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Wealthy Hellas

JOSIAH OBER
Stanford University

THE EARLY TWENTY-FIRST CENTURY IS SHAPING UP AS A GOLDEN AGE FOR research on ancient economies.[1] Roman historians have been leading the way. A sophisticated body of work offers estimates of several key economic indicators for the period ca. 100 B.C.E.–200 C.E.: first, the rate of intensive (per capita) and extensive (aggregate) economic growth; second, population density, distribution, and urbanization; third, distribution of wealth and income. The ultimate goal is to trace changes in human welfare over time and across regions. Helpful surveys of "the new Roman economy" are now available.[2] Meanwhile, although there have also been substantial advances in the study of ancient Greek economies, and although much of the new work on Greece is focused on the same core areas of growth, demography, distribution, and welfare, there is, to my knowledge, no readily accessible summary of the most

[1] This development is signaled especially in Manning and Morris, eds. 2005; Scheidel, Morris, and Saller, eds. 2007; cf. further the works cited in n4, and below. Social scientists, economists and political scientists alike, are also working actively on ancient economies; on the Greek side and *exempli gratia* only: Fleck and Hanssen 2006; Lyttkens 2006; Kaiser 2007; Karayiannis and Hatzis 2010; Kyriazis 2009; Pitsoulis in progress. My thanks to Peter van Alfen, Mogens Hansen, Geoffrey Kron, John Ma, Emily Mackil, David Teegarden, and Joe Manning, for friendly advice and access to unpublished work. I owe special thanks to Ian Morris and Walter Scheidel. The importance of their published work will be evident throughout and their detailed and constructive suggestions improved this article at every step of the way. None of the above ought be supposed to agree with all of the arguments presented below.

[2] See, e.g., de Callataÿ 2005; Bang 2007; Hopkins 2009; Bowman and Wilson, eds. 2009; and parts V–VIII of Scheidel, Morris, and Saller, eds. 2007.

recent developments in archaic and classical Hellenic economic history.[3] This article sketches a few preliminary results of an emerging area of scholarship that will, I believe, revolutionize how classicists and social scientists think about the Greco-Roman world.[4]

The results reported here are based on the ongoing research programs of several leading specialists in ancient Mediterranean economic history, along with some of my own recent work. I argue that commonly held premises about Greek economic performance are wrong (Sections 1 and 2), make three factual claims about the performance of the Greek economy in ca. 800–300 B.C.E. (Sections 3–5), and advance two hypotheses to explain Greek economic performance in this era (Sections 6–8). In the concluding Section (9) I discuss how my argument might be falsified or verified. *Caveat lector:* the results I report here are not yet definitive and I do not pretend to offer anything like an adequate review of a large and growing literature. Nor is this article a statement of consensus conclusions endorsed by all specialists in Greek economic history. It also addresses only the archaic and classical periods of Greek history, both because of the availability of data and because the definition of "the Greek world" changed dramatically at the end of the fourth century B.C.E.[5]

I hope and expect that the premises and hypotheses offered here will be refined in years to come. Nevertheless, the main outlines of a new and more realistic picture of the Greek economy seem to me tolerably clear: archaic and classical Hellas, taken as a whole, was a wealthier place than most historians once imagined. Indeed, late classical Athens (and perhaps other advanced poleis of the fourth century B.C.E.) appears to have been among the most prosperous communities of premodernity.[6]

[3] Although see the relevant chapters in Scheidel, Morris, and Saller, eds. 2007: Morris 2007; Osborne 2007; Davies 2007; Möller 2007; and von Reden 2007.

[4] A highly selective list of seminal work on various aspects of the Greek economy published since 2000 includes Horden and Purcell 2000; Bresson 2000 and 2007; Meadows and Shipton, eds. 2001; Cartledge, Cohen, and Foxhall, eds. 2002; Scheidel and von Reden, eds. 2002; Manning and Morris, eds. 2005; Eich 2006; and the relevant chapters of Scheidel, Morris, and Saller, eds. 2007. Other works are cited below, but this article does not even begin to offer a proper literature review.

[5] Although there is some reason to believe that the economic trends of the previous 500 years did not continue into the third century in what had been the Greek world before Alexander (Reger 2007: 481–83), Hellenistic economic performance remains, for me, very much an open question.

[6] Edmund Burke, in a seminal article on "Lycurgan finances" (1985), was among the first to emphasize late-classical Athenian prosperity; this article (along with Burke 1990, 1992) helped to open my eyes to the issues addressed here.

1. THE STANDARD ASSUMPTIONS ARE WRONG

Among the assumptions about the archaic and classical Greek world with which I grew up as student in the 1970s was that the world of the Greek city states was relatively poor. This assumption was based in the first instance on what we may call "the standard ancient premise." It is stated succinctly in Herodotus, Book 7: "Hellas has always had poverty as its companion" (τῇ Ἑλλάδι πενίη μὲν αἰεί κοτε σύντροφός ἐστι, 7.102.1). Herodotus's statement, put into the mouth of Demaratus, deposed King of Sparta, in the context of a conversation with Xerxes, King of Persia, is frequently cited.[7] This quotable line, along with other passages in Greek authors, contributed to the formation of what we may call the "standard modern premise." In Alfred Zimmern's pungent early-twentieth century prose: "the pioneers who created our European civilization were stricken with poverty all of their days … it was the doom of Athens that Poverty and Impossibility dwelt in her midst from first to last" (Zimmern 1911: 219).

Along with the claim that it was the Greeks who pioneered "our European" civilization, Zimmern's comment is notable for its assumption of Athenian exemplarity: for Zimmern, "Athens" stands for "Hellas."[8] How exemplary or exceptional Athens really was, and how much we can extrapolate from Athenian economic performance to the wider Greek economy, remain questions that are important and difficult to answer.[9] In the imperial fifth century, but also in the post-imperial fourth century, Athens was certainly among the most prosperous of the Greek poleis (Ober 2008, Ch. 2). For our present purposes it suffices to say that if classical Athens really was impoverished, then it is

[7] Modern citations of Hdt 7.102.1: Michell 1963 [1940]: 352; de Ste. Croix 1981: 117; Migeotte 2009. Cf. Hdt 8.102.1, 8.111.3 (Andrians respond to Themistocles' invocation of Persuasion and Necessity in demanding funds that the deities Poverty and Impossibility were endemic to their island), 9.82 (King Pausanias compares sumptuous royal Persian feasts with simple Spartan suppers and mocks the wealthy King of Persia for seeking to steal Hellas's poverty), Men. *Dys.* 603–6, Diod. Sic. 9.37.2, Ar. *Plut.* 436–610, Alcm. fr. 64, Xen. *An.* 3.26, Pl. *Criti.* 111b4–7 (references from Desmond 2006). Not all ancient historians accepted the standard ancient premise: Chester Starr (1977) believed that economic growth was a key factor in Greek social history, but the no-growth argument canonized in Finley 1999 [1973] largely carried the day.

[8] So much so that Zimmern's line about the "doom of Athens" is borrowed from a comment about Poverty and Impossibility made by Andrians (Hdt. 8.111.3), who were explicitly contrasting their impoverished situation with that of "great and prosperous" (*megalai te kai eudaimones*) Athens; see previous note.

[9] I discussed this issue in Ober 2008: 276–80.

likely that the rest of the Greek world fared poorly. If Athens was relatively wealthy, it is at least possible that some other parts of the Greek world were quite well off.

It has long been recognized (e.g., Morris 2004: 730) that the poverty claim in the ancient premise must be understood in comparative rather than absolute terms. In the key passage Demaratus compares the quotidian life of ordinary citizens in Greece (and especially Sparta) with the court of the King of Persia. When the King of Persia is the standard, everyone in classical Greece was certainly comparatively poor. But, equally obviously, when specialists in ancient history (as opposed to a Spartan exile) are seeking to compare the performance of ancient economies (rather than offering policy advice to the Great King), "ordinary Greeks v. court of Xerxes" is the wrong standard of comparison.

