PART III

CLASSICAL GREECE

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CHAPTER 12

CLASSICAL GREECE: PRODUCTION

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I THE NATURE OF THE EVIDENCE

More useful evidence for economic activities survives from the fifth and fourth centuries BC, the so-called "classical" period, than from earlier or later periods of Greek history. This and the two following chapters therefore paint a fuller picture, while acknowledging that the evidence remains sketchy and is heavily skewed towards Athens, a region seriously untypical in several respects. The historians' narratives, indeed, provide little directly usable information, since they focus on political and military matters; but the biographical tradition preserved in Plutarch's *Lives* and elsewhere offers some relevant vignettes. More helpful, perhaps surprisingly, are the philosophers and scholars writing in the Socratic tradition – Plato, Xenophon, Aristotle, and Theophrastus – both for the specific information they provide and for their often revealing depictions of attitudes and values. More helpful still, though perilous in so far as its context of utterance was overwhelmingly Athenian, is the surviving corpus of over 100 law-court or public speeches, ascribed (not always accurately) to the major orators and frequently offering information about economic transactions and institutions or on the size and composition of inheritances. However, the most valuable written sources are inscriptions, which proliferate as the two "classical" centuries unfold to encompass far more than the limited pre-500 repertoire of laconic gravestones and one-line dedications. Laws and decrees of state, calendars of sacrifices (often stating the prices of victims), leases of public property, records of property sold or pledged, and especially annual accounts of public financial transactions drawn up and promulgated by state or sanctuary officials, all yield invaluable insight into economic activities and systems.[1]

[1] The most important single series of such inscriptions is the so-called "Attic Stelai." In 415/14 BC, convicted of participation in various scandals (Thuc. 6.27–9; Andoc. 1.11–69; MacDowell 1962: 167–93), about fifty prominent Athenians and resident aliens had their property confiscated and sold off by the Athenian state. It was probably the most extensive such operation in Athenian history, and is certainly the best documented. It was recorded on ten inscribed stone slabs, originally set up in the Eleusinion at Athens, the sanctuary of two of the deities whose cult had allegedly been impiously treated. On these slabs the responsible officials recorded the prices they got for the crops and stores they sold off, the agricultural equipment, the slaves, the household goods and chattels, and eventually the

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Such written material is complemented in two ways by physical evidence. The first is the landscape itself, more and more of which has been the subject of intensive surface survey in the last thirty years.[2] Right across the zones of Greek culture and settlement, such surveys have provided a basis for estimates of population, settlement pattern, and gainful activities at various periods from the Neolithic to the present day. Relevant to this specific group of chapters are the consistent indications that population levels peaked in the late classical period, reaching if not exceeding the estimated carrying capacity of each landscape and not being equalled or exceeded until late antiquity or even the nineteenth century. Although one further corollary of such work has been increased awareness that even within a putative "Greek culture zone" habitats and ecologies differed significantly, and that it is necessary to analyze in terms of a series of micro-regions rather than a uniform "Greek economy,"[3] it serves to keep in view the likelihood of continuing demographic pressure on land, resources, and technologies in the classical period.

The second group of physical evidence relevant to these chapters comprises the tangible objects which were created and used. These range from installations such as houses, temples, public buildings, and infrastructure, through weaponry, ceramics, coins, textiles, and the normal furnishings and equipment of a dwelling house or a farm, to the more exotic and high-value products of the sculptor or the silversmith. This material, invaluable though it is for the economic historian, has yet to yield its full potential. Partly this is because it is proving very difficult to establish the cost of an object of a given size and quality: ornate dedications or grave monuments, for example, are hard even to convert into man-days of labor, while a recent study of the documentary evidence from Olynthus in Chalcidice has concluded that urban house-prices varied not just by size or fabric but by location, in a way which will be dismally familiar to all modern householders.[4] Partly, too, scholars of coins or painted pottery or sculpture have, for good and bad reasons, been more concerned with classification, dating, images, and aesthetic values than with aggregates of production or with distribution

real estate – houses, farms, and property overseas. Together with some ancillary information (Pippin 1956), these inscriptions (*IG* 1^3 421–30: conspectus of named items in Pritchett 1956 and Amyx 1958; D. M. Lewis 1966 [= 1997: 158–72] for the sale procedures) provide an unparalleled portrait of the material circumstances of upper-class Athenian society at its apogee of prosperity. If ever we could hope to see, in detail and with prices, what was being produced by (and for) a Greek economy in the classical period, this is the occasion. Encouragingly, the picture they present is confirmed and filled out by the surviving corpus of law-court speeches from Athens, which frequently refer casually or systematically to the property-holdings of residents.

[2] Keller and Rupp 1983; Osborne 1987: 204; Alcock et al. 1994; Bintliff 1994; Cherry 1994; Whitley 2001: 47–50 and 382–91; Osborne 2004a; Osborne 2004c: 88–90.

[3] Osborne 1987: 29–34 (map of isohyets p. 32) and Rackham 1990 for the contrast between the wetter west and the drier east; Horden and Purcell 2000: 51–172.

[4] Nevett 2000; Cahill 2002: 276–81.

maps. Partly, again, especially with objects like wooden furniture or textiles which were mostly made at home and have totally perished anyway, the challenges of quantifying or of costing production are massive.

Such considerations should warn the reader that even in such a comparatively well-documented epoch as the classical period, our sources do not lend themselves to straightforward assemblage, let alone to coherent analysis. Anything we create is a precarious construct, subject to imponderable correction factors, lending itself to widely differing interpretations, and transforming itself in the light of changing scholarly agendas.

II TERMINOLOGY ANCIENT AND MODERN

The term "production" itself needs clarification, for implicit in it is the connotation of "production for a market," which the particular configuration of fifth- and fourth-century Greece might render misleading. Three uses of the term "market" need to be distinguished. In a first, aggregative sense, it includes all activities and products generated by known consumption habits and effective demand, including the so-called Domestic Mode of Production, and therefore irrespective of whether exchange takes place beyond the locus of production. In a second, behavioral sense, it encompasses the varying values, attitudes, and strategies of producers and consumers. In a third, institutional and even sometimes physical sense, it denotes a price-setting marketplace. Whether or not precursors can be detected, in Greece or the Levant,[5] markets in this third sense had unquestionably emerged as institutions by the fifth century, at least for some commodities and in some locations. Proof, if it be needed, comes both from the portrayal by the late fifth-century comic poets of well-established market activity in some localities, especially for food,[6] and from innovations in language. Clearest of the latter is the way in which Greeks extended the word *agora*, etymologically meaning "talk-place" and used in Homer only in the sense of "assembly," to embrace first the open space used for such assemblies and then the exchange activities for which such central spaces were convenient; an extension which had taken place by the middle of the fifth century and had generated a new verb *agorazo*, "I buy," alongside the older verb *agoraomai*, "I speak in assembly."[7] That this development correlates closely with the adoption of coined money by many Greek states in the generation after

[5] Silver 1995: 97–177 for an extreme view: Harris 2002: 74–80 for differentiations even within this third category.

[6] Harris 2002, with Ehrenberg 1943: 113–46. However, such market *agorai* may not have been common (only at Athens, Piraeus, and Sounion in Attica: Osborne 1987: 108), and may have been seen as peculiarly Athenian (Arist. [*Oec.*] 1.1344b31–3, with Horden and Purcell 2000: 205).

[7] For the evidence see LSJ s.vv. The complexities of the Greek words used for "buy" and "sell," and of the semantic fields of their compounds, are highly informative but cannot be explored here (cf. Chantraine 1940).

‘The map which appears here in the printed edition has been removed for ease of use and now appears as an additional resource on the chapter overview page’.

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c. 540 BC is indubitable, but its rate of spread, its range of applicability to exchange transactions, and its impact on behavior and social values are still matters of debate.[8] More important for this chapter is the corollary, that though the basic patterns of commodity production, i.e., "market" in the first sense, may have remained largely stable throughout the two centuries under review, the relations of "producers" to "markets" evolved significantly. We are therefore looking at a portfolio of production that is not merely distorted for us by the availability of evidence, but was also undergoing substantial long-term change.

There remains one further aspect, at once terminological and analytic, to do with the terms "workplace," "sector," and "industry." Of course some "workplaces" can be recognized straightforwardly, whether on the ground,[9] or in visual representations on pottery, statuary, or bas-reliefs,[10] or in language, where the normal everyday word *ergasterion* precisely translates "workplace" and can refer to workshops of upwards of thirty slaves (see below). However, other "workplaces" are more elusive, because the place of production was also the place where other activities were undertaken. This is perhaps most obvious with textile production, performed overwhelmingly by women within the house, but other commodities too were produced or processed within the household,[11] while all agrarian activity took place by definition within an area of landscape which was intrinsically an undifferentiated space. Likewise, though "sector" and "industry" are useful analytic terms, they correspond to nothing in contemporary Greek terminology or social organization. In part, of course, this was because the agrarian "sector" was so preponderant that all who were engaged in it could define themselves primarily in terms of other collectives (villages, cult-groups, etc.), while those who did identify themselves by a gainful occupation[12] failed to generate a collective presence. Conspicuously, for example, though there were identifiable potters' quarters in Athens and in Corinth[13] and a "Street of the marbleworkers" in Athens,[14] and though miners at Laurion might well make joint dedications,[15] there is no trace whatever in classical times

[8] Howgego 1995: 12–18; von Reden 1995a; Kurke 1999; Davies 2001b; Kim 2001; 2002.

[9] E.g., Melite in Athens (Young 1951), the silver-mining area at Laurion (Conophagos 1980; Osborne 1985a: 29–36; Travlos 1988: 203–10; Goette 2001: 209–19), an amphora workshop on Halonnesos (*Archaeological Reports* 1999–2000: 69–72; 2000–01: 70–2), the Pottery Quarters in Athens (Baziotopoulou-Valabani 1994; Monaco 2000) and in Corinth (Stillwell 1948: 3–62; Salmon 1984: 101–3).

