *Ab initio* is the claiming of an unowned place or thing or the creation of one. *Usucapio*, by far the most important method, was the acquisition of ownership through possession for a period of time (two years for land) as long as it was not acquired illegally. Ownership extended to buildings on the land; there was no modern distinction between the structure and the land itself. Only land in Italy could be privately owned, although exceptions were made for some larger *coloniae*, communities of colonial status. They had an “Italian right” (*ius Italicum*) that created the legal fiction that their land was Italian, that they had full *dominium* over it, and they were exempt from taxes (Crook, 1967, 140). And land could be leased. Much of agricultural land must have been leased to tenant farmers, possibly in the form of share croppers, in which the tenants paid the landlord with a predetermined share of their crops. “Although it is not possible to quantify this, it seems clear that farm

tenancy was an important form of land tenure throughout Roman antiquity (Kehoe, 1997, 5).” “As a general rule, the imperial administration exploited these [African and Egyptian] properties by leasing them out, in various forms, to individual small-scale cultivators (Frier and Kehoe, 2007, 139).”

Turning to possession, tenants appear to have had durable tenure on their land even if they did not own it. Taxes appear to have been levied on tenants rather than land owners. Land ownership appears to be special to Italy and public land elsewhere that did not pay taxes. Provincial land was largely *ager vectigalis* that owed taxes. Tax liability went with sales of land even though most taxed land was leased rather than owned. Tenancies could be inherited as long as the taxes were paid, and their transfers were spoken of as buying and selling as commonly as letting and hiring (Crook, 1967, 148, 158). It must have been possible to buy and sell leases, possibly using simpler rules than the cumbersome legal processes for owned land.

Tenants also had rights relative to their landlords that appear to have been supported by the courts. These rights appear to be like common-law rights in the modern world, although there was no common law at the time. Roman courts were consistent in their support of tenant rights when the tenants argued that landowners were encroaching on their rights. “Rather, the state used the law to establish a more even playing field to facilitate the type of investment and cooperation that could lead to economic growth (Kehoe, 2007, 194).”

Egyptian taxes were an exception to the general rule of tax liability since land owners appear to have paid taxes in Egypt. Modern scholars refer to surviving Egyptian land surveys as landholdings, leaving ambiguous whether the surveys recorded

ownership as opposed to tenancy. The surveys clearly were compiled for tax purposes even if not all the land parcels paid tax at the same rate. Bowman referred to landowning and compared the concentration of ownership in fourth century Egypt with nineteenth century Britain, implying Roman Egyptian ownership rather than tenancy (Bowman, 1985; Bagnall, 1992).

While the forms of land tenure clearly were varied, we can attempt an abstract statement of Roman land tenure arrangements. Land was private or public, owned either by individuals or the emperor. Public land was leased, and tenants had the right to buy and sell leases. They paid taxes on their land, probably a share of their crop. Private land also could be bought and sold; most of it was leased, and tenants paid rent to the owners. Owners did not pay taxes, and it is reasonable to assume that rents on private land were similar to taxes on public land. There may also have been local taxes to support municipalities, and the incidence of these taxes is unknown. “By the third century, royal [Egyptian] land had become largely assimilated with private land, the one significant difference being a separate rate of taxation (Frier and Kehoe, 2007, 141).”

A new census of people and land was made at the end of the third century to provide a new basis for taxation. In Syria, one *iugera* of good land was considered equal to two of average land and three of poor land. Cropland was distinguished from vineyards as well. This was the most elaborate of land rankings, and there were many regional variations. While the census was extensive, there was little uniformity. Jones (1964, 64) observed that, “Under Diocletian the *annona*, the requisition in kind, seemed to have been assessed on land only, while the *capitatio*, the poll tax, was paid in money.” If so, the *annona* may have been sharecropping in practice.