An alternative standard of comparison for the ancient Greek economy might be sought among the most advanced economies of the nineteenth to twenty-first centuries of our era. If Xerxes is self-evidently the wrong comparison for, say, Tellus of Athens, then what about middle-class American, John Doe? When we compare median income (in standardized dollars) or consumption (measured, e.g., in per capita energy use) in ancient Greece with the US (or western Europe) in the nineteenth to twenty-first centuries, the Greek world, once again, looks impoverished (cf. Saller 2005, Morris 2010).

As in the case of Demaratus's pointed contrast of ordinary Greeks to ultra-elite Persians, comparing ancient and modern income or consumption tells us *something*—but nothing that we do not already know, at least in general terms. It is hardly news that median levels of consumption in modern first-world economies are much higher than median consumption levels in any ancient economy: Tellus of Athens did not shop at WalMart. It is certainly worth investigating just *how much* higher modern income and consumption levels actually are. But using modern first-world economies as a standard of comparison is not particularly informative if we are seeking to learn something new about the relative economic performance of specific ancient societies. Neither the Tellus/Xerxes nor the Tellus/John Doe comparison gives a satisfactory answer to the question we are actually posing when we ask, "Are the standard ancient and modern premises right?"

Rather than seeking to determine how much poorer Tellus was than Xerxes or John Doe, when we ask, "Are the standard ancient and modern premises concerning Greek poverty right?," I suppose that what we want to know is whether or not the ordinary Greek was relatively worse off than the ordinary individual in other premodern societies. While we cannot answer the "com-

parative general welfare" question directly, we can provide at least tentative answers to questions that will in turn give us an indirect way to approach the question of general welfare:

- Was the rate of Greek economic growth high or low, relative to other premodern economies?
- Was the Greek world more or less densely populated, and more or less urbanized, than other premodern societies?
- Was the distribution of wealth and income across the Greek population relatively more or less equitable than that of other premodern populations? What part of the Greek population lived at a level high enough above subsistence to qualify as at least minimally decent?

Using these questions as proxies for investigating comparative general welfare, the answer to the question "Was Greece impoverished?" now appears to be "no"—Greeks were not poor when compared to people in other ancient or medieval societies. The Greek economy grew comparatively briskly in the period 800–300 B.C.E. By the later classical period, the Greek world was comparatively densely populated and urban. A relatively high percentage of Greeks (or at least of Athenians) appear to have lived comfortably above the subsistence level that has been the economic fate of most people since the dawn of civilization. Indeed, by the standards of other premodern economies, Hellas was wealthy. Moreover, despite the Demaratus-Xerxes exchange, and similar passages in the *Histories*, there is some reason to think that Herodotus (and by extrapolation, his original readers) realized it.

The "Eastern monarch discusses comparative welfare with a wise Greek" motif of the Demaratus-Xerxes interchange in Book 7 of Herodotus's *Histories* is anticipated in Book 1, in the well-known scene in which King Croesus of Lydia interviews Solon of Athens. The subject is human happiness and the context is relative wealth. Croesus expects Solon to acknowledge that Croesus is outstandingly happy on the basis of the superabundant wealth that the King of Lydia has displayed to his visitor. But to Croesus's surprise, Solon instead names as the happiest (*olbiōtatos*) person to have lived, Tellus of Athens, "who came from a prosperous city ... and the circumstances of his life were likewise prosperous, by our standards" (Τέλλῳ τοῦτο μὲν τῆς πόλιος εὖ ἡκούσης ... τοῦτο δὲ τοῦ βίου εὖ ἥκοντι, ὡς τὰ παρ' ἡμῖν, 1.30.4).[10]

[10] Kurke 1999 discusses the Solon-Croesus story in the context of changing Greek conceptions of eastern, and especially Lydian, wealth. The question of *why* Greeks chose to represent themselves as relatively poor becomes even more pointed if Hellas was, in reality, relatively wealthy.

Tellus is not portrayed by Herodotus's Solon as a member of a tiny privileged elite of wealth. Quite to the contrary, he is depicted as a reasonably but not exceptionally well-to-do, "middling" Greek citizen of a reasonably well-to-do Greek polis (his imagined life was, of course, long before the Athenian empire). Tellus was, in Solon's pithy account, just an ordinary Greek man who just happened to be extraordinarily fortunate in his progeny (healthy and excellent children and grandchildren) and demise (timely, heroic death in victorious battle). Per the line quoted above, reasonably prosperous material conditions did constitute a necessary precondition for Tellus's exceptional happiness. Yet the clear implication of the story is that many of Tellus's fellow-citizens enjoyed a similar prosperity. It was Tellus's relative advantages in respect to his descendants and the timing and circumstances of his death, rather than his wealth that, in the Herodotean/Solonian calculus, placed Tellus ahead of all others in respect to happiness. It is, however, the background conditions that concern us here: Tellus and his large and healthy family evidently lived comfortably above the level of bare survival, in a community in which living at that level was not regarded as remarkable in and of itself.

For our purposes, the important point is this: If, as Herodotus seems to imply, the material conditions enjoyed by Tellus and his family were not atypical, then a decent level of income (i.e., enough to live well above substance) was fairly common in the Greek world. A society featuring a substantial body of ordinary people, living in decent conditions, well above subsistence, would be, by ancient standards, an exceptionally wealthy society. We, Herodotus's readers, see that Croesus is vastly richer than Tellus. But, if we think about the socio-political conditions sustaining the great wealth of Croesus and his court, we will have reason to doubt that Lydia supports a substantial body of people living at the moderately prosperous "Tellus level." And so we may come to the conclusion that, to the extent to which ordinary, moderate prosperity is a sign of a relatively well-to-do community, Hellas as a whole may be fairly well off after all.

Indeed, the type-figure of "ordinary, relatively prosperous Tellus" seems not to be a Herodotean fiction. As we will see (Section 5) there is good reason to believe that, at least by the classical period in which Herodotus was first being read, a strikingly high percentage of Athenians (and perhaps of Greeks generally) fit a profile of Tellus-like moderate prosperity. That percentage was almost certainly much higher than was the case, overall, in Lydia, the Persian Empire, or elsewhere in the ancient world.

We still lack the detailed studies of the economies of ancient Near Eastern societies that would allow meaningful pair-wise comparisons to the economy of Hellas (Bedford 2007). But it seems to me unlikely, on the face of it, that

the Lydian empire as a whole, the Persian empire as a whole, or indeed any other ancient empire substantially outperformed the Roman empire of the first and second centuries C.E. in terms of per capita consumption or urbanization.[11] As noted above, we now have reasonable (albeit hotly debated in the details) estimates of Roman imperial economic performance. One upshot of those estimates is that Rome appears, by ancient standards, an exceptionally prosperous and urbanized empire. Estimates of the performance of the relatively high-performing Roman imperial economy can be compared to estimates of archaic and classical Greek economic performance. As we will see, it appears that, at least according to certain key measures (aggregate and per capita economic growth, urbanization, and income distribution), the Greek economy of ca. 800–300 B.C.E. outperformed the Roman economy of ca. 100 B.C.E.–200 C.E.

If it is true that Rome economically outperformed other ancient empires (a claim that must be tested by future research), and that Hellas outperformed Rome (as argued below), then it is fair to say that the society of Hellas was, in fact, relatively wealthy compared to its contemporaries and successor societies in the ancient world. Moreover, certain features of the Greek economy (or at least the Athenian economy) of the fifth and fourth centuries B.C.E. appear to compare favorably with the most advanced premodern economies—Holland and England in the fifteenth to eighteenth centuries C.E.[12]

2. THREE PREMISES AND TWO HYPOTHESES

The significance of the comparative analysis of Hellas to Rome and other ancient societies is not, of course, to score points in a game of Hellenists v. Romanists—or v. students of other premodern societies. The Greek world was a small place compared to the Persian or Roman empires (see Section 4) and had distinctive advantages in respect to location (Section 6). The explanations I will advance (Sections 7, 8) for Greek economic performance are, in the first instance, political and institutional; they have nothing to do with ethnicity or national character. Nor does the wealthy-Hellas argument bear on the moral

[11] I hope that this assumption will be tested in future work; the intensive archaeological investigation of at least some parts of western Asia would seem to offer the raw material for modeling some parts of the ancient Near Eastern economy.