[10] Useful selections in Ehrenberg 1943; Metzler 1969; Burford 1972; Ziomecki 1975; Hopper 1979: plates 40–7; and S. Lewis 2002, with Sparkes 1962 for kitchen utensils. Sadly, Francotte's two volumes (1900–1) have not a single illustration, and those in Glotz 1926 are poorly reproduced.

[11] Pesando 1987; Jameson 1990a: 183–7; Jameson 1990b: 102–3; Carr 2000; Nevett 2000; Cahill 2002: 223–88.

[12] As in the late archaic and fifth-century dedications from Attica: *IG* I^3 546 *artopol*[*is*] "breadseller," 554, 616, 905 *knapheus* "fuller," 620, 628?, 633, 824 *kerameus* "potter," 646 *skylodesph*[*os* or *es*] "tanner," 666, 754 *kitharodos* "singer to lyre," 776 *keryx* "herald," 794 *plyntria* "washerwoman," 841 *gramma*[*teus*] "secretary."

[13] See n. 9 above. [14] Burford 1972: 82, citing Shear 1969; Camp 1992: 142.

[15] Burford 1972: 171, nn. 465–6; Lauffer 1979: 172.

of associations of producers comparable to Roman *collegia* or mediaeval guilds.[16]

III LAND, LAND-USE, AND LAND-OWNERSHIP: THE UNCULTIVATED LAND

As always, for any identifiable region, production is a function either of the processing of whatever can be grown, reared, found, cut, dug, or excavated from that region's environment, or of the added value created by the transformation of raw materials imported from elsewhere. The landscape and its productive potential are therefore logically primary. This volume is fortunate in that nowhere have changing scholarly interests and agendas made a more salutary impact than in the study of landscapes and land-use, where the simple picture of Greek agrarian practices which was available thirty years ago has gained greatly in complexity and sophistication.[17] Attention has focused not only on crops and yields but also on wider questions of land-use, notably the market-oriented specialization and the integration of differing types of terrain which can both be predicated of a population which experienced significant growth in the fifth and fourth centuries BC, with all that that implies for pressure on land and on productive techniques. Production and distribution therefore both grew in scale and generated various symbioses (reflected in part by inevitable overlaps between this chapter and the next), not least in the use of terrain. For example, for most landscapes occupied by Greeks, varying depths of soil and the imminence of uncultivable mountains generate a clear distinction between cultivable and uncultivable zones. It is now evident that the importance of the latter, in all its various forms (garrigue, maquis, savanna, badland, marshland, hillside) as an essential and productive complement to the economic life of the farm cannot be overestimated, and not just because it may well have comprised "more than half of the total area of ancient Greece."[18] A brief sketch of its various productive capacities can therefore usefully begin this section.

First, it provided grazing land for sheep and goats (though arable land was also used),[19] and was a source of essential nutrients such as nuts, herbs, and honey,[20] while the flora also provided gathered foods such as wild greens, herbs for the kitchen, and the ingredients for *materia medica*, as

[16] That some of the various cult-groups that proliferated in classical Attica may have comprised such *collegia*, as they probably did in Hellenistic Rhodes (Gabrielsen 1997: 123–9), has long been admitted, but if so the absence of explicit self-identification is striking.

[17] Among the main bases of study are now Osborne 1987, the Greek papers in Whittaker 1988, Isager and Skydsgaard 1992, the papers in Wells 1992, Burford 1993, 1994, the Greek papers in Shipley and Salmon 1996, and Grove and Rackham 2001. Cf. also Dufkova and Pecirka 1970; Ampolo 1980.

[18] Forbes 1996: 71. Forbes 1996 is the basic survey, with Rackham 1983; Garnsey 1988: 53; Chaniotis 1991; Rackham 1996; Chaniotis 1999b; and Grove and Rackham 2001.

[19] See Section v below.

[20] J. E. Jones et al. 1973: 397–414 and 443–52; Burford 1993: 144–5; Forbes 1996: 92–3.

well as reeds and brushwood for baskets and house-construction.[21] Likewise, it produced essential minerals such as salt from salt-marshes and seaside saltings, stone from quarries,[22] and metals from mines, not to mention clay deposits which fed potteries. More exotically, it was the venue for ostentatious forms of hunting.[23] True, the more mundane and low-status forms – trapping, bird-catching, snaring – so far from being confined to the wilderness, were ubiquitous in cultivated terrain too, as the comic poets' lists of foodstuffs make clear,[24] and contributed significantly to the supply of protein. However, though hare, deer, and perhaps wild boar were still accessible in some domesticated mainland areas in the classical period, the pursuit of bears and lions (non-productive in economic terms anyway) needed access to the wilder mountains of Epirus and Macedonia, or to Persian game parks.[25]

There remain wood and timber, the prime products of the "waste" areas and the subject both of complex ambiguity between "wild" and "cultivated" and of much current debate. One end of the spectrum is clear enough, viz. the stands of large timber (principally fir, Greek *elate*) most prized for ship-building, located by Theophrastus in Macedon, parts of Thrace, south Italy, the south shore of the Black Sea at Sinope and Amisos, Mt. Olympos in Mysia and Mt. Ida in Troad,[26] though sadly we have no idea to what degree such stands were managed (other than by royal control on the release of material and its destination) or re-planted. Much the same range of species – fir for preference (Theophr. *Hist. pl.* 5.7.4–5), cypress, and cedar, but also beech, oak, elm, and a scatter of other woods – was used in prestige construction projects, as fourth-century building accounts from sanctuaries at Epidauros, Delphi, Eleusis, and Delos attest.[27] These timbers seem to have had more varied origins, Arcadia being a principal source (via Sicyon) for the builders at Delphi, Macedon being one for Delphi and Delos, and Corinth itself, surprisingly, being one for those at Epidauros and Eleusis. However, local sources must also be presumed, as no doubt for the more mundane but much more widespread requirements of the building industry in general, since Theophrastus admits (*Hist. pl.* 5.7.4) that most woods are usable for house-building although he also reports a preference for silver-fir, cypress, oak, and types of cedar.

[21] Foxhall and Forbes 1982: 74–5; Baumann 1993: 92–127 and Rihll 1999: 116–28 (medical uses). Forbes 1996: 81–4.

[22] Osborne 1985a: 93–110 for Attica, with further references at 238 n. 1; Korres 1995 for stone transport for the Parthenon.

[23] General survey in Lane Fox 1996, with bibliography.

[24] References most conveniently in Ehrenberg 1943: 319–21.

[25] Xenophon's *Cynegeticus* is mostly about hare-coursing (i-viii), with single chapters each for deer (9), boar (10), and exotic animals (11).

[26] Theophr. *Hist. pl.* 4.5.5, with other usable species (pine and cedar) available in Cyprus, Cilicia, and Lebanon (Meiggs 1982: 116–39).

[27] Meiggs 1982: 423–50.

Even more widespread and peremptory was the perpetual need for small wood, whether for direct use as firewood or for conversion into charcoal, but the modalities of their production are virtually untraceable. One large Athenian estate is reported to have generated 12 drachmas per day from the sale of wood ([Dem.] 42.7), but imports of firewood by Delos are well known[28] and imports from the north Aegean to Attica are now attested,[29] while even apart from domestic and cultic uses the needs of pottery kilns, smelting furnaces, and bath-houses throughout the Greek world and beyond will have been gigantic.[30] True, it has been estimated[31] that the smelting needs of the Laurion mines could have been met locally (though at the cost of using "one-seventh of their land-area as a fuel supply"), but we do not know whether they were thus met.[32] If to such considerations we subjoin the use of wild olives for grafting, the intake, by trenching or terracing, of the hill-land surrounding them, or the widespread extraction of pitch and resin from coniferous trees,[33] the impression is confirmed of uncultivable land as an essential productive resource, heavily exploited and intimately linked with the life of farm, household, and market.

IV RIVER AND SEA: THE FRUITFUL WATERS

Those words apply with equal appropriateness to the other uncultivable environment – sea, rivers, lakes, and marshes. Some products, like the eels from Lake Copais in Boeotia which were a delicacy in Athens,[34] were a matter of direct gathering, though we should not underestimate the skills required and risks incurred by divers for sponges, pearls, or coral.[35] Comparable skills and risks attended the gathering of the main harvest, the supplies of fish which made a poor diet tolerable and spawned an entire gourmet culture.[36] At least for well-placed communities, this was no marginal activity. Behind windfall catches such as those recorded on sanctuary dedications[37]

[28] *IDélos* 509, with Meiggs 1982: 452–3; Reger 1994: 127–88. [29] *SEG* XLIII 488.

[30] Meiggs 1982: 188–217 and Hannestad 1988 for Attica, and more generally Forbes 1996: 84–8. Oil (as bitumen) was known, but only as an exotic substance used for embalming rather than for heat (Diod. Sic. 19.98–9, with J. Hornblower 1981: 147–50).

[31] Rackham 1996: 29–30.

[32] Theophrastus reports the silverminers' preferences as being for holm-oak, oak, and arbutus for the first smelting, but also for pine (*Hist. pl.* 5.9.1 and 3). If any contemporary awareness of loss of timber and of ground cover does underlie Plato's notorious scenario of the antediluvian world (*Criti.* 111a–d), south Attica is indeed a likely candidate, but scepticism is in order (Rackham 1996 against Hughes 1983).

[33] Meiggs 1982: 453–4; Forbes 1996: 77–9 and 88–9; Foxhall 1996: 53–60. For pitch cf. also Hdt. 4.195 (Zacynthus).