These rules stayed in place for at least four centuries. During that period, the Roman Empire preserved peace around the Mediterranean basin and allowed the system of land ownership and taxation to continue. Starting in the fifth century, the ability of the Western Empire to preserve peace began to erode. Rome was sacked early in the fifth century, a traumatic event that led Augustine to write the *City of God* distinguishing belief in the Catholic Church from the defense of any earthly city. More important if less visible to most people living through it was the capture of Africa by the Vandals in 439. This loss deprived the central government of an important component of its tax base and made it impossible for the government to mount effective counter attacks against the various invaders of the Roman Empire. This clearly set up a cumulative process that led in a few decades to the demise of the Western Empire (Heather, 2005; Wickham, 2009).

What was the effect of this cataclysmic change on Roman property owners? I suggest that many landowners were unaffected as the decline of central authority began. Most of their activities were local, and local authorities continued to guide local economies. Invasions were sporadic and affected only swaths through the vast empire. Landowners in the path of the invaders must have experienced problems with their land ownership, but land owners in other areas probably carried on as they and their fathers had done before. Imported goods to any area became more rare and expensive as travel became more dangerous. “[A]cross the sixth and seventh centuries African goods are less and less visible in the northern Mediterranean; they vanish first from inland sites, and then from minor coastal centres (Wickham, 2009, 218).”

The process of Roman decline was not one of uniform decline that affected everyone alike. Instead it was a selective process that involved more and more people

over time. The spread of violence was sporadic and uneven. As more and more areas were affected, land ownership under Roman rules became more and more localized. Land ownership in the form described earlier was confined to Roman islands in a barbaric sea (with apologies to Pirenne, 1956). These islands shrank over time as the violence overspread the declining empire until most of them disappeared at some undetermined time (McCormick, 2001).

We see remnants of the Roman land system in an account of taxes due from tenants to the Abbey of St. Martin de Tours around 700 listing 1400 tenants and the modii of wheat, rye, barley, oats and spelt due (Gasnault, 1975, 95ff). There is more detail in a list of tenants of the Abbey of St. Germain-des-Prés a century later. There is a list of over 1500 farms with “at least” 10,000 residents. Almost all of these farms were “ingénuelles”, but some were “lidiles” and “serviles.” Most of islands of Roman land tenures must have clustered around abbeys, the most stable land-holders in Merovingian and Carolingian times (Longon, 1978, Tome I, 243).

The Eastern Empire did not collapse and only lost control of Egypt in 698. The Byzantine state remained strong and land taxation continued to provide a fiscal base to the state. “Indeed, payment of the [land] tax was itself proof of ownership. Since the early eighth century, perhaps earlier, the tax was estimated on the value of the land (Laiou and Morrisson, 2007, 50).” High-quality land was worth the most; second-quality land, less; and pasture, even less. The tax rate, which appears to have endured into the twelfth century, was about one quarter of cereal production. Although there appeared to be land consolidation later in this period, the tax rate remained level for land owners and

was higher only for the increasing proportion of tenant farmers (Laiou and Morrisson, 2007, 107).”

Agricultural production was divided between what can be called estates and village. Estates were the successors to Roman *latifundia*, and villages were composed of independent proprietors. The latter paid taxes to the state as in Roman times, and their tax rate was only half the dues paid by tenant farmers. This major difference was due partly to the protection offered by the estate and partly to services and capital provided by the lord of the estate. “[P]aroikoi [tenants] were considered by Byzantine jurists as the heirs of the proto-Byzantine *coloni* (Lefort, 2002, 238).” Wage laborers were scarce, and labor services on estates were small to the extent we can judge. It looks as if Byzantine independent proprietors were the analog of what I have called Roman islands in the West. Since the state was stronger and more continuous in the East, these Roman remnants were a more important part of the rural landscape (Lefort, 2002).

The Byzantine system of land tenure was taken over by the Ottoman Empire and continued into modern times. In fact, the land tax in modern Israel is known as the *arnona*, a Hebrew term that goes back to the Talmud, where it denoted a tax on livestock and grain. It is most likely derived from the Latin word, *annona*, the Roman land tax to finance food distribution in the city of Rome.

In contrast, invasions of Western Europe multiplied and violence spread after the Western Empire collapsed, and the Roman organization of society broke down entirely. We know little about the terms of land tenure in the Carolingian period as the terms used disappeared in later centuries. Archaeology however has discovered some holdovers in early medieval fields of the Roman *centuriatio* (Verhulst 2002, 18-19).