[12] Allen 2001 is a detailed study of wages, prices, and welfare levels in a number of early-modern European cities. His conclusions (2001: 427–30, 434–33; cf. Allen 2009: 338, adding Delhi and Beijing) are clear: between 1500 and 1800 only Holland and England managed to break out of the Malthusian trap (on which, see below) in which a rising population led to falling wages and lower welfare for most people.

standing of Greek civilization: whatever our standards of moral evaluation, it is surely the case that a society may be rich and bad, or rich and good.

The point of the comparison is to falsify what I have been calling the standard ancient and modern premises about Hellenic poverty. If those standard premises are false, then to the extent that any account of Greek history or culture depends on them, it is wrong. This conclusion is important for the study of the Greek world in part because it helps to clarify the background context for remarkable events (e.g., the fifth-century Persian Wars and Alexander's conquests). More generally, and perhaps ultimately more importantly, it means that the material context in which archaic and classical Greek literature, art, and philosophy were produced was one of relative prosperity rather than relative deprivation (Section 9). That conclusion, if sustained, ought to change the way we think about Hellenic civilization.

The rest of this article is devoted to sketching three new premises and two hypotheses about the Greek economy in the half-millennium from the end of the Dark Age in ca. 800 B.C.E. to the consolidation of the Hellenistic Kingdoms in ca. 300 B.C.E.

Here are three reasons to believe that, *compared to other ancient societies*, Hellas was wealthy:

- *Premise 1.* The Greek economy grew steeply and steadily from 800–300 B.C.E., both (a) in its aggregate size and (b) in per capita consumption.
- *Premise 2.* By the fourth century B.C.E. Greece was (a) densely populated and (b) remarkably urbanized, yet (c) living standards remained high.
- *Premise 3.* Wealth was distributed relatively equitably across Greek populations; there was a substantial "middling" class of persons who lived well above bare substance, yet below the level of elite consumption.

Below, I will discuss several explanations for why Hellas was comparatively wealthy, including geography and exploitation. I will, however, focus primarily on two institutional explanations:

- *Hypothesis 1.* Egalitarian institutions typical of polis society (a) promoted heavy investment in human capital and (b) lowered transaction costs.
- *Hypothesis 2.* In the context of the dispersed authority structure of Hellas (the city-state system) beneficial institutional innovations were continuously (a) spurred by inter-polis competition and (b) spread by inter-polis learning.

The three premises, in the form of descriptive statements about the Greek economy, are based in the first instance on economic models that are in turn based on extensive collections of empirical evidence for ancient Mediterranean and early modern European economies. Ancient economic performance

can only be estimated, based on the always-lacunary ancient evidence, and by extrapolating from better documented premodern economies. Better comparisons may emerge that would require reassessment of one or more of my three premises. Moreover, to state the obvious, the evidence for the ancient economies is, in every case, slight and anecdotal when compared to the much more systematic evidence for modern economies. We will, for example, never have time-series data for premodern income distribution that even approximates the detailed, year-by-year data sets from first-world countries in the mid-twentieth century and onwards. Because the evidence for ancient economies is relatively thin, it is always possible that new written or archaeological evidence will come to light that requires rethinking the three premises presented here.

The two hypotheses are attempts to explain how and why specific institutional features helped the Greek economy to perform comparatively well. These attempts at explanation are drawn from well-tested theories employed by contemporary social scientists. They are, like the premises, preliminary and they may need to be revised in the light of new data or better theoretical frameworks. Like every working explanatory hypothesis, the two hypotheses offered here are always subject to ongoing tests of "goodness of fit" (that is, do they make sense of the data we have?) and to outright falsification based on counterfactual challenges and/or as new evidence is brought to bear.

3. First Premise: High Aggregate and Per Capita Growth

In recent papers Ian Morris has assembled an impressive array of data for measuring Greek economic growth in the period 800–300 B.C.E.[13] The first factor to consider in measuring Greek economic growth is demographic change. It is uncontroversial to state that the population of Hellas grew substantially in the half-millennium 800–300. On the basis of J. K. Beloch's exhaustive surveys of literary evidence (1886, 1993 [1889]), supplemented by recent work in survey and excavation archaeology, Morris 2004: 727 posits that the Greek popula-

[13] Morris 2004, 2005, 2007; cf. von Reden 2007; Kron forthcoming b. It is important to keep in mind that no estimate of ancient economic change (aggregate or per capita) is fine-grained. All that can be estimated is change over relatively long periods of time. These long periods would certainly have included short-term eras of negative growth as well as eras of positive growth. For the mix of positive-growth and negative-growth years in modern societies, see North, Wallis, and Weingast 2009: 5–6 with Table 1.2. Thus, although the general trend of Greek economic growth was positive over the 500-year period 800–300 B.C.E., a given generation might have experienced substantial overall negative growth.

tion of "the Aegean and the colonies in southern Italy and Sicily" rose from under 500,000 persons in the ninth century to perhaps 4 million persons in the fourth century. If this is correct, the population of this part of the Greek world increased about ten-fold and the per annum demographic growth rate was over 0.4%. As Morris points out (2004: 728), this is a comparatively high rate of sustained demographic growth in a premodern society.

Morris's figures are only estimates, but in order for Morris's posited demographic growth rate to be much too low, we would have to assume that the population of the Aegean/Italian-Sicilian Greek world in 800 B.C.E. was much larger than 500,000, or that in 300 B.C.E. the relevant parts of the Greek world had a population much less than 4 million. Neither counterfactual seems plausible: for the early period, archaeologists have expended a great deal of time and effort searching for and analyzing sites from the Greek Early Iron Age (a.k.a. the Dark Age) and they have done their best to show that the Dark Age was not so dark as all that. Despite their best efforts, known Early Iron Age Greek occupation sites remain comparatively sparse and small. At the other end of the time period, Morris's estimate of the population of the core Greek world in 300 B.C.E. is in line with demographic estimates since the nineteenth century, and is probably somewhat *lower* than the recent, detailed estimate of Mogens H. Hansen (2006a), who uses different estimation methods and addresses a somewhat different geographic area (see Section 4).

The second key factor in estimating aggregate economic growth is per capita consumption. Morris sought to estimate changes in per capita consumption over the same period. While there is no way to measure consumption directly, the proxies employed by Morris are telling. Morris assembled a substantial data set (n = 405) of Greek house-plans. The median Greek house in the ninth century was small and squalid. Over the next 500 years, the median house became both much bigger and much better built. Looking at square footage alone, when account is taken of probable second-stories, the change in the size of the median house is over 350%—from ca. 80 m^2 to ca. 360 m^2 (Morris 2004: 721). Given the striking improvement in building standards, the total increase in the economic value of a house will actually have been substantially greater. Morris 2004: 723–24 notes the difficulty of measuring the change in other consumption goods, but based on archaeological evidence of sites destroyed suddenly, he posits that, over the period 800–300, "a five- to ten-fold increase ... seems reasonable."

Moving from these numbers to per capita consumption is a complex problem; a big part of premodern consumption was in the form of food and (where applicable) taxes and rents. Morris argues, on very reasonable

grounds, that per capita consumption in ninth-century Hellas must have been close to the subsistence minimum. By 300 B.C.E., however, he suggests that consumption had increased by 50% and perhaps as much as 95%. Thus, by 300 B.C.E. a typical Greek household was consuming half again to twice what an ordinary household had been consuming 500 years before. This range yields a per annum growth rate in per capita consumption of 0.07–0.14%. By comparison, the growth in the Roman per capita growth rate has been estimated at 0.1% (Saller 2005). I return to the question of Greek per capita growth below (Section 5), arguing that Morris's upper-range estimate is more likely than any lower estimate, and that the actual rate of Greek per capita growth 800–300 B.C.E. was probably about 0.15%—one and a half times the estimated Roman growth rate.