[34] Ehrenberg 1943: 132 n. 4. [35] Flemming 1996; Rihll 1999: 112–16.

[36] Gallant 1985; Davidson 1997: *passim*. Fourth-century comedy supplies the main evidence, as Athenaeus' books 6–7 make wearisomely clear.

[37] *IG* I^3 994 (Athens, Acropolis, 500–450); Paus. 5.27.9 and 10.9.3–4 (the bull of Corcyra, dedicated c. 480 at both Delphi and Olympia to commemorate an exceptional haul of tuna, with Habicht 1985: 75–7 for confirmatory detail, and Horden and Purcell 2000: 194–5); Gallant 1985, with Horden and Purcell 2000: 576; Purcell 1995.

lay the systematic deployment of shoal-watchers,[38] the livelihood of many a well-placed coastal community,[39] and systems for transforming perishable fish into commodities which could be husbanded, harvested, preserved, stored, and transported. Prime among these was the use of the other prime maritime product, salt,[40] in order to create *tarichos*, salt-fish, a commodity produced in quantity and traded over long distances, from Spain to Corinth and from the Black Sea to Athens.[41]

V LAND AND LAND-USE: THE CULTIVABLE LAND

All the same, agrarian production was absolutely primary. Though small-scale irrigation was common,[42] dry farming was dominant, even in areas like Attica or the south Aegean islands where annual precipitation, then as now, was probably near the lower limit (300 mm.) of effective dry farming. Though the "Mediterranean triad" of grain, vine, and olive is in some respects misleading, it serves well enough as a first step in description, for they were the staples of diet, moulded most farming activity, and were sanctified, as other foodstuffs were not, by myths linking each of them to the beneficence of a major deity.[43] Of the triad, grain crops, principally wheat and barley (millet and oats were marginal),[44] were far and away the most important nutritionally, providing up to 70–75 percent of calories in the normal diet,[45] even though yields are reckoned, admittedly on very uncertain evidence, to have ranged only from 3:1 to 10:1, with high interannual variation.[46] The choice between barley and wheat depended in part on soil type and in part on rainfall, with barley predominating

[38] Ar. *Eq*. 313 (Aegean, unspecific); Strabo 5.2.6 and 5.2.8 (Populonia and Cosa in Etruria); *ibid*. 17.3.16 (Ras Kaboudia in Tunisia).

[39] E.g., Iasos (Strabo 14.2.21).

[40] Lowe 2001; Davies 2001b: 24–6. For non-maritime salt cf. the trans-Saharan route followed in Hdt. 4.181–4.

[41] For Spain, Lowe 2001: 186–7; for the Punic amphoras warehouse in Corinth, Williams 1979; 1980; for Black Sea production, Braund 1995.

[42] Cf. Burford 1993: index s.v. 'Irrigation'. Millet (Xen. *An*. 2.4.13) and sesame (Theophr. *Hist.pl*. 7.7.3) were known to do well under irrigation.

[43] Thus grain was seen as the gift of Demeter, the vine of Dionysos, and the olive of Athena, though the olive-mill and other agrarian techniques were also fathered onto Aristeas the son of Apollo and Cyrene (Amouretti 1986: 153 n. 1).

[44] For millet Burford 1993: 128, for oats Theophr. *Hist. pl*. 8.4.1 and 8.9.2. Other farinaceous products (e.g., rice) were known but not used in Greek areas (Theophr. *Hist. pl*. 8.9.2; Amouretti 1986: 33).

[45] Foxhall and Forbes 1982: 74.

[46] No reliable figures exist, either for yield per land-area or for yield-for-seed. The only attested figures, from *IG* II^2 1672, report tithes given to the goddesses at Eleusis from wheat and barley in Attica and its dependent territories for the year 329/8, but (a) their accuracy as a reflection of total real yield is debated, (b) the area under cultivation (as distinct from total surface area) cannot be ascertained, and (c) since the early 320s saw famines, the figures may well not reflect an average year's crop. See Garnsey 1988: 98–106; 1992b.

overall and especially in drier areas.[47] Since digging, ploughing (ideally three times), sowing, hoeing, weeding, reaping, threshing, winnowing, and storing were highly labor-intensive for much of the year,[48] and the normal agrarian regime is probably reflected in leases of public or cult-owned land that assume that half the land will be sown to cereals each year,[49] there is little doubt that cereal cultivation was by far the greatest user of labor in classical Greece, and its yield the largest single product by volume and by value. That remained true even during the classical period, when the cereal production of the older-established Greek communities was proving seriously inadequate, requiring regular imports from the Black Sea, Sicily, and north Africa. However, the scale of imports, the period of their emergence as a major issue, and the degree to which intensification of production was resorted to in lieu, are matters of major debate.[50]

Grapes and olives, by contrast, seem to have been produced in sufficient quantity not merely to make most Greek communities self sustaining but also to generate a surplus.[51] Such surpluses could be used for prestige cultic purposes, as the Athenians did with olives by (presumably tithing production and) offering jars filled with olive oil as prizes at the Panathenaic games.[52] However, they also singled out olive oil as the only (agrarian) product which might be exported,[53] a form of market-oriented activity which Acragas pursued on a much larger scale in the late fifth century by supplying Carthage[54] and which other Aegean states – Chios, Lesbos, and notably Thasos[55] – pursued in a systematic way via wine production and export. This is admittedly only an impression, for, in contrast to work on cereals, work on viticulture and olive production both ancient[56] and modern has

[47] Theophr. *Hist. pl.* 8.6.4. and *Caus. pl.* 3.21.1–5; Burford 1993: 127–8. Thus, the barley:wheat ratio for Attica in 329/8 was over 12:1, while that for Lemnos in the same year was almost 1:10 (*IG* II² 1672, with Garnsey 1988: 98 table 5).

[48] Amouretti 1986: 51–77; Osborne 1987: 34–52; Isager and Skydsgaard 1992: 21–6; Burford 1993: 100–29.

[49] The most specific are *IG* II² 2492, lines 14–18 (Aixone, 345/4), II² 2493, lines 7–10 (Rhamnous, 339/8), and *SIG* 963, lines 7–8. See nn. 71–2 below.

[50] Brief sketch in Davies 1992: 300–1.

[51] For vine cultivation in general, see Amouretti 1988; 1992b; Hanson 1992; Isager and Skydsgaard 1992: 26–33. For the olive, Drachmann 1932; Amouretti and Comet 1985; Amouretti 1986: 153–96; 1992b; Isager and Skydsgaard 1992: 33–40; Ault 1994; Brun 2003; 2004.

[52] Thus, the property of one of the men convicted in 415/4, probably Alcibiades, included no fewer than 82 Panathenaics (*IG* I³ 422, lines 21 and 41–60, with Amyx 1958: 178–86).

[53] Plut. *Sol.* 24.1, F 65 Ruschenbusch. Whether the law was genuinely due to Solon in the early sixth century is unresolvable. Notable, perhaps as a response to short supply in the 420s and 410s (Ar. *Vesp.* 252 with MacDowell ad loc.), is the stipulation, in a lease of cult-owned land in Athens in 418/17, that the lessee is *inter alia* "to plant shoots of olives not less than two hundred, and more if he wishes" (*IG* I³ 84, lines 33–4): since the lease was to run for twenty years (lines 37–8), there was time for both lessee and cult to benefit from the eventual produce.

[54] Diod. Sic. 13.81.4–5. [55] Texts and full discussion in Salviat 1986.

[56] The emphasis placed on viticulture and arboriculture rather than on cereal crops in Theophrastus' two agricultural treatises is explicable partly because the techniques were more intricate, especially so

tended to focus, for good reasons of practicality, on techniques of production rather than on quantification. Nonetheless, for present purposes both products, each of high economic and nutritional importance, can be regarded as long-established and stable components of the normal agrarian regime by the classical period.

The classic triad was complemented by a range of other crops. Prime among them were pulses and legumes. Those cited on the Attic Stelai are bitter vetch (*orobos*) and lentil (*phakos*), others known from classical sources and sites being chickpea (*erebinthos*), broad bean (*kuamos*), and garden pea (*pisos*).[57] They were essential crops for three reasons. First, though they produced toxins, and though the risks of favism may have lain behind the prejudice of Pythagoreans and others against broad beans,[58] they were recognized both as foods for the poor and as a valuable resource against crop failure because of their capacity to survive drought and to keep well.[59] Second, for all (not just the poor) they provided essential protein in a diet which risked otherwise being short of it.[60] Third, though the process of nitrogen-recovery via legume cultivation was not understood, and though overall calorific yield from cereal-legume rotation may have been lower than from cereal-bare fallow rotation, extant leases indicate that there was enough awareness of the benefits of "green manure" on the soil for legumes to occupy a recognized role in good practice.[61]

A second complementary group comprised fruit trees. The Attic Stelai attest only almond (*amugdale*) and fig (*sukon*) as stored crops, but a few other cultivated species – apples, pears, pomegranates, and quince – are known from Theophrastus, while for him yet others such as walnut, hazel, and chestnut, harvested and pruned but not propagable by man, straddled the boundary between cultivated and wild. Hardly surprisingly, therefore, orchards figure prominently in the literary and epigraphic record from Homer onwards, complete with injunctions about optimum densities for individual species.[62]

with vines (*Caus. pl.* 3.11–16), and partly because the greater variation of species rendered them more botanically interesting. Of the two treatises, *Enquiry into plants* (*Hist. pl.*) and *On the causes of plants* (*Caus. pl.*), *Hist. pl.* is largely about taxonomy, the identification of species, and their correlation with habitat and seasonal growth, while *Caus. pl.* focuses on the processes, both intrinsic and human-directed (such as grafting and pruning), involved in the cycle of growth and perpetuation. Throughout both works, as commentators note with frustration, Theophrastus' interest was that of a botanist, not that of an agronomist. Along with Xenophon's *Oeconomicus* they remain the main sources for agrarian production methods, but many procedures remain sadly unclear.