After the Carolingians however came the Northmen and further disintegration of landholdings.

Marc Bloch (1961) described how feudalism gradually created order out of chaos, and I follow his lead in this discussion of land tenure. There was no land tenure in the period of chaos when you only had authority over a plot of land if you were physically present and could fight off other claimants. It was hard even to grow a crop in such a situation as there was no way to ensure you could reap the harvest from seeds you had sown. Population consequently was very small, declining sharply to the extent we know it after the western Roman Empire collapsed.

Travel was so hazardous that it was easier to bring people to food than food to people. “The nobleman with his entourage moved round constantly from one of his estates to another; and not only in order to supervise them more effectively. It was necessary for him to consume the produce on the spot, for to transport it to a common center would have been both inconvenient and expensive (Bloch, 1961, 63).” Land ownership was exceedingly tenuous.

This chaotic period when central authority disappeared was traumatic in European history. Shakespeare employed the memory of this period many centuries later to set the stage for the tragedy of King Lear, based on a twelfth century play. In the first scene Lear divides his kingdom between his two faithful daughters—as he sees them at the time—and adds, “Ourself, by monthly course, / With reservation of an hundred knights / By you to be sustain’d, shall our abode / Make with you by due turns.” In modern prose, the king says he will travel with a large armed escort from place to place to consume the local produce. The many knights were to protect him; the traveling was

to take him to the food instead of vice versa. It is extraordinary that in the well-ordered England of several centuries later that this memory of the hard times should be used as the entry to a searing play of morals.

There was no ownership of land in this situation, as control could not be exerted at a distance. There was instead possession by people on the land who could and would defend it. This kind of possession was called a fief, an adaption of the Carolingian Latin *feodum*. “By fief was meant a property granted not against an obligation to pay something ... but against an obligation to do something (Bloch, 1961, 167).” A fief lasted only as long as the person possessing the land gave service; it was not inherited. It was far different and less stable than land ownership or possession in Rome.

Wickham (2009) described this transition in great detail in his account of Europe from 400 to 1000. But while his account is rich in detail, the transition of land tenure arrangements is obscured by his language. Wickham wrote of a change from a society based on taxes to one based on ownership: “Tax was, that is to say, no longer the basis of the state. For kings as well as armies, landowning was the major source of wealth from now on.” He refers to this process as “the shift from taxation to landowning (Wickham, 2009, 103-04).” As I have discussed and Wickham acknowledged in his book, land taxation has to be based on land ownership or possession. There can be no taxation without some way of knowing who to tax. The decline of the Roman Empire led to a decline of both land taxes and land ownership. The growing chaos Wickham described precluded both activities. A better frame would have been to say that the society changed from one based on taxes to one based on personal service. What does it mean to own land if taxes on the land no longer sustain a government?

Feudalism was the way out of this chaos. It is best seen as a way to organize defense in a violent world. There was not enough security for a central government to collect taxes and field a military force, and all action had to be local. Subject to this constraint, it was natural for families and then close acquaintances to band together for their mutual defense. Adam Smith told us that labor specialization is limited by the extent of the market. Markets in these conditions were local and small, and the labor differential was limited to two classes of people, those who fought and those who farmed—knights and farmers.

A fief allowed a knight to fight for the defense of the farmers in the fief, but isolated knights were not much use against concerted attack. Feudalism was a way for knights to come together through lord and vassal arrangements that constructed a hierarchy of vassals under a lord who could field a group of knights. Vassals then used the resources of their fiefs to support their military activities, which were used in the service of their lords. The farming that underlay all this of course was done by the lords' villeins and other serfs. The lords in return for the vassals' support used their military resources to preserve the vassals' fiefs. Fiefs were retained as long as vassals fulfilled their part of the bargain, giving rise to elaborate rituals to assure lords that vassals would come forth when needed.