Combining his estimate of demographic growth with his estimated growth in per capita consumption, Morris posits that total aggregate consumption growth (number of people x rate of consumption) in Hellas increased roughly 15 fold (assuming his lower per capita rate) to 20 fold (assuming his higher per capita rate) in the period 800–300 B.C.E., for an annual aggregate economic growth rate of 0.6–0.9%. As Morris 2004: 728 points out, Holland (along with England) is the gold standard for a high-performing early modern economy. The annual aggregate growth rate for Holland in 1580–1820 was about 0.5%. And so, as Morris notes, even if we were to cut his estimate of growth *in half*, the Greek economy compares favorably to an exceptionally high-performing premodern economy.

Morris's conclusions about relatively high per capita and aggregate Greek economic growth are consistent with other indirect proxies that point to substantial growth in the late archaic and classical periods. Based on data made available in the online version of the Oxford-based *Lexicon of Greek Personal Names*, I calculate that the number of known (from literary or archaeological sources) names of persons in Attica grew from ca. 1,200 in the sixth century to ca. 17,000 in the fourth century, an approximately 14-fold increase over just 300 years. The increased visibility of individuals is obviously the product of multiple variables, notably growing rates of literary and epigraphic production. This high rate of growth in name visibility is consistent with a world in which many more people were consuming substantially more. Counterfactually, a world with a declining population and one in which most people lived at a level of bare subsistence would clearly be less conducive to rapid growth in the literary and epigraphic visibility of people's names.[14]

[14] My thanks to Elaine Matthews of the *Lexicon of Greek Personal Names*, who provided access to beta-versions of the online database. Breakdown of numbers by century (men/women): 7th: 75/9, 6th: 1,062/124, 5th: 5,234/436, 4th: 14,714/2,424.

Based on data taken from the *Inventory of Greek Coin Hoards* (Thompson, Mørkholm, and Kraay 1973), David Teegarden and I estimate that the volume of coined money circulating in the Greek world increased substantially as well. Between the sixth and fourth centuries B.C.E., the median size of a Greek coin hoard (an indirect proxy for per capita rather than aggregate growth) roughly doubled, from 23 coins to 48 coins per hoard. Meanwhile, the average hoard size quadrupled, from 52 coins to 213 coins, reflecting the increasing incidence of exceptionally large hoards.[15]

When looking at the total number of hoards, and at the total number of coins in all known hoards (which ought to be indicative of aggregate growth), the sixth-century numbers are misleading since coinage was introduced in the Greek world in the course of that century. Yet even when we restrict our survey to the classical period, the numbers are suggestive. The number of hoards more than doubled from the fifth century to the fourth, from 238 to 564 hoards, while the number of total coins in all hoards grew three-fold, from 34,385 coins to 109,433. These numbers cannot readily be translated into a given annual growth rate. Short-term growth in hoarding may, in fact, indicate economic crisis (Turchin and Scheidel 2009). But over the long term of several hundred years, the substantial growth in both hoard size and numbers of hoards is likely to reflect a world in which there was more money in circulation, and in which more people could afford to save some part of their income in the form of cash. This ought, in turn, to mean a world in which more people were living substantially above the level of bare subsistence.

Table 1 sums up the evidence for change over time in the economic indicators discussed in this section.

4. Second Premise: Dense, Urbanized Population

A second way to compare economic development among societies is by measuring population densities and urbanization. Among the important results achieved by the Copenhagen Polis Center, directed by Mogens H. Hansen, has been to give us a better sense of the total population of the extended Greek world in the late classical period, and the distribution of that population. By the later fourth century, there were something like 1,000 poleis in the Greek world (*Inventory of Classical and Archaic Poleis* = Hansen and Nielsen 2004); the geographic size of more than half of these is now known or can be plau-

[15] This *IGCH* data was collected and analyzed, beginning in 2005, by myself and David Teegarden; cf. discussion in Ober 2008: 285–86. Much more accurate data on coins in Greek hoards is currently being compiled under the direction of Peter van Alfen at the American Numismatic Society.

TABLE 1. SUMMARY OF POPULATION AND PROXY-INDICATORS OF ECONOMIC GROWTH IN THE GREEK WORLD.

	Start date (TI)	*End date (T2)*	*Multiplier (T2/T1)*
Population	9th	4th	10
House floor plan	9th	4th	3.5
Household goods	9th	4th	5-10
Per capita consumption	9th	4th	1.5–2
Aggregate growth	9th	4th	15–20
Names (Attica)	6th	4th	14
Hoard size, median	6th	4th	2
Hoard size, average	6th	4th	4
Coins in hoards	5th	4th	3
Hoards, number	5th	4th	2

sibly approximated. Beginning with the extensive empirical evidence of his inventory of poleis, Hansen 2006a, 2008 [2010] uses what he calls a "shotgun method" to estimate Greek population and distribution. This method arrives at overall estimates of population by employing (a) the evidence of the physical size and estimated population densities of relatively well documented poleis, (b) the size and estimated densities of intramural areas, and (c) the known distribution of poleis across a range of sizes. On the basis of his shotgun method, Hansen offers new estimates for the total population of the Greek world, the distribution of the Greek population among large, middling, and small poleis, and the relative scale of urban and extra-urban populations.

Hansen 2006a: 27–28, 32, 2008 [2010]: 259–60 estimates that the extended Greek world in the late fourth century B.C.E. had a population of 7.5–10 million people (note that this extended Greek world includes regions of Greek settlement excluded from Morris's estimate of ca. 4 million for the Aegean, Sicily, and southern Italy). If Hansen's estimated total Greek population range is correct, the Greek world of the late fourth century B.C.E., taken *in toto*, was something like 10–15% of the size of the Roman empire at its first/second century C.E. height of ca. 70 million. In the fourth century B.C.E. Greeks may have made up something like 3–4% of the world's total population.[16]

[16] Hansen 2008 [2010] offers new empirical evidence that suggests that his original "shotgun method" estimates may have been too low: i.e., there were probably more than 1,000 poleis in the late fourth century (perhaps 1,100 poleis: *ibid.* 262, 276), total Greek population (inclusive of Macedonia and Epirus) was probably more than 7.5 million

The Greek mainland contained only a part of the total Greek population. Hansen concludes that the Greek mainland (including Acarnania, Thessaly, and the Aegean islands, but excluding Epirus and Macedonia as well as the Greek settlements in Asia, Africa, and the western Mediterranean) had a population of about 3–3.5 million people.[17] By way of comparison, in 1889 a census by the state of Greece (comprising nearly the same geographic area) counted 2.2 million persons. As Hansen points out, there is reason to believe that the population of Greece in 1889 was very close to Greece's agricultural carrying capacity (Hansen 2006a: 79); which is to say that the land could not grow enough food to feed more people. If these figures and assumptions are in the right range, it has considerable bearing on the performance of the ancient Greek economy.

Unless we are willing to assume that fourth-century B.C.E. Greece was greatly more agriculturally productive than nineteenth century C.E. Greece (which seems, on the face of it, unlikely), if we adopt both Hansen's figures and his assumptions about carrying capacity, we must suppose that a substantial part of the fourth-century Greek mainland population was fed from food imported from abroad (Hansen 2006a: 34). Something like 0.75–1.25 million Greeks, i.e., 25–35% of the mainland/Aegean population in the fourth century B.C.E., thus may have lived on grain imported (e.g.) from the western Mediterranean, from the Bosporus/Crimea, or from north Africa.

Once again, even if we were to cut *in half* the number of Greeks (derived from Hansen's estimates) who must be presumed to have lived on imported food, we are still left with some 350,000–650,000 persons in excess of the presumed carrying capacity of mainland Greece. This means, in turn, that Athens cannot have been the only major grain-importing Greek polis. And so, the mainland Greek world can no longer be regarded as defined entirely by subsistence agriculture or local exchange. The imported food had to be paid for somehow—by commodity exports (oil, wine, silver), manufactured goods, services, or the extraction of rents (i.e., by the use of power to obtain

(8.5–9.5 regarded as more realistic: *ibid.* 265, 276), and the urban population was probably higher than originally estimated (*ibid.* 275–76). In the calculations below, I employ the earlier, lower, estimates from Hansen 2006a. Roman population, total world population in antiquity: Scheidel 2007. By comparison, the population of the U.S. is currently about 4.25% of the world's population.