[57] Pritchett 1956: 188, 191; Isager and Skydsgaard 1992: 42–3; Flint-Hamilton 1999. Cf. Dem. 22.15 for vetch as a famine food.

[58] Hdt. 2.37.5; Iambl. *VP* 61, with Clark *ad loc.*; Sallares 1991: 300–3; Flint-Hamilton 1999: 373–4, 379–80.

[59] Garnsey 1988: 52–5; 1992a; Flint-Hamilton 1999: 374.

[60] Foxhall and Forbes 1982: 44 n. 10; Sarpaki 1992.

[61] Sallares 1991: 301; Burford 1993: 124–5, citing Theophr. *Hist. pl.* 8.7.2 and 8.9.1; Flint-Hamilton 1999: 374. For *IG* II^2 2493 + 2494 see n. 72 below.

[62] Theophr. *Hist. pl.* 3.2.1–6; Pritchett 1956: 182, 190; Isager and Skydsgaard 1992: 41–2; Burford 1993: 129–33.

A third group, domestic and farm animals,[63] is less straightforward, for their near-invisibility in the leases (see below) and in Xenophon's *Oeconomicus* contrasts with their indispensability on the ground, and has presented modern scholarship with an awkward problem of interpretation. At the descriptive level, to be sure, their roles in production were plain enough. Some were simple: while all yielded much-needed manure, pigs were raised for meat, poultry for meat and eggs, and equids largely for haulage and carrying, though horses were also bred for non-productive display purposes in racing and for military purposes as cavalry mounts.[64] Three other species – cattle, sheep, and goats – had more complex uses, for apart from wool and the haulage functions performed by bovids, all yielded milk *in vivo* and meat, hides, and bones (for glue) after slaughter. Their roles as sacrificial animals (especially pigs, sheep, and goats: the greater bulk and higher unit cost of bovids confined them to larger-scale occasions) gave them a role in supplementing the supply of protein for a population otherwise largely dependent on cereals and legumes, as has long been recognized (though it should not be exaggerated),[65] and helps to explain why flocks of sheep and goats are normal components of lists of property in the Athenian orators.

The task of incorporating stockrearing into an overall picture of the Greek farm has thrown up two problems. The first, more tractable, is literally that of finding grazing space in the crowded landscapes of classical Greece where cultivation seems to have encroached onto every usable area, however marginal. True, some areas are easily identifiable, such as those set aside for rearing animals for sacrifice at major sanctuaries: the Sacred Land near Delphi and the Orgas at Eleusis are the most prominent, but were certainly not unique.[66] Publicly owned common land was another usable resource,[67] especially that on the shoulders of mountain watersheds which was the goal of such limited transhumance as can be safely predicated of classical Greece.[68] So, of course, as noted above, were woodland and

[63] General descriptive surveys in Burford 1993: 144–56 and in Isager and Skydsgaard 1992: 83–107, the latter largely based on the main primary source, Aristotle's *Enquiry into animals* (*Hist. an.*), but also listing work of the 1930s on the rearing of individual species in Greek antiquity (p. 83).

[64] Bugh 1988 for Athens, and Spence 1993 for Greece at large, concentrate entirely on the military role, as also, understandably enough, do Xenophon's two essays *On horsemanship* and *Being a cavalry commander*.

[65] Jameson 1988: 105; Burford 1993: 151 for flocks in Attic texts; Chaniotis 1995 for animal husbandry on Crete.

[66] For the debate cf. Osborne 1987: 47–52; Hodkinson 1988; Skydsgaard 1988; Forbes 1994; 1996: 92. For "Sacred lands" cf. Parker 1983: 160–6; Isager 1992: 119–20; McDonald 1996. The sensitivities involved are shown by the Athenian request for guidance from Delphi whether land near Eleusis should be leased out or left "holy-idle" (*aneton*) (*IG* II² 204, lines 51–2) and by the care which the demesmen of Piraeus take to lease only "what it is possible and holy-licit (*themiton*) to cultivate" (*IG* II² 2498, lines 16–17).

[67] For examples cf. Burford 1993: 256 n. 147; Chaniotis 1995.

[68] Georgoudi 1974; Hodkinson 1988: 51–8; Skydsgaard 1988; Isager and Skydsgaard 1992: 99–101; Burford 1993: 153. The use of Mt. Cithaeron reflected in Soph. *OT* 1120–40 remains, disturbingly, the best-attested example.

scrubland, and perhaps marshy areas such as the plain of Marathon.[69] However, the main usable resource was probably arable land in its fallow year, all the more since the land benefited from manure, a substance much valued and always in short supply.[70]

Less tractable is the challenge of deciding how far stockrearing was integrated with agrarian land-use. Prompted in part by enhanced awareness (sketched above) of the value of legumes and pulses and in part by the high population levels suggested by survey evidence, recent scholarship has pondered how far traditional biannual fallowing was modified, at least in regions subject to significant population stress, by the interculture of widely spaced olive trees with cereals and by cropping pulses and legumes on fallow land for both human and animal consumption, thereby integrating stockrearing more closely and increasing the overall annual yield, albeit at the price of greater labor input and of enhanced risk of soil exhaustion. This is not the place to adjudicate a still open debate,[71] but simply to note the one body of direct evidence which may illustrate both this specific problem and the general panorama of agrarian production in classical Greece. This consists of lease inscriptions of agricultural land.[72] They lay down, for example, what may be assumed to be standard good practice provisions for olive and vine cultivation, or the retention of manure and chaff on the estate, while they split interestingly between enjoining either biannual fallow or the planting of pulses on half of the fallow: animals, in contrast, barely appear save in the most detailed of all, a late fourth-century document from Amorgos[73] which explicitly excludes them while otherwise specifying precisely how the tenant should manage the land.

Finally, this section needs to look beyond foodstuffs to other forms of processing basic materials. The task is of very uneven difficulty. On the one hand contemporary evidence from sites, artifacts, inscriptions, and literary texts[74] makes it easy to relate attested occupations and productive activities

[69] In general Rackham 1983; Hodkinson 1988: 48; Rackham 1996: 26 (marshland). For Marathon, Paus. 1.32.7, with Isager and Skydsgaard 1992: 14–17.

[70] Hence its supplementation by nightsoil (Owens 1983). *SIG* 963 contains the revealing provision (lines 20–6) that since the tenant was forbidden from bringing flocks onto the leased *temenos*, he had instead to bring a stated load of dung annually.

[71] It can be followed from Jameson 1977/8: 125–33 through Gallant 1982; Halstead 1987; Garnsey 1988: 93–106; Hodkinson 1988; Skydsgaard 1988; Isager and Skydsgaard 1992: 108–14 (a very sceptical summary); to Burford 1993: 156–9 (degree of economic rationality).

[72] Principal list in Osborne 1987: 42–3 (table), with discussions in Osborne 1987: 41–52; 1988. Add Behrend 1979; Jameson 1982; 1987; Behrend 1990; Burford 1993: 110–24 and *passim* (with *SEG* XLIII 1221); Arnaoutoglou 1998: 52–7 (selected translations); Petrakos 1999: 143 no. 180 (re-publication of *IG* II^2 2493 + 2494). Though the leasing of privately owned agricultural land to tenants is well attested in the Athenian orators (Davies 1981: 54 n. 30), all extant inscriptions concern land owned by deities and sanctuaries or by communities and collectives.

[73] *SIG* 963, with *SEG* XXXVIII 1944 and XLIII 1221 and Foxhall 1996: 48–51.

[74] Burford 1972 and Hopper 1979 largely supersede the older surveys of Francotte 1900–1, Glotz 1926, and Bolkestein 1958, but do not in themselves wholly supersede the basic antiquarian assemblage

to such primary materials as wood (foresters, sawyers, carpenters, furniture-makers), stone (quarrymen, stonemasons, sculptors, mosaicists, hauliers), metals (miners, blacksmiths, armorers, silversmiths, goldsmiths, coiners), clay (potters, tilers), hides (tanners, cobblers), reeds (ropers, basketmakers), herbs (healers, perfumiers), or wool (fullers, dyers, weavers). The challenge is to produce an overview of this enormous sector of production, a task which requires more attention to the technologies, procurement of materials, quantification of production, and distribution-patterns of artifacts than is currently available. Nonetheless, both the excellence of such artifacts as do survive, and the prominence given to the sector in epigraphic and literary documentation, single it out as the crucial productive complement of the agrarian economy. Nor was its importance exclusive to Athens, for though the degree of development, extreme specialization, and craftsman skills documented for Athens may not have been widespread, Corinth had been her precursor, while Rhodes and Syracuse were not far behind. Indeed, we can probably apply across Greece the characteristics noted for Athens by Harris 2002: first that the sector showed much horizontal specialization, with multiple occupations, but little vertical specialization in the form of management structures; and second that in both location and human relations (with the probable exception of labor in the silver mines) "the Athenians did not make a clear distinction between the *oikos* (household) and the business enterprise or *ergasterion*." To them can be added a third, noted and much commented on both by contemporaries and by modern scholarship, that (on public projects at least) citizen, resident alien, and slave workers often worked side-by-side, and were paid the same daily rates. As with slave bankers, so with slave ship's captains, status and function could cross-cut each other in ways which could render the citizen echelon marginal to the real life of the state.