The feudal system succeeded in bringing more peaceful conditions to Western Europe, and problems changed from defending from invaders to defending against neighbors. There developed a small arms race in armaments for knights and their horses. The small economies of scale in this arms race accentuated the need to have substantial

fiefs for knights. Since there was no market for fiefs, the issue of size only came when a vassal's service ended and the fief reverted to the lord, typically when the vassal died.

The nonhereditary fief eventually was supplanted by a hereditary model as lords needed a reliable source from which to obtain vassals. The most convenient way to obtain future vassals was by making new acts of homage with the children of current vassals. Once this practice started, the converse situation where children of vassals were denied the fiefs of their fathers made it harder to add more vassals. Fiefs consequently took on a hereditary character as feudalism evolved, and eventually this characteristic of the fief became law in several regions of Europe. This heritable land could be sold, but the lord clearly had a large influence on who could buy it. "The medieval arrangement of property rights to land, with all kinds of overlapping claims and rights, served other needs than purely economic ones aimed at market exchange (Van Bavel, 2008, 16)."

Society thus was divided into two parts. Knights and clerics did not work and paid no taxes. Peasants worked and paid for the consumption of the upper class as well as their own, a division of society that lasted into the eighteenth century. A major problem for the new aristocracy was how to avoid the dissolution of their position by partible inheritance, which was widespread among Germanic cultures. And as fiefs became hereditary, some way needed to be found to keep them intact to preserve the size needed to support knights (Duby, 1974, 168-74; Hay and Rogers, 1982).

One way to preserve fiefs was for polities to adopt a rule of primogenitor, where only the oldest son inherited the fief. Another way was to entail a land holding, that is, to impose rules on the deed that limited inheritance to members of a family. A fee tail is a type of entail that fixed the rule of inheritance within a family and can be traced

to another land tenure mechanism known as the *maritagium*, when a grant was made by a woman's relative, usually the father, to her husband. This kind of grant served as the woman's inheritance, provided material support, and encouraged an alliance between the families through marriage. Under *maritagium* land could only be inherited by the woman's children and would revert back to the original donor in the case where there were no heirs.

There were many restrictions on land and land transfers as the need for service and the desire for inherited land got in each other's way. There must have been an evolution of these restrictions, but many different approaches appear to have been in use at the same time. This appearance may reflect the scarcity of historical evidence, but it more probably reflects a combination of regional differences in customs and uneven evolution even in local areas. Travel was difficult and transport was expensive; regions were far more isolated than in Roman times. "Regional differences were sharp, even between neighboring regions (Van Bavel, 2008, 14)."

An "unusually perfect feudal structure was imposed after the Norman Conquest. ... The whole social structure was based on landholding in return for service." Knight's service or other personal services known as grand sergeanty were the basis of land tenure, which was granted by the Crown. In addition to tenures, landed estates held by subjects of the king were held for life, in fee tail (inheritable by lineal descendants) or in fee simple (inheritable by heirs more broadly). Most agricultural labor was done by villain tenants (Megarry and Wade, 1975, 13-15, 24, 42).

Feoffment is the English term for the action of investing a person with a fief or fee, the two terms used for land possession in Medieval England. Normally, as noted

already, acquiring a fief or fee obligated an individual to render military service for a lord. Missing is any mention of land sales, taxes or prices. In addition, tenants, that is, villeins, had no bargaining power as they had no mobility; they were serfs. There are no court records of tenant appeals, as there was no central state to oppose the lords (Kaye, 2009). This is what it means to lack both a land and labor market.

Not all land was contained in fiefs or held in fee. Independent plots of land were known as allods, and they were of course at risk from lords and knights supported by fiefs. A recent survey of land ownership in the eleventh and twelfth centuries in the north of France revealed the presence of many small landowners that contrasted with the nearby holdings of the Count of Ponthieu. The allods lasted until the expansion of royal power in the late thirteenth century (Van der Beek, 2010a, b). We tend to know of their existence largely by records of their incorporation into fiefdoms, which creates a presumption that they were disappearing. As population increased in the increasingly peaceful feudal age, it became harder for allods to escape notice, and they were at increasing risk from armed lords and vassals.