[17] As noted above, Hansen's "catchment area" for mainland Greece (Hansen 2006a: 33) is different from that of Morris 2004 (Aegean, south Italy, and Sicily). Hansen's estimate of the population of mainland Greece is not radically different from that of earlier demographers (see Scheidel 2008b), although his estimate is probably somewhat higher than that of Morris.

resources at prices lower than those that would pertain in a competitive market).[18] The general point is that by the fourth century B.C.E., the mainland Greek world evidently broke through the "low Malthusian ceiling" of agricultural subsistence. For how long that breakthrough was sustained, or could have been sustained, is a matter for future research.[19]

Total population, however, is only one part of the equation. If we are to understand the conditions of Greek economic growth, it is important to determine how the population was distributed. Hansen's analysis of the numbers of large, middling, and small poleis across the Greek world suggests that most poleis (about 800 of 1,000) were small, with populations of ca. 1,000–5,000 persons. Yet only about 35% of the total Greek population lived in these small poleis. Another 25% lived in middling poleis, that is, in communities with a median population of about 15,000 persons. The remainder of the polis-dwelling Greeks lived in large communities, with a median population of about 30,000 persons (Hansen 2006a: 24, 28). The results are tabulated in Table 2.

Among Hansen's most striking claims, based once again on the shotgun estimation method, is that about half of the population of Greece lived in intramural "urban" centers (2006a: 26–29). Combined with the distribution into small, middling, and large poleis, this result suggests that, by the later fourth century, about 30% of Greeks lived in towns of 5,000 persons or more. If these numbers are correct, the Greek world of the fourth century B.C.E. was much more highly urbanized than the Roman imperial world of the first and second centuries C.E., in which perhaps 10–12% of the population lived in similarly large towns (Scheidel 2009: 11–12, citing Wilson forthcoming); see Table 3.[20]

The relatively high urban population of Hellas fits comfortably with the conclusion that a good many mainland Greeks consumed imported rather than locally grown food. It would surely be wrong to imagine that the set "urban residents" completely overlapped with the set "imported food consumers"; a substantial number of urban Greeks may have lived in "agro-towns" from which residents commuted to their fields. Some very extensive intramural areas may have enclosed gardens or even fields. Nevertheless, the estimate that some 30% of the Greek world was urban is compatible with the finding that roughly

[18] Definition of rents: Krueger 1974.

[19] For the Malthusian trap, see Clark 2007; Goldstone 2002 notes examples of ancient societies that escaped the "trap" for extended periods of time.

[20] Of course, because the Roman world was much larger, the total number of Romans living in towns (ca. 7–8.5 million) was much greater than the number of urban Greeks (ca. 2.25–3 million).

TABLE 2. ESTIMATED DISTRIBUTION OF GREEK POPULATION. BASED ON HANSEN 2006A.

	Small (1k–5k)	*Middling (median 15k)*	*Large (median 30k)*
Poleis %	80	10	10
Population %	35	25	40

TABLE 3. ESTIMATED URBAN POPULATIONS: LATE FOURTH-CENTURY B.C.E. HELLAS AND IMPERIAL ROME. BASED ON HANSEN 2006A AND WILSON FORTHCOMING.

	Urban population (in towns >5k), percent	*Urban population, number of persons*
Hellas 350–300 B.C.E	30	2.25–3 m
Rome 100–200 CE	10–12	7–8.5 m

25–35% of the mainland Greek population was fed from imported food. Both results push against the notion that the Greek economy was overwhelmingly defined by subsistence agriculture; together the two demographic results point to a relatively sophisticated and diversified economy, one that produced a substantial surplus beyond bare subsistence. These population figures are, in turn, in line with recent work, notably by Alain Bresson, to the effect that trade, in commodities as well as luxury goods, was much more important in the Greek economy than was long thought to be the case.[21]

Higher levels of urbanization correlate with economic intensification, but not necessarily with improved welfare: rapid growth of urban populations has historically been associated with the spread of disease and, e.g., in nineteenth century England and Holland, with squalid living conditions in crowded tenements.[22] There is no evidence that these dismal conditions pertained in fourth-century Greek towns. While the data on change over time in the health of Greek populations are difficult to interpret, and in some ways contradictory

[21] Bresson 2000, 2007. Horden and Purcell 2000 characterize ancient Mediterranean trade as defined by intricate networks of interdependent regional exchange, based on a multiplicity of micro-environments.

[22] Population growth leads to substantially lower living standards in most of the cities of Europe in 1500–1800: Allen 2001; disease: Scheidel 2007; squalid conditions in the advanced economies of England and Holland: Kron forthcoming b.

(Morris 2004: 714–20; Kron 2005; von Reden 2007: 388–90), it is clear enough from studies of human bones found in Greek archaeological excavations that the average life span of Greek men and women reaching adulthood increased substantially from the end of the Dark Age to the fourth century B.C.E. Based on the more recent (1990s) analyses, the ages at death of individuals surviving childhood seems to have increased by about 10 years for both men and women over this period (Morris 2004: 715, Fig. 2).

Life expectancy at birth (which in all premodern populations is much lower than average age at death for those surviving into adulthood, due to high levels of infant and child mortality) in fourth-century Greece will still have been very low by modern standards, probably not exceeding the mid- to upper-twenties.[23] But it was substantially better than it had been 500 years previously, in the Early Iron Age—when there was probably no town of as many as 5,000 persons. Moreover, there is no evidence in the many excavations of Greek towns for extensive tracts of small and squalid urban dwellings. As we saw above, the median Greek house, urban as well as rural, became much larger and better built in the five hundred years after 800 B.C.E. Given the intensity of the archaeological exploration of Greece, it seems unlikely that slums have simply escaped notice.

In sum, by the late classical period, Hellas was relatively densely populated and urbanized. The number of Greeks who lived in relatively urban areas was remarkably high by ancient standards. They lived in bigger settlements, in bigger houses, and in healthier conditions than their ancestors could have dreamed of. A good part of the population of mainland Greece was fed from imported food. The Greek economy cannot adequately be explained by reference to subsistence agriculture alone.

5. Third Premise: Equitable Distribution

A third measure of economic development is the distribution of wealth and income. Historically, all complex societies have been characterized by economic inequality. Yet when wealth and income are distributed extremely inequitably, such that society is bi-modally segmented into a tiny elite of the very wealthy and a great mass of individuals living at subsistence, there is correspondingly little room for robust and sustained economic growth. This is because the "motor" of consumption powered by a tiny elite is relatively

[23] On the question of life expectancy at birth, see Morris 2004: 7; Scheidel 2009. Kron 2005, forthcoming c argues for longer life expectancies at birth for Roman and especially Greek populations than have other investigators.

feeble. It is only with the emergence of a substantial and stable "middling" class of persons living well above the level of subsistence, and therefore willing and able to purchase goods unnecessary for their mere survival, that societal consumption becomes a strong driver of economic growth.[24]

How equitably was the wealth of Hellas distributed across its relatively dense and urbanized population? Once again, house sizes can be used as an indirect proxy. Morris 2004: 722–23 shows that archaic/classical Greek settlements were never characterized by a few mansions and many huts. Rather, across the entire half-millennium 800–300 B.C.E. the distribution of Greek houses tends to cluster around the median house size. The size of larger houses (the top quartile in floor plan) failed to diverge markedly from that of smaller houses (the bottom quartile). The size of larger and smaller houses grew more or less in lock step across the period: by 300 B.C.E. houses in the 75th percentile of the distribution were only about one-fifth again (roughly 50 m^2) as large as those at the 25th percentile. Geoffrey Kron's survey of house sizes at Olynthus and other urban areas confirms this general picture: unlike (e.g.) nineteenth-century England, the distribution of house sizes at Olynthus describes an inverted U curve: most houses fall in the middle, rather than on the far left (tiny house) side, of the distribution.[25] Obviously not every Greek family could afford to buy a substantial house—which may have cost something in the neighborhood of 6–15 years of income (Morris 2004: 723). But many could afford to own a home: based on recorded house costs and the census of 322 B.C.E., in which some 9,000 citizens (of a presumed total of ca. 31,000) owned property amounting to more than 2,000 drachmas, Kron estimates that at least nearly a third of citizen families, and possibly as many as three-quarters of them, of could afford to purchase a house.[26]

Kron has attempted to calculate late fourth-century wealth distribution among Athenian citizens more directly, by reference to the standard Gini coefficient of inequality. The lower the Gini Index number, the more equitably the good in question (in this case household wealth) is distributed. Wealth was certainly not distributed with anything approaching perfect equality in Athens. Based on reports of the census of 322 B.C.E. and other sources, Kron

[24] Scheidel and Friesen 2009: 72–73 discuss the literature on the correlation between distribution of income and economic performance.