Even so, whatever its location, the *ergasterion* staffed by slaves, owned by an entrepreneur or rentier, and run by a free, freedman, or slave overseer, had unquestionably become the typical non-agrarian productive institution, and could attain significant size. True, those depicted by vase painters tend for the sake of clarity to be small groups, while in a well-known passage Xenophon noted how the degree of craftsman specialization depended on

of Blümner 1912. Harris 2002 lists c. 170 occupations attested in classical Athens. The various *Studies in Ancient Technology* of R. J. Forbes wholly fail to differentiate areas and periods. For particular activities, and in respect of production techniques rather than connoisseurship, cf. Amyx 1958 and Lawall 1998 (amphoras); Hodge 1960 (specialized carpentry); Strong 1966 (silversmithing); R. M. Cook 1972 (potters); Bettalli 1981 (textiles); Ampolo 1981 and Osborne 1985a: 93–110 (quarrying); Mattusch 1988 and Lapatin 2001 (statuary); Billot 1992 (tanning); Williams and Ogden 1994 (goldsmithing); Treister 1996 (metallurgy); Monaghan 2000 (dyeing); Rihll 2001 and Rihll and Tucker 2002: 276–86 (mining); Reger 2005 (perfumes). A book-length survey of craftsman production in the classical period, complementary to Treister 1996 and comparable to that of Gillis et al. 1997 for premonetary Greece, is much needed.

the size of the city (*Cyr.* 8.2.5), but even aside from the huge silver-mining gangs we hear of workshops not just of 9 or 10 slaves (Aeschin. 1.97 and 101), but of 20 (Dem. 27.9), 30 (Dem. 37.4), 32 or 33 (Dem. 27.9), and even, very exceptionally, of 120 (Lys. 12.19). While on the one hand such figures must reflect a flourishing slave trade, of which we know virtually nothing, they also generate an appreciation of the scale of activity and skill required to procure raw materials, provide suitable premises, supervise a workforce, and mesh with retailers and consumers.

The task is therefore one of gaining a sense of the varying loci of such occupations and of their relationship to markets, in any of the three senses described above. Two examples illustrate the range to be encompassed. First, textiles. At one extreme, as the predominance of "spinsters" (*talasiourgoi*) among slave women recorded as gaining their freedom at Athens in the 320s makes clear, much textile production remained within the household, so that even an upper-class wife was assumed to spend much time making, supervising, and storing such produce.[75] At the other extreme, not only do records of prices reveal an established set of market mechanisms by the late fifth century, but also there was a significant flow of expensive textiles from the Near East.[76] Likewise, though classical Greece shows a new level of activity in public and private building, only in a few public projects, especially in Attica, are management frameworks visible, principally via piecework contracts with individuals or teams of craftsmen, while the modalities of private construction remain wholly undocumented.[77] We do not even know how house-production in the "new towns" of Olynthus and Piraeus was regulated or financed. Thus, though of course in one sense the markets for labor and materials were common to all participants, neither of these sectors of production shows a single pattern of production or a uniform relationship to markets, nor even a clear movement from one pattern toward another. Here as elsewhere a plural economy must be predicated.

VI LAND AND LAND-OWNERSHIP

It is time to turn from agrarian and maritime primary products to consider land as a commodity and limited good, together with the unit of

[75] 50 "spinsters" in *IG* II² 1553–78, the largest single occupational group; Xen. *Oec.* 7 *passim*. For the general issue, Bettalli 1985.

[76] Pritchett 1956: 203–8 (prices); Miller 1997: 75–81.

[77] The physical modalities, in contrast, are well attested and studied, not only for temples and other public buildings (e.g., Berve and Gruben 1963; Burford 1969; Boersma 1970; Ashmole 1972; Coulton 1974; Dinsmoor 1975; Coulton 1976; Coulton 1977; Lawrence and Tomlinson 1996; Camp 2001) and fortifications (Winter 1971; Lawrence 1979) but also for housing both urban and rural (e.g., Young 1956 [Attica]; J. E. Jones et al. 1962; J. E. Jones et al. 1973; J. E. Jones 1975 [Attica]; Travlos 1971: 392–401 [Athens]; Hoepfner and Schwandner 1994 [general]; Schuller, Hoepfner, and Schwandner 1989 [general]; Jameson 1990a and 1990b [general]; Kiderlen 1995 [large houses]; Nevett 1999 [general]; Cahill 2002 [Olynthus]).

production, the "farm," and its ownership. Most historians assume that by the fifth century BC there was little "spare" land, and that every square meter was in service. Support for this comes partly from survey data, which reveal dense networks of settlement across the entire cultivable area.[78] There were also some significant intakes in the classical period,[79] perhaps including those termed "lands at the end (or limit)" (*eschatiai*) in literary sources.[80] Partly, again, the difficulties which states encountered in protecting pasture reserved for animals destined for sacrifice at major shrines suggests land shortages.[81] More contentious, given the lack of a clearly identifiable word for "terrace" in classical Greek, is the surmise that terracing was used to extend the cultivable area.[82] Overseas colonization, especially by Athens, reflects complex social and politico-military agendas as much as land-hunger; but although circumstances were not uniform, the general assumption is safer than any alternative.

The unit of production is usually termed "farm." However, this is a modern term, with no precise ancient equivalent. Classical Greek used *agros*, which reflected land-use (field, tilled land, countryside), *oikos*, which denoted the household and its property, *kleros*, which etymologically meant "lot, assigned portion, share," or *chorion*, a general word for "place, area, space." These semantics matter, for they mirrored systems of land-ownership which themselves reflected trade-offs between agrarian practicality, military need, and community authority. Agrarian practicality favored units which could be cultivated by, or under the authority of, one nuclear family, maybe with some hired or servile help, but were large enough to sustain such a family reliably. High interannual variability of yield and what appears to have been a rule of thumb of one hectare per person, tended to generate productive units of at least 5 ha. of arable land. Military need, shaped by the ever-present threat or opportunity of invasion, exerted pressure in the contrary direction: a community's survival (or chance of

[78] E.g., Renfrew and Wagstaff 1982 [Melos], Wright et al. 1990 [Nemea valley], Cherry et al. 1991 [Keos], Jameson et al. 1994 [S. Argolid].

[79] Examples known from literary evidence are tree clearance at Philippoi and Krenides in Thrace after the Macedonian conquest of the 350s (Theophr. *Caus. pl.* 5.14.5–6), drainage of marshland before Theophrastus' time at Larisa in Thessaly (*ibid.* 5.14.2; Strabo 9.5.19, 440C), and attempted drainage at Eretria on Euboea (*IG* XII 9, 191) and of Lake Copais in Boeotia in the 320s (Strabo 9.2.18); further references in Argoud 1987 and Wilson 2000. Also, though its ascription to the classical period is disputed, a substantial intake into cultivation has been claimed for the Athenian deme of Atene, barely inhabited before 500 but later the object of substantial agrarian installations (Lohmann 1992; 1993; more cautiously, Foxhall 1996: 62–3; Whitley 2001: 377–81). Another such area may well have been on Mt. Aipos on Chios, where clear signs of classical cultivation cover an area now largely desolate (Lambrinoudakis 1986; Isager and Skydsgaard 1992: 72).

[80] Cf. D. M. Lewis 1973: 210–12 [1997: 291–3]; Lane Fox 1996: 125 n. 1, with further references.

[81] Cf. n. 65 above.

[82] The debate can be followed through Jameson 1977/8: 128 n. 32 (who canvasses the word *haimasia* [*Od.* 18.359; Men. *Dys.* 377]); Isager and Skydsgaard 1992: 81–2; Rackham and Moody 1992; Rackham 1996: 26; Foxhall 1996; Grove and Rackham 2001: 107–18.

gain) could depend on putting as many heavy-armed men into the field as possible, which encouraged division of the productive landscape into the maximum number of units of minimum viable size, each providing one such warrior. Communities, however traditional, minimal, or remote, had to devise an acceptable compromise between these opposed imperatives, and seem to have done so in two complementary ways: first, by asserting a primordial public authority over the landscape, and second by preventing excessive accumulation of property. The first expedient typically took mythic form, attributing the community's possession of its landscape to a god,[83] both so that its individual members might have (in theory or in reality) a share allotted to each (hence the use of the word *kleros*), and so that the community as a collective could feel itself entitled at need to confiscate, redistribute, or reassign land.[84] The second expedient involved favoring partible inheritance over primogeniture, ensuring at the extreme that a *kleros* did not become "empty" (*eremos*),[85] setting a limit to the size of individual estates,[86] and enveloping the acquisition of several *kleroi* in a cloud of social disapproval.[87]

Such considerations so privileged the "family farm" for both practical and ideological reasons that, assisted by rosy depictions in Aristophanes and elsewhere, it has come to be seen both as the economic norm and as the social ideal.[88] Such a view is both simplistic and misleading. In the first place, its stability through time depended on sons succeeding fathers as farmer-owners and passing *kleroi* to their own sons, and so on. Demographic reality, visible above all in the Gortyn lawcodes and in Athenian inheritance disputes, engendered a far less-stable environment, characterized by divisions of *kleroi* between sons, by losses and gains via dowry transfers or divorce, and by adoptions. Second, provisions against the concentration of property might be weak, as was calamitously the case at Sparta,[89] not least because the office-holders with the duty of enforcing them were typically drawn from an upper class in whose private economic interest it was to flout them. Third, not all productive land was in the hands of owner-farmers, for some was owned by deities, collective cult-groups, or the state and its segmental

[83] The "Great Rhetra" of Sparta (Plut. *Lyc.* 6) is the classic example.

[84] Confiscation was common enough, usually after legal process but often driven by nakedly fiscal reasons. Periodic redistribution was rare in practice, the Lipari Islands being the only known case (Diod. Sic. 5.9.4–5, with Burford 1993: 24–6 [cautious]), but was feared as a revolutionary contingency (*ges anadasmos*).