The burden of rents and feudal dues on peasants has been calculated as about 40 percent of their production, although it varied quite a bit between manors (Allen, 2005, 36; Van der Beek, 2010a). This is higher than the commonly accepted levels of taxation in the Early Roman Empire, which hover around ten percent of production. If these estimates are even approximately accurate, then one of two things must have happened in the first millennium. Either farming must have become vastly more efficient, or the after-tax income of farmers must have shrunk dramatically. The latter choice appears more likely at our current state of knowledge.

Feudal warfare relied upon direct hand-to-hand combat, which established the knight as the primary military unit. Over time, military armies employed greater use of archers, which provided key advantages over knights in battle, and the knight as a military unit decreased in importance and gradually disappeared. With the introduction of firepower, archers made way for musketeers who used muskets as a means of offense. Although early firearms were less accurate and efficient than the bow and arrow, continual technological improvements in guns eventually rendered archers obsolete. Considering that it usually took many years of training to make an archer, while only days were required to train and field a musketeer, it became more efficient to employ musketeers as a military unit. The lower costs and faster production associated with training and fielding musketeers allowed for significant increases in army sizes.

In economic terms, the process was determined by economies of scale. In the feudal age, when chaos was the issue, there were economies of scale for individual fighters, that is, knights. There were few economies of scale after this limited scope. As security increased and warfare changed, archers and musketeers provided economies of scale that extended to larger numbers of soldiers. Economies of scale near the origin were reduced as archers and then musketeers needed less equipment and training than knights, while economies of scale for groups of soldiers increased as the power of firing in volleys became apparent. The new economies of scale came more from military organization than individual training. The new system was clear enough to be described clearly around 1600. “Maurice of Nassau and Gustavus Adolphus developed a system of organization, tactics, and drill that harked back to the Roman legions (Boot, 2006, 103).” The economics of warfare had come full circle.

Land tenures had been advancing as military technology improved, at least in the most urbanized parts of Europe in northern Italy and the Low Countries. Land sales by peasants are recorded as early as the eighth and ninth centuries when northern Europe was in chaos. The clarification of property rights and the introduction of civil courts stimulated land markets in the later twelfth century. The Low Countries caught up by the fourteenth century when voluntary registration of private land transfers by public courts became common. Although these two regions developed differently, the growth of private land ownership and transfer increased in both during the Medieval period (Van Bavel, 2011).

Tilly (1990) argued that coercive exploitation played an important role in the creation of European nation-states. He used the concept of a protection racket to describe European developments into state-making, where a strong individual or group forces weaker individuals to pay tribute in some form in exchange for protection or avoidance of damage. Tilly argued that states achieved a monopoly of violence and carried out varied activities of organized violence: making war, creating states, protection, and extraction of resources through taxes.

Independent lords became like allods in the feudal era; they could not defend themselves from the new states and were subject to capture or submission. Lords stopped being vassals and turned into landowners. The land that they owned however had the restrictions that had been imposed when the land had been a fief, when fee tails had evolved into entails. These impediments to market activity were retained by the aristocracy to preserve the integrity of the family estate. Lord Peter Wimsey is a fictional

character of the early twentieth century, but his role as the landless younger son of the mythical Duke of Denver was a staple of British aristocracy for many centuries.

This restricted survey of European history brings us to the present. Some land is still entailed or subject to other restrictions, and the way to indicate that there are no such restrictions on a property is to hold them in fee simple. That term means that they are remnants of fiefs but lack all the obligations that made fiefs what they were. This curious way of designating land that can be bought and sold freely like many other marketable assets is the product of the a millennium of European history and expresses our freedom from the constraints of feudal forms of land tenure.

The familiarity of more recent history makes it hard to understand the terms of land ownership in antiquity. We are used to a monotonic history, typically starting from the agricultural revolution and continuing through the industrial revolution. But the modern history of land tenure comes from the violence that followed the end of the Roman Empire; it says nothing about the conditions that obtained while the Roman Empire was intact. It is hard to visualize a modern type of land holding in the ancient world, but the evidence suggests that the intervening impediments to land usage and sale are not relevant to the history of ancient Rome. Land, then as now, typically was held in fee simple.

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