[25] Kron forthcoming a and b.

[26] Kron forthcoming a. Calculation is based on Athens citizen male population of ca. 31,000. Of these, 9,000 met a 2,000 dr. census in 322 B.C.E. Kron notes the cost of a typical large Greek house as ca. 1,000–2,000 dr. and house prices in inscriptions as low as 200 dr.

calculates that in late fourth-century Athens the richest 1% of the citizen population owned about 30% of all private wealth; while the top 10% owned about 60% of the wealth. This yields a Gini index of 0.708. Kron compares this figure to the figures for several modern societies. The late-classical Athenian *citizen-family* level of total-wealth inequality is roughly comparable to that of the total population of the USA in 1953–54 (0.71). It is less equal than Canada in 1998 (0.69), but more equal than Florence in 1427 (0.788) or the USA in 1998 (0.794). It is much more equal than the USA or England in the early twentieth century (0.93 and 0.95 respectively).[27]

Kron's conclusion on the comparatively equitable distribution of private wealth among citizen-families in late classical Athens is consistent with estimates of landholding among citizens in Athens: independent studies by classical scholars (Foxhall 1992, 2002; Osborne 1992) concluded that about 7.5–9% of citizens owned about 30–35% of the land of Attica; some 20% owned little or no land. Excluding those at the top and bottom of the distribution, we are left with roughly 60–65% of the land being owned by about 70–75% of the citizen population. Morris 1998: 235–36 points out that the resulting range of Gini coefficients, 0.382–0.386, is strikingly low in comparison to estimated distributions of land-holding for other ancient and medieval societies. Although the base-line Athenian figures do not tell us anything about some relevant factors affecting the value of land, e.g., distribution of especially productive land or financial encumbrances on landholdings, Morris is certainly right to conclude that "the basic point is clear: landholding was unusually egalitarian in Classical Athens" (1998: 236).

Another way to assess relative equality of wealth distribution is by measuring income. Walter Scheidel (2010; Scheidel and Friesen 2009) has analyzed the real wages of unskilled workers (i.e., those at the lower end of the economic distribution) in a number of ancient and medieval communities. Scheidel 2010: 436–52 converts daily income into a "wheat wage"—a well established

[27] Kron forthcoming a. It is important to keep in mind that the overall Gini wealth index for Athenian society as a whole, including slaves and metics, would surely be substantially higher—I cannot say how much higher because I know no way to calculate wealth of metics or slaves. It is worth noting that wealth inequality, as measured by the Gini coefficient, is typically much higher than income inequality. Based on work still in progress, I would estimate income Gini for the whole of Athenian society (including slaves and metics) to be in the region of 0.40–0.45. This is similar to the income Gini estimate of 0.42–0.44, suggested by Scheidel and Friesen 2009: 84–85 for the high Roman Empire. Yet, based on the income distribution models proposed below, the shape of the Lorenz curves for the two societies would be quite different in light of the substantially larger Athenian "middling" population.

method of assessing the level of income in different currencies or kind by reference to single standard (liters of wheat per diem).[28] If the price of wheat can also be calculated, the wheat wage can then be used to estimate the proximity of the wage-earner to the base-level of bare survival. Scheidel's figures (2010: 452) show that in most premodern societies in which daily wages can be calculated (and thus converted into liters of wheat/day), wheat wages for adult male wage-earners fell in a fairly narrow "core" or "customary wage range" of 3.5–6.5 liters of wheat/day with a median of 5.5 liters/day.

Scheidel 2010: 454 suggests that 3.5 liters/day defines the lower limit of the customary wage range—this level of adult-male wage cannot have been far above bare subsistence (i.e., close to the edge of survival).[29] If we take that level of adult-male income as a baseline "head of household" contribution, below which it was not possible to fall, very far or for very long, if an ordinary family were to survive (3.5 liters/day adult-male income = baseline = 1S), we can then calculate more generous income regimes, featuring higher wheat wages, as multiples of that baseline. Thus the median of the "customary wage range," at 5.5 liters/day, is about 1.6 x baseline (= 1.6S). This is enough to get by, but is still not far enough above the level of bare survival to be described as comfortable, or even decent conditions of life.

Scheidel and Friesen 2009 suggest that wages in the 1–2.3S range (i.e., up to about 8 liters/day) may be regarded as constituting the general category of living at the level of subsistence. Adult-male incomes of 2.4–10S (about 8–35

[28] Of course most people were not paid in wheat, and in many times and places in antiquity they may not have eaten wheat as a staple, substituting, e.g., less expensive grains such as barley. The wheat-wage method is similar to converting modern incomes from different countries and over time into, e.g., "1990 dollars per annum."

[29] Scheidel and Friesen 2009: 83 posit a bare subsistence minimum level of 335kg of wheat equivalent per annum (i.e., 429 liters wheat wage) per person in a tax-free environment, which translates to 1,716 liters (4 x 429) for a family of 4. This comes to 4.7 liters/day/family. These figures are consistent with the calculations of Markle 1985, who argued that 3 obols/day (a juror's pay in Athens = a wheat wage of ca. 4.5 liters) was adequate to sustain a nuclear family at a subsistence level. Allen 2009 uses a somewhat different calculation (assuming a family as 3 rather than 4 "adult-consumption equivalents" and 250 rather than 365 wage-days per year), but he arrives at similar results for what he describes as a "bare bones" existence (2009: 340). In sum, an adult male wage-earner at the "floor of the core" 3.5 liter/day level might provide about two-thirds to three-quarters of his family's minimum subsistence, meaning that women's and children's contributions to family income would be essential; see further, Scheidel 2010: 433–35, 454. Foxhall and Forbes 1982 offer a detailed examination of the role of grain in ancient diets—a key factor in any attempt to calculate actual subsistence minima.

TABLE 4. PER DIEM INCOME FOR ADULT MALE (REAL WAGES) EXPRESSED AS WHEAT WAGES AND SOCIO-ECONOMIC CATEGORIES. BASED ON SCHEIDEL 2010 AND SCHEIDEL AND FRIESEN 2009.

	Customary range	*Subsistence*	*Decent Middling*	*Elite*
Wheat wage (liters/day)	3.5–6.5 (median 5.5)	3.5–8	8–35	>35
Multiplier x baseline of 3.5 liters/day (S)	1–1.9 (median 1.6)	1–2.3	2.4–10	>10

liters/day) are considered to define a decent, "middling" existence—families with an income-earner at this level could be expected to consume some goods not necessary for bare existence. This supra-subsistence-level consumption will be an important driver of economic growth if the "middling" families constitute a substantial part of the total population. Those whose incomes were greater than 10S (over 35 liters/day) are categorized as "elite." This elite group was a very small part of every premodern population. Thus, the conversion of wages to wheat wages allows the possibility of estimating the distribution of the population of a given society across the broad, but analytically useful categories of subsistence, decent/middling, and elite levels. See Table 4.