[85] Cf. *Ath. pol.* 43.4 for the procedure at Athens, and the general preoccupation with the bestowal of heiresses in marriage within the kindred (Karnezis 1972 [Athens]; Davies 2005: 317–22 [Gortyn]).

[86] Large single units in Attica go up to 300 *plethra* = 30 ha., but not beyond. Whether this was by chance or by unattested rule is unknown. Larger portfolios of property holdings existed, but comprised many scattered component parts (Davies 1981: 52–4).

[87] Isae. 11.37, with Davies 2001c: 206.

[88] A view documented but not shared by Burford Cooper 1977/8; cf. also Foxhall 2001 for Attica.

[89] Arist. *Pol.* 1270a15–b6, with Hodkinson 2000: 94–103.

parts such as demes, and was leased out, the income being used for communal or cultic purposes.[90] Though it is hard to estimate the proportion of productive land thus owned,[91] it was not negligible, and its existence provided flexibility and opportunities for tenants' energy and ambition.[92]

Further, the adoption of coinage in most Greek states except Sparta by the end of the sixth century BC had two fundamental long-term consequences that eroded the efficacy of the compromise sketched above. First, though land-ownership remained the principal determinant of status, though prohibitions of sale are reported for some regions and some categories of land,[93] and though we cannot document an institutionalized market in land,[94] nevertheless land did change hands, not least via the public sale of confiscated property, and there is evidence of land being bought as an investment, to improve and resell.[95] The second, more radical consequence was the gradual takeover of much military activity from the early fourth century onwards by professional mercenary soldiers. Paid in coin, trained by innovative condottieri, and employed only when needed, they were a more efficient solution to landward military needs than amateur hoplite militias.[96] Yet, the more such men took over mainstream military roles, the less states needed to retain systems of landholding which maximized the number of warrior smallholders.

Two salient points emerge. First, patterns of land-ownership were not, and could not be, determined purely by agrarian economic rationality. Considerations generated by that logic were indeed – and knowingly[97] – part of the picture, but coexisted with military needs, the needs of temples, cult-bodies, and local collectives for reliable income, and with the role of land-ownership as a signifier of status. Second, patterns were not static throughout the classical period: not just because demographic instability drove endless small-scale fluctuations, but also because long-term changes affected links between land-tenure, civic status, and community obligation. One such movement, to assimilate to each other the circles of those who owned land, fought, voted, held office, and had direct access to law or

[90] The estates of Apollo on Delos and Mykonos are perhaps the most prominent (Kent 1948; Reger 1994), but the system was widespread (Davies 2001b). In addition, royal land certainly existed at Cyrene (as *temene*, Hdt. 4.161.3), as it presumably also did both in the territories of the well-established national monarchies of Epirus and Macedonia and (by confiscation) in the territories of the "tyrants" of the classical period in Sicily and elsewhere.

[91] Only for Attica is any estimate possible, though Andreyev's guess of up to 10 percent (1967: 72) may have been on the high side (D. M. Lewis 1973: 199 [= 1997: 276]).

[92] Davies 1981: 54 n. 30; Osborne 1988.

[93] E.g., Herakl. Lemb. 373.12 Dilts (sale of the "ancient portion" [*archaia moira*] prohibited at Sparta), with Hodkinson 2000: 68–75.

[94] Its commodification was probably a gradual process and therefore remained unremarked as such in our sources, but was clearly a normal aspect of Athenian life by the late fifth century.

[95] Xen. *Oec.* 20.22–6. [96] Arist. [*Oec.*] 2. 24a, 1350b, for the need to pay mercenaries in coin.

[97] See n. 152 below.

distributions, tended toward the creation of a single, semi-level platform of all who "had a share in the state," and thereby impeded change in the ranks of landowners. A contrary movement, which tended toward the disaggregation of roles and statuses (as with military activity and much non-agrarian production) and toward eroding links between landholding and citizenship, gathered pace in the fourth century and broke surface, sometimes violently, thereafter.

VII LABOR

No survey of labor as a component of production in classical Greece can ignore two basic determinants. First and foremost, the multiplicity of microstates, and the differences in legal status within the "workforce" even within a single microstate, so fragmented labor markets that *ad hoc* expedients could not go far to integrate them. The second is that most people had to work very hard nearly all the time. True, a leisure class did exist, living on rents or from the direct produce of others' labor, and features so prominently in our evidence as to give an utterly misleading picture of the demands and constraints of ordinary existence. Even for most male citizens, apart from the windows of leisure provided by slack periods of the agricultural calendar, participation in community activity required buying out via public pay (*misthos*) the time which would otherwise be spent in labor; serfs, slaves, and the vast majority of the free but unenfranchized male population had no such access, while the *misthos*-system itself may not have been widespread outside Athens.[98] As for women, though there were high-status exceptions, especially for those with a visible role in cult, it is safest to make the stark assumption that most had no leisure at all.[99]

Labor in classical Greece was therefore intrinsically scarce and at a premium. There were of course the physically or mentally unemployable, but in negligible numbers. More importantly, the flexible deployment of free labor in a wage market was severely constrained, whether by the prejudice against being the private employee of another citizen,[100] or by the scarcity of coined money, or by the feebleness of the protection (divine or human) available to those who ventured beyond their own *polis* boundaries: it is no accident that the most significant wage-labor market, with the widest geographical scope, was for mercenary soldiers and rowers, recruited above all from among the landless, much in demand whenever there was a funded paymaster, and better able to protect themselves when abroad.[101]

[98] de Ste. Croix 1975 and 1981: 602 n. 24.

[99] S. Lewis 2002: chs. 2–3; Miller 1997: 192 for the paraphernalia of the leisure class.

[100] Xen. *Mem*. 2.8.1–5 – though the prejudices of a dispossessed rentier may not have been typical. A hireplace for day-laborers is attested for fifth- and fourth-century Athens (Fuks 1951 [= 1984: 303–5]). More generally Garlan 1980.

[101] I owe this perception to Vincent Gabrielsen, to whom my thanks.

In order to bypass such inflexibilities various expedients emerged. One, visible mainly in the towns most open to human migration by sea, was the creation of the status of "resident alien" (*metoikos* or *paroikos*).[102] This allowed free men to offer their labor where it was needed, to remain formally "free" (albeit with the requirement to relate to a local citizen "protector" [*prostates*]), to work and earn without formal limit, and to have some basic legal protection, while being liable to military service in the adopted microstate and being excluded *sine die* from landowning, intermarriage, and the political process. Athens at least consistently saw metics not as a threat to citizen status but as an asset, to be encouraged as long as the citizen boundary was not crossed.[103]

A second was to bring major building and some other activities directly or indirectly under state control, giving contractors a formal relationship with a civic or cultic collective, not with a private individual. Such contracts are widely attested in temple- and fortification-building accounts from all over Greece.[104] Not only do they reveal contracts being let to citizens and metics on what appear to be equal terms, but they also (especially at Delphi, Tegea, and Epidauros) show how, subject to putting up local guarantors (*enguetai*), craftsmen from elsewhere could seek and win contracts, offering thereby a regional common market of labor and expertise[105] closely comparable to that which had long allowed sculptors, musicians, silversmiths, and artists to take commissions throughout the Greek world and beyond.[106]

A third expedient, widely practiced by conquerors and invaders, was to subject an existing population to some form of serfdom. In ethnic terms it is clearest in colonies such as Syracuse and Heracleia Pontica, where Greeks exploited indigenous labor, though there is increasing evidence of gradual assimilation and acculturation as the classical period went on.[107] In terms of evidence, the modalities are clearer for those regions of old Greece whose regimes rested, in myth or in reality, on the claim of immigration and divinely chartered occupation. Thessaly with its *penestai*, Crete with its *woikeis*, and Laconia-Messenia with its helots were the leading examples, but were not unique.[108] As elsewhere with serfdom, so also in Greece the

[102] Gauthier 1972: 107–56; Whitehead 1977 [Athens]; Whitehead 1984 [general].

[103] Xen. *Vect.* 2.1–7 is the classic statement.

[104] Cf. Maier 1959–61 [fortifications]; Burford 1969 [temples].

[105] Davies 2001d: 221–3.

[106] I know of no synoptic treatment of this topic for Greek culture comparable to that of Gold 1982 for Rome; it was explicitly excluded from Wallace-Hadrill 1989. Cf. meanwhile Bowra 1964: 355–7 (Pindar as paid professional poet) and Morgan 1990: 34–41 (itinerant craftsmen).

[107] Lotze 1959; Garlan 1988: 85–118.

[108] Argos, with its post-494 "*douloi*" (Hdt. 6.83), is a complex and contentious case (Tomlinson 1972: 96–100). Nor was Athens immune, for if the local understanding of the term *hektemoroi* has substance (*Ath. Pol.* 2; for the endless debate thereon see now de Ste. Croix 2004: 109–28), pre-Solonian Attica too may have been moving towards a quasi-serf system until the custom of pledging one's body as security for debt was outlawed, traditionally by Solon. In general Finley 1959; 1962; Brockmeyer 1979; Finley 1985: 62–94; Garlan 1988; de Ste. Croix 1988; Fisher 1993.

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system had three components: a population retaining its location and family structures but tied to that location and to the estate owner; a regime of agrarian sharecropping, the split of produce varying from region to region; and an upper echelon of estate-owning rentier families, likely to reside in "town" and closely brigaded together in military structures designed above all to preserve the exploitative system.