Distributing populations into three income tiers (subsistence, middling, elite) is obviously artificial and reductive; it obscures meaningful differences in levels of welfare and ignores how people defined themselves relative to others. Yet it is analytically useful in assessing and comparing the overall potential economic performance of ancient societies. As noted above, if a given society is divided into a tiny wealthy elite on the one hand, and a mass of people living at subsistence at the other, there will be relatively little social surplus, and so economic performance will be correspondingly low. If there is a substantial "middling" population of persons living comfortably above subsistence, then there will be correspondingly more demand for surplus production, making possible relatively higher economic performance. Scheidel and Friesen 2009: 71 argue that Roman wages fell within the low "customary wage range" and that most Roman laborers thus remained at the subsistence level.[30] On the basis of these assumptions, they offer two simple models for the distribution of income across Roman imperial society. The "optimistic" model is based

[30] Allen 2009: 42–43 reaches similar results, based on the figures in Diocletian's price edict of 301 C.E.

TABLE 5. INCOME LEVEL DISTRIBUTION, ROMAN EMPIRE. BASED ON SCHEIDEL AND FRIESEN 2009.

Roman Empire	*Elite*	*Decent Middling*	*Subsistence*
Optimistic %	1.5	12	86.5
Pessimistic %	1.5	6	92.5

on assumptions pointing to a relatively more egalitarian income distribution (and thus, per above, to more consumer demand and a correspondingly higher expected rate of economic growth); the "pessimistic" model employs assumptions that lead to a less egalitarian distribution (and so less demand and less growth). The goal is not to specify a single distribution (we simply do not have the evidence to do that) but to develop a general range into which the actual distribution of incomes can reasonably be assumed to have fallen. See Table 5.

The key point here is that even on the optimistic scenario, only a small percentage of the total Roman population fits into the middling category; most residents of the empire lived close to subsistence and thus had relatively little surplus to spend on non-essential goods. On the basis of this model, Scheidel and Friesen 2009: 74 argue that imperial Rome, overall, did not generate a sufficiently large social surplus to break past the Malthusian constraints that limit the growth of subsistence-level economies. Once again, however, it is important to keep in mind that the Roman empire was very large and there must have been considerable regional economic variation (Scheidel and Friesen 2009: 90). Whether some regions of the empire did much better, and if so, for how long, remain important questions for future research.

Athens is the only classical-era community for which we have figures for daily wages.[31] On the basis of the available evidence, classical Athens appears to be one of the very few societies in the period 1800 B.C.E.–1300 C.E. in which daily wages were substantially above of the subsistence-level "customary wage range" (Scheidel 2010: 453–58). Construction-work wages and military wages in Athens in the later fifth century averaged 1 drachma/day; the wheat price was about 6 drachmas/medimnos, yielding a daily wheat wage of 9 liters and thus a baseline-multiplier of 2.6S. This is just above the "middling" floor of 2.4S. In the 320s, unskilled laborers were paid 1.5 drachmas/day; wages for

[31] Athenian figures cited and discussed by Scheidel 2010: 441–42, 455–56 are taken from epigraphic and literary sources collected and discussed in Loomis 1998: 111–13 and Markle 1985.

skilled laborers were up to 2.5 drachmas/day; the wheat price was 5–6 drachmas/medimnos. This yields a range of wheat wages of 13–16 liters/day and a baseline multiplier of 3.7–4.6S: thus solidly within the "middling" range of 2.4–10S.[32] By way of comparison, median wages in Holland, ca. 1500–1800, translate to a wheat wage ranging from 10–17 liters/day, and thus a baseline multiplier of 2.9–4.9S. See Table 6.

The evidence for late fourth-century Athenian wages is anecdotal, but it is consistent with what Athenians were being paid for especially important forms of public service: citizens attending a meeting of the Athenian Assembly (which did not ordinarily last more than a half-day: Hansen 1991: 136–37) were paid 1 drachma (30 annual ordinary meetings) or 1.5 drachmas (10 annual principal meetings).[33] The key point is that both in the later fifth century B.C.E. and, a fortiori, in the later fourth century, Athenians who were engaged in unskilled as well as skilled labor (at least on construction of state-sponsored buildings) were paid wages sufficient to elevate them to a decent, middling premodern standard of living: they no longer hovered at a subsistence level perilously close to bare survival. Based on data currently available (summed up in Scheidel 2010; Allen 2009), this was very rare anywhere in the world, before the nineteenth and twentieth centuries.

If we assume that the available data about Athenian wages is more or less accurate, we can make informed guesses about the distribution of the late fourth-century Athenian population into the three general income categories of subsistence, middling, and elite.[34] The figures on which the following estimates are based are detailed in the Appendix. Following the lead of Scheidel and Friesen 2009: 84–87, I posit two possible distributions: a "pessimistic" (less equitable, ergo lower consumption, lower expected growth) distribution and an "optimistic" (more equitable, higher consumption, higher expected growth) distribution. For each distribution, I assume a total population for Athens of just under a quarter-million persons, of which about a third were slaves, and about a tenth were resident foreigners.[35]

[32] In Delos in the third century B.C.E. the wheat wage was 8 liters/day—thus a multiplier of 2.3—just below the "middling" floor: Scheidel 2010: 442–43.

[33] See, further, Gabrielsen 1981; Hansen 1991: 314.

[34] I focus on the late fourth-century population because Hansen's (2006a) "shotgun method" demographic model focuses on that period. Moreover, Athens did not have an empire in the late fourth century and was thus, in this way at least, more similar to other large poleis.

[35] For detailed discussion of fourth-century Athenian demography, see Hansen 1986, 1988, 2006b.

TABLE 6. ATHENS AND HOLLAND, WHEAT WAGES. BASED ON SCHEIDEL 2010: 437, 441–42.

Athens	*Pay (dr/day)*	*Wheat price (dr/medimnos)*	*Wheat wage (liters/day)*	*Multiplier x base*
Athens 5th c. B.C.E.	1	6	9	2.6
Athens 4th c. B.C.E.	1.5–2.5	5–6	13–16	3.7–4.6
Holland 16th–17th c. C.E.			10–17	2.9–4.9

Elite status in Athens can be defined by a liturgical fortune of 3–4 talents (Davies 1971: xx–xxiv). Assuming a conventional annual return of 1:12, such a fortune would in fact yield a living standard of roughly 10 times bare survival. The elite population of Athens amounts to a little over 1% of the total. In the optimistic scenario I assume that most citizens and metic males, and even a small number of slaves (those who "dwelled apart" from their masters) would be able to make at least one drachma/day on average and so would achieve middling status. In the pessimistic scenario I assume that only about two-thirds of citizens, a minority of metics, and no slaves received regular wages at or above the one-drachma/day level. In this simplified model I do not take into account women's or children's paid labor; the middling women and children in the Appendix are assumed to be members of "middling" families. Nor do I make any allowance for the historically-exceptional absence of heavy taxes or steep rents paid by Athenian citizens below elite status (cf. Wood 1988). Both productive labor by women and children, and the low-tax/rent regime may push in the direction of more optimistic scenarios than I have presented here, as would a presumption that slaves constituted less than a third of the total population. The results are tabulated in Table 7.

Table 7, based in the first instance on the evidence for relatively high Athenian wages, incorporates a number of assumptions, some of which may be too pessimistic (per above). Other assumptions may be overly optimistic, notably that the wages recorded in our sources represent something approximating the market standard and that unemployment and under-employment were not rampant. On the other hand, because achieving middling status required average wages of only 1 drachma/day (rather than the reported late fourth-century wage level of 1.5–2.5 drachmas/day) there is a fair amount of discounting already built in—even without taking the relative absence

TABLE 7. INCOME LEVEL DISTRIBUTION, LATE FOURTH-CENTURY B.C.E. ATHENS. FOR CALCULATION, SEE APPENDIX.

Roman Empire	*Elite*	*Decent Middling*	*Subsistence*
Optimistic %	1.1	58	41
Pessimistic %	1.1	42	57

of exploitative taxes or rents into account. In sum, it appears likely that a substantial number of residents of fourth-century Athens lived far enough above subsistence to enable them to live decent lives. The surplus consumption capacity of a comparatively large middling population would have been a major driver of the Athenian economy.