All three expedients had one crucial shortcoming: though adequate for static systems of agrarian production or for productive opportunities suitable for self-employed labor, they could not provide a labor force which could be closely controlled or could be assembled at, or moved to, the loci of such production as was innovative in method or scale. Though wage-labor did exist,[109] the most convenient solution was to extend the system of chattel slavery which had been used to staff the wealthier households for centuries. It was not a cheap solution: an adult slave (man or woman) might cost about 200 dr. in the classical period,[110] nor, given the chances of slaves escaping or dying young, was it low risk. But it had the overwhelming advantage of providing a means, via the slave trade,[111] of moving men and women efficiently (because forcibly) over long distances and if need be across cultural and ethnic boundaries, to where they could be profitably used. It is no accident that the locations and sectors of production where we are most aware of slaves in significant numbers are the silver mines of south-east Attica,[112] metal-working in Athens and Piraeus,[113] and intensive agriculture on Chios and elsewhere,[114] though the extent to which slaves were used in agriculture remains a very contentious matter.[115] Conversely, there were regions where the use of slaves seems to have been a recent development in the fourth century BC,[116] while the practice, attested above all in Athens, of slaves "living apart" from their owners, fending for

[109] Brockmeyer 1979: 105, with 289 n. 4.

[110] Average prices for slaves sold in 415–14 were 179 dr. (men) and 178 dr. (women) (Pritchett 1956: 276–81) in what may well have been a skewed market (D. M. Lewis 1966: 186 [= 1997: 169]). Fourth-century prices were somewhat higher.

[111] Garlan 1988: 53–5; Thompson 2003: 18–19.

[112] Xen. *Vect.* 4.14–17 names the owners of 300, 600, and 1,000 slaves, hired out to mining contractors in the later fifth century within a total workforce which has been estimated at anything up to 30,000 (Lauffer 1979: 140–71; further references in Osborne 1995: 31 with 40 n.18).

[113] Examples and references in Hopper 1979: 101 ff. and Treister 1996: 190–233.

[114] For Chios, Thuc. 8.40.2 and Ath. 6.265b–266f. The documentation about Thasian wine-production (Salviat 1986) focuses overwhelmingly on the product, not on the modes of production, so that the absence of allusions to slave labor is not serious negative evidence. Indeed, it is hard to suppose that the level of production evidenced by the amphora record for the main wine-producing areas (Thasos, Chios, Mende, Lesbos) could have been reached and sustained without slave labor. For Attica, the 12? agricultural slaves manumitted in Attica in the 320s (*IG* II^2 1553–78 with D. M. Lewis 1959; 1968) represent the largest single occupational group after the 50 "spinsters" (above, n. 75).

[115] Jameson 1977–8; Wood 1983; 1988; Jameson 1992; Osborne 1995: 32–4; Foxhall 1996: 54.

[116] Their use in Phocis is claimed to have started in the 350s (Timaeus, *FGrH* 566 F 11a *apud* Ath. 6.264 cd).

themselves but paying them a daily rent from their earnings,[117] shows the institution being used more to yield a rentier income than as an investment in production.

VIII CAPITAL

The role of capital in facilitating production, as distinct from distribution or consumption, is easy to underestimate. Its deployment in private hands is barely visible until the fourth century, while the public acquisition and use of capital, whether for military ends or for displays in temples and sanctuaries, followed drives and priorities which were rational enough, and had clear and far-reaching economic effects, but mostly were not investment for productive purposes. The one possible major exception to this is investment in infrastructure such as water-supply, harbors, bridges, and roads, but investment in the latter two, and in the harbor installations at Delos, seems to have been mostly for the sake of safe access to sanctuaries,[118] while the balance of investment at Piraeus between military and civil installations (quays, stoas, etc.) is wholly unclear.[119] Investment in water-supply facilities, too,[120] was primarily to meet the needs of urban agglomerations. However, at least for Thasos, a major wine-exporting state, it is likely that harbors were built in order to facilitate commercial shipping.

Also, though resources in bullion or coin did increase substantially during the period under review, they remained very limited and uneven. "Money supply" meant M1 and nothing else, for though systems of raising loans were of long standing, and created debtor–creditor relations which could become socially and politically explosive,[121] and though a rudimentary banking system emerged, the extent to which the variety of interest-bearing and interest-free lending mechanisms facilitated gainful activity (as against lubricating social obligations) before the Hellenistic period remains an unresolved and contentious matter.[122] If for simplicity's sake we leave aside less easily convertible, non-bullion modes of storing wealth such as cattle and jewelry (though neither was negligible), the money supply comprised silver and (to a far lesser degree) gold in the forms of coin held in private, civic, or royal hands, of objects of greater or lesser utility likewise in private, civic, or royal hands (tableware, etc.), and of specie lodged in

[117] Most of the retail traders listed on the Attic manumission lists will have fallen into this category.
[118] Davies 2001d: 215–16.
[119] Garland 1987: 139–70; Travlos 1988: 340–63; von Eickstedt 1991: 18–81.
[120] Cf. Rihll and Tucker 1995 (Samos) and the survey chapters in Wikander 2000 by Hodge, Jansen, and Wilson.
[121] Asheri 1969 (texts and full discussion); Millett 1991 (Athens); Davies 2005: 322–5 (Gortyn).
[122] The debate can be followed through Bogaert 1968; Humphreys 1970; Bogaert 1986; Millett 1991; Cohen 1992: 207–15; Gabrielsen 2005.

temples or sanctuary treasuries as deposits and dedications. This third category deserves more attention than it has received, for its total bulk and value was certainly substantial, and such dedications removed bullion from circulation and thereby diminished the money supply. The process had a significant adverse impact on liquidity, even if some deposits were envisaged as being recyclable without impropriety[123] or re-entered circulation via pillage.[124]

However, we can also identify ways in which the classical period saw increases in money supply. One was via plunder from warfare out of region,[125] the most substantial being the gains made at the expense of the Persian empire between 480 and 450.[126] A second source was mercenary service out of region. This was an old custom on a small scale, but grew in importance from the late fifth century when both the Persian empire and its adversaries resorted to hiring Greek soldiers.[127] A third comprised spasmodic, politically motivated consignments from non-Greek rulers, such as the payments made by Persia to one side or another for a century from the 420s till Alexander's conquest.[128]

Yet the impact of these three sources on the money supply was minor compared to new bullion from silver mines. The main sources exploited in the classical period after the flooding of the workings on Siphnos were Laurion in south-east Attica, the Pangaion range by Amphipolis on the north Aegean coast, Thasos, and the hinterland of Apollonia.[129] Unfortunately, the rate of bullion inflow into the Greek economy cannot be reliably quantified, and certainly experienced high annual variation,[130] while the routes by which it entered circulation changed during the period under review. The older pattern had been that the community claimed either a tithe of produce (as at Siphnos) or even the right to distribute all produce to its citizens (the presumption behind Themistocles' expedients in Attica in

[123] Notably the bullion lodged with Athena by the Athenian state in the fifth century (Thuc. 2.13.3–5).

[124] Classic instances are the pillage of temples in Attica and Eretria by the Persians in 480, that of the temple of Eileithuia at Caere by Dionysios I c. 384/3 (Diod. Sic.15.14.3–4, etc.), and the conversion of the dedications at Delphi into coin by the Phocian occupation in 356–346. For the complexities and quantities involved, cf. provisionally Davies 2001b: 124–6.

[125] But internal warfare *within* Greek space, though disruptive in other respects, will have had no impact on the aggregate money supply.

[126] Though exact accounting of the finances of the fifth-century Athenian empire before the late 450s is wholly out of reach, there is no way in which the accumulated reserve of 9700 tal. could have accrued wholly from tribute payments. Much of that sum must represent plunder.

[127] Parke 1933; Griffith 1935; Roy 1967; Briant 1996: 802–20, 1012–15, and 1061–5. Again, mercenary service within Greek space, notably the payment of rowers during wars in the Aegean, will have been neutral.

[128] Details in D. M. Lewis 1977 [Sparta] and Miller 1997: 3–28 [Athens].

[129] Starr 1970 [Athens, but regrettably not covering the period of maximum production]; May 1939 [Damasteion]; Gale et al. 1980 [general].

[130] Cf. de Callatay 2005a.

483/2),[131] but that did not prevent profitable rights of working from falling into private hands.[132] By the fourth century, if not earlier, at least in Attica, an elaborate leasing pattern enabled the state, the landowner, the lessee, the owner of smelting premises, and the owner of the (slave) labor force all to benefit from the workings, even if the precise routes by which silver bullion leached into private hands remain obscure.[133]

However, that said, the combined impact of a step-change in the quantity of accessible bullion and of the adoption of coinage was profound. The intellectual and ideological consequences are explored in detail elsewhere:[134] more pertinent here are the economic practicalities. At the state level, minting coinage was governed by existing weights and measures. These yielded coinages of incompatible standards, the emergence of some regional norms, and at least one attempt by an imperial power to impose a uniform system,[135] but the generally high standard of minting purity, the emergence of acceptable counterfeits, and the willingness of markets to accept specie by weight reduced barriers to common use: rare is the hoard whose coins do not represent a plurality of states and emissions.

More generally, the growing availability of coined money eased the emergence or extension of patterns of behavior, which went far to transform the Greek economy. Not all were productive: the emergence of paid employment for military purposes, for example, was productive only in the sense that it enabled first Athens in the 470s, then Corinth, Syracuse, and other states, to man warships for sustained aggression, leading to the creation of predatory overseas empires. Rather more productive was the use of coin to remunerate building workers and contractors, whether by day rates or by piece- and contract work. Its negotiability and portability allowed craftsmen from a wide geographical radius to be paid in a form which they could take away and use at home. Though such remuneration is visible in our sources only with publicly sponsored projects, it is in private building that one form of deliberate investment for profit first becomes visible. By the later fifth century urban rental property emerged, and amenities such as inns, private bath-houses, and gymnasia are attested,[136] while new-style housing units such as the multiple dwelling (*synoikia*), first

[131] Hdt. 3.57.2 (Siphnos): Hdt. 7.144, Plut. *Them.* 4.1, and *Ath. Pol.* 22.7 (Athens).

[132] Most notably Thucydides the historian, with his possession of the (rights of) working the goldmines at Skaptesyle opposite Thasos (Thuc. 4.105.1).

[133] Crosby 1950; Hopper 1953; Faraguna 1992: 289–322.

[134] E.g., Seaford 1994: 220–32; von Reden 1995a; 1997b; Kurke 1999: 6–23 and 299–331; but note also de Ste. Croix 2004: 371–420.

[135] Cf. the adoption of the Aeginetan standard in much of central Greece (Kraay 1976: 315); the Athenian attempt, via a decree now certainly to be dated in the 420s (ML 45 = *IG* I^3 1453), to impose the use of Athenian coins, weights and measures throughout the empire; and the sudden spread of Corinthian coinage in Sicily in the fourth century (Kraay 1969: 53–63).

[136] Davies 1981: 49–55 (urban rentals); Delorme 1960 (gymnasia); Ginouvès 1962 (bath-houses); Yegül 1992: 6–29, with 424–8.

attested – remarkably – in Kerkyra town in 428,[137] catered for those legally or financially barred from property ownership and provided rents to the landlord.

By that date, too, the main components of at least three monetized subsystems of capital circulation are reflected in our fragmentary evidence. The first and most straightforward concerned temples, sanctuaries, and local cult-groups which might come to possess substantial capital accumulations from the rents of land or urban property, from donations or dedications made by the pious, from fees charged in coin for access, or for the sale for sacrifice of animals reared by the shrine. In various ways, with all due piety and caution, and at orders of magnitude which ranged from 200-drachma units to the gigantic sums which Athena lent the Athenian state in the fifth century, it came to be deemed proper to lend such monies out at interest, beginning the long and complex history of the temple as quasi-bank.[138] The largest known loans, those from Athena, were exclusively for military purposes,[139] but the purposes of the smaller loans to states, such as those from Apollo on Delos,[140] or to individuals remain unknown.

Second, with only one major exception (Sparta) and irrespective of whether they themselves issued coins, the Greek micro-states themselves all became monetized fiscal systems in the fifth century. Fines and taxes were levied in coin, while the exigencies of military power – not least the vastly increased costs of naval activity engendered by trireme technology – compelled states either to pay soldiers and crews in coin or (especially within the Aegean orbit of the Athenian fifth- and fourth-century empires) to pay tribute in coin.[141] Again, though there are scattered examples of public investment in infrastructure or amenities other than temples, it was normally only plunder or other windfall gains which allowed such improvements, at least until Athenian politicians of the fourth century refined the concept and techniques of unified, managed public budgets.[142]

However, thirdly, and hardly surprisingly, far more possibilities were open to individuals. Though *misthos* on its own (see above) had little impact on an individual's accumulation, coin made the purchase of slaves easier and allowed owners either to group them in workshops[143] or to profit in coin (*apophora*, usually 1 obol per day) from the work of slaves "living

[137] Thuc. 3.74.2; Nevett 1999: 157–8. [138] Bogaert 1968: 279–304; Davies 2001b; Gabrielsen 2005.
[139] ML 72 = *IG* I³ 369. [140] Bogaert 1968: 126–53.
[141] Thuc. 1.99 for Aegean commutation to payment in coin after the 470s; Diod. Sic.14.10.2, with Hamilton 1979: 61–2 and Austin 1994: 551–2, for Sparta and the Aegean after 404; Cargill 1981: 124–7, and Austin loc.cit for the post-377 Aegean.
[142] Cf. the amenities and public works paid for by booty from Kimon's double victory over the Persians at Eurymedon in the early 460s (Judeich 1931: 73–4). For the development of a unified budget, Faraguna 1992: 171–94 and D. M. Lewis 1997: 212–29.
[143] Davies 1981: 41–9; Osborne 1995.

apart,"[144] while gains from inheritances, plunder, bribes, property rents, business or trading profits, and the sale of agrarian produce[145] all helped create a monetized sub-sector within individual property portfolios which supplemented the agrarian economy and may even, in extreme cases, have supplanted it altogether as the core of an individual's wealth.[146]

IX PRODUCTION, PRODUCTIVITY, AND THE PRODUCTIVE MENTALITY

The core question, whether the classical Greek world experienced what economists would recognize as genuine economic growth, or merely knew various types of accumulation of resources within existing parameters of yield, not least via predatory expansion, can neither be evaded nor as yet answered, in spite of the intensive debate of the last thirty years. Some, particularly Athenian, evidence does appear to point to genuine growth, but it is hard to place it in sufficient perspective to paint an overall picture, all the more since we cannot postulate uniform directions or speeds of development across a poorly articulated Greek-speaking world. This final section therefore confines itself to creating a provisional sketch out of various component parts.

If we had reliable figures for the aggregate GNP of the Greek-speaking world during the classical period, they would almost certainly show a significant increase in overall production from that of the sixth century. The salient sectors would be metal extraction and metal-working, cut stone from the innumerable quarries for construction, timber for ships, houses, and fuel, retailing, and most of the agrarian-pastoral sector. Some of this production, especially the coined silver, moved out of the Greek-speaking areas to pay for imports, especially iron from Etruria and elsewhere, grain from Egypt and the north shores of the Black Sea, papyrus and flax from Egypt, luxury items from the Levant, and so on. However, most coins stayed in Greece as payment for civic and military services. Concomitantly, at least in some localities, extra manpower is likely to have become available. Some of this reinforcement comprised forced labor, imported to be deployed as slaves in mines, workshops, or agriculture, while others as free movers constituted a significant flow of skilled labor within Greece which came to concentrate especially in urban centers like Syracuse, Corinth, and Athens.

This increase did not stem from the use of new materials, or from dramatic step-changes in the technology of production, but rather from small increments and from the wider use of existing techniques. For example, the

[144] Perotti 1974; 1976; Garlan 1988: 69–73.
[145] E.g. Plut. *Per.* 16.4; [Dem.] 43.69–70.
[146] Davies 1981: 38–72.

large-scale washeries at the Laurion silver mines replicated existing techniques on a grander scale, just as the large slave workshops of classical Athens were a larger version of Corinthian workshops of the previous centuries, or as the intakes of previously uncultivated land used available techniques to yield more produce. This is not to belittle the importance of innovations such as the use of the crane for building, the acculturation of new crops such as alfalfa, the use of slaves for intensive agriculture, or – the primordial innovation – adjustments to behavior triggered by the adoption of coined money.[147] At least by the 420s, in addition to the changes sketched in Section VIII above, the latter had stimulated two further innovations. The first was the private bank, functioning in turn as money-changing locale, safe deposit, and money-lending route.[148] The second, driven by the need to assemble large sums of money (3,000 drachmas in our one surviving contract, [Dem.] 35.10–13) in order to buy, for transport to Athens or other Aegean towns, a ship's cargo of grain at an overseas port, was the development of a specific form of money-lending, the so-called bottomry loan, secured on the vessel or the cargo itself and ignoring civic or status boundaries.[149]

At the same time it would be foolish to overrate the scale or speed of change. Socially and economically, the various scattered and loosely linked regions of Greece were moving at very different speeds, the more remote or the less wealthy not catching up on the Aegean states until well into the fourth century or later.[150] Even within the economic leaders, much productive activity did not need to change, and even the adoption of coinage need not have generated a monetary economy, still less a market-oriented one, especially in those regions which coined only intermittently. Probably for much of Greece, as the Great Code of Gortyn makes brutally clear for Cretan conditions, so far from credit providing opportunities for enhancing production, its blacker downside, debt, drove men to pledge their bodies and to suffer social degradation within a static and isolated economy. Even within the comparatively prosperous Athenian context, a stream of interest-bearing loans for productive purposes has to be set against the equally widespread institution of the *eranos*, interest-free loans made for social purposes as an important component of social solidarity.[151]

All this suggests that neither the techniques of production, nor the associated attitudes and values, nor the pertinent institutions can be accommodated within any single model of interaction. The complexity emerges,

[147] Coulton 1974 (crane); Pliny, *HN* 18. 144 (alfalfa); in general Greene 2000, and works cited in n. 134.

[148] Bogaert 1968: 61–88; Millett 1991: 179–217; Cohen 1992: *passim*.

[149] Millett 1983; Cohen 1992: 111–83.

[150] Thuc. 3.94.4–5 (Aetolia in 429 BC) and n. 135 above. For other regional studies cf. Gehrke 1986, and the papers in Brock and Hodkinson 2000.

[151] Finley 1952: 85–7 and 100–6; Davies 1981: 62–3; Millett 1991: 127–59.

no doubt deliberately, from Xenophon's portrayal in his *Oeconomicus* of the techniques of household and estate management which he ascribes to a quintessential Athenian gentleman, Ischomachus. On the one hand, all is to be stable, ordered, morally honorable, even puritanical, as befits a man of inherited wealth and prominent social position whose estate is worked by slaves with a slave bailiff, and whose house is run by his wife, a housekeeper, and slave domestics. Yet, just as he followed his father's practice in buying up, improving, and selling previously uncultivated or neglected land for profit (20.22–6), so too the common goal of endeavor is repeatedly said to be "to increase the estate" (*auxai ton oikon*),[152] a goal which is to be internalized both by Ischomachus' wife (7.16) and by their (slave or freedwoman) housekeeper (9.12), and is yet also one most likely to be reached by self-control and "by just and honorable means" (7.15, tr. Pomeroy). It is hard not to detect a strong hint of a Protestant ethic.

[152] Xen. *Oec.* 1.4, 1.16, 3.15, 11.12, 21.9: an aspect not picked up by Johnstone 1994: 229–35.