Assuming, for the sake of the argument, that my model of income distribution in later fourth-century Athens is more or less correct, can we extrapolate from Athens to the wider Greek world? Were high Athenian wages at all typical of the Greek world generally? The answer to that question will depend on how we imagine Greek labor markets as operating. If (counterfactually) we assume labor markets with zero transaction costs (i.e., that there was no restriction or cost, material or psychic, to movement from one part of the Greek world to another, and that people would choose to move to where wages were highest) then Athenian wages would reflect the equilibrium conditions of the Greek world and we could assume that high Athenian wages reflected Hellenic norms. The no transaction-cost assumption is, of course, false: the value of the Athenian evidence for the rest of the Greek world depends on how high the transaction costs associated with moving from one labor market/polis to another actually were.[36]

The question of how best to model the Greek labor market must remain a topic for future research. Suffice it to say that many non-Athenians *did* choose to live in Athens as metics, and certainly at least some of them did so for economic reasons. Thus, the costs of moving were not so high as to preclude all economically-motivated movement.[37] It is, therefore, at least a plausible guess that high Athenian wages point to a Hellenic wage regime that is somewhat higher than the 5.5 liter/day wheat wage postulated by Scheidel 2010 as the ancient/medieval "customary wage range" median. Suppose, again for the sake of the argument, that in estimating income distributions across

[36] On Greek labor markets and inter-polis movement of workers, see Davies 2007. My thanks to Barry Weingast for discussion of the labor market problem.

[37] See, further, Whitehead 1977; McKechnie 1989.

the Greek world we cut *in half* the percentage of middling persons in the *pessimistic* Athenian model. The resulting percentage of "middling" Greeks (a little over 20%) would still nearly double the estimated middling percentage in Scheidel and Friesen's *optimistic* Roman empire model (12%). All of this suggests, in turn, that there may have been, at least by the later fourth century, a substantial number of Greeks living well above subsistence, and thus that there may have been a correspondingly substantial social surplus produced by the Greek economy. This necessarily tentative conclusion is compatible with the two earlier premises of (1) striking high per capita and aggregate economic growth and (2) a remarkably dense and urban population.

In light of the evidence for income in Athens, and its hypothesized bearing on income distribution in the Greek world, I posit that Morris's upper range estimate of Greek per capita economic growth is more likely than his lower range. Morris's upper range assumes that consumption roughly doubled from 800–300 B.C.E. This assumption makes sense when translated into wheat wages. If we assume that in 800 B.C.E. an ordinary family's per capita daily consumption hovered very near the subsistence minimum, and thus that the adult-male wage-earner contribution was about 3.5 liters/day, doubling consumption would mean that by the later fourth century B.C.E. the adult-male wage-earner contribution would be at least 7 liters/day. Given that Athenians were being paid at roughly *twice* that rate (13–16 liters/day—a rate that is roughly comparable to the 10–17 liters/day wages in Golden Age Holland) a late-classical Greek median daily income for adult male workers of at least 7 liters seems quite plausible. Under this model, the rate of per capita Greek economic growth would have been around 0.15% per annum (compared to ca. 0.1% per annum for the early Roman empire: Saller 2005).

The bottom line is that, when the whole of Hellas is compared to the whole Roman empire at its height, or when the presumptively most advanced Greek state (Athens) is compared to the most advanced early modern European states (Holland and England), Hellas may reasonably be described as wealthy.

6. EXPLAINING WEALTHY HELLAS

There is plenty of room for debate about just how wealthy Hellas was, but the evidence discussed above, drawn from a variety of primary sources, and modeled in a variety of ways, all points in the same direction and away from what I have called the standard ancient and modern premises about Greek poverty. It remains to explain the phenomenon. Why was Hellas wealthy? How did Hellas become wealthy? I will argue below (Sections 7 and 8) that the answer to why Greece outperformed other premodern societies is best sought in distinctive Greek institutions. The primary drivers of the compara-

tively strong Greek economic performance were, I will argue, egalitarian rules and institutional innovation. Yet before turning to institutions, two familiar features of the Greek world—Mediterranean location and exploitation of others—deserve mention because they can help us to explain the phenomenon of wealthy Hellas.

The physical conditions associated with the Greek world's Mediterranean location—including topography, climate, exposure to disease pools, and natural resources—certainly mattered. Mainland Greece has striking features: a highly indented coastline; a topography characterized by small agricultural plains amidst rugged but not impassable mountains. Much of the Greek world shared a rare (about 2% of the earth's land area) "Mediterranean" climate (type "Cs" = temperate/mild wet winter/dry summer: Dallman 1998: 1; Peel, Finlayson, and McMahon 2007). Yet the Mediterranean is also naturally subdivided into many micro-regions, each with distinct resources and micro-climates. This made the Mediterranean basin especially well suited for the emergence of complex networks of short- and medium-distance trade (Horden and Purcell 2000). Classical Greek authors, for their part, claimed that mainland Greece (and especially Athens) occupied a particularly advantageous location, both climactically and geographically.[38] There were no doubt profits to be reaped by Greeks who served as Mediterranean middlemen, exploiting a favorable location between the environmentally and economically diverse regions of western Asia (especially after the consolidation of the Persian Empire in the sixth century), northern Europe, and northern Africa (with its two great civilizations, Egyptian and Phoenician).

The geophysical conditions and location of Greece were potential assets, but focusing on these relatively constant features leaves us with the question of why Greece stands out economically, relative to other premodern societies, just in the period 800–300 B.C.E. Why was Greece not similarly prosperous before or after that time? Certainly the archaic and classical periods were not the only bright moments in Greek economic history. Archaeological evidence points to the Minoan era (mid-second millennium B.C.E.) and late antiquity (fifth and sixth centuries C.E.) as relatively prosperous periods. Developing proxy evidence for the economy of Greece in these periods should be a high priority for further research. In the meantime, however, there seems little reason to believe that any era of Greek history before the mid-twentieth

[38] Advantages in respect to location and climate: Xen. *Vect.* 1.6–8 (specifically Athens). Arist. *Pol.* 7.1327b29 notes Hellas's central location between Asia and Europe; [Pl.] *Epin.* 987d regards the Greek climate, balanced between summer and winter, as optimal for *aretē*.

century saw economic performance comparable to that of 800–300 B.C.E. Greece seems not to have been especially prosperous, compared to other premodern societies, in the Roman imperial, medieval, or early modern eras. In the early twentieth century, administrative records suggest that Greece was, per capita, the poorest nation in Europe. So, if the location argument is to explain wealthy Hellas, we need to know why the location of Greece proved especially valuable in 800–300 B.C.E.[39]

The archaic/classical Greek world certainly benefited from its location among large economic zones managed by great empires (notably Persia and Carthage). A somewhat similar situation pertained in the Roman, Byzantine, and Ottoman periods. In those later periods, Greece was not politically independent—and Greeks were therefore subject to paying rents to an imperial center. Political independence may have helped archaic/classical Greeks to benefit from their location relative to big imperial economies, which might help to explain Minoan (and conceivably late antique) prosperity. But, *pace* Demaratus and the standard ancient premise, sustained classical-era Greek political independence, in the face of Persian imperialism, was at least in part a product of Greek wealth. So here we run into what social scientists call "the problem of endogeneity." It is the exceptional wealth of Hellas that we are seeking to explain. If wealth is part of the location-based explanation (because wealth helps sustain political independence and independence conspires with location to create exceptional wealth), then location, in and of itself, is no longer an adequate explanatory factor. Location may be part of a causal explanation, but it cannot be the cause pure and simple.[40]

Exploitation provides a second possible explanation: the wealth of Hellas was based in part on rents. The economic performance advantage of Greece, relative to other premodern societies, might be explained if we could show that the Greeks extracted more rents at a lower cost than did other premodern societies. There is no doubt that Greeks extracted substantial rents. Throughout the period in question Greeks exploited various forms of non-free labor,

[39] Once again, more detailed analyses of the economy of the Greek world in other periods are needed to test the premise that 800–300 B.C.E. was truly exceptional. See, meanwhile the following preliminary studies. Bronze Age: Bennet 2007; Early Iron Age: Morris 2007; third century B.C.E.: Reger 2007: 481–82; Roman Greece: Alcock 1993 and 2007. Early twentieth-century Greece: Allbaugh 1953, esp. 15: "Greece, before World War II, had the lowest per capita national income of any country in Europe."

[40] On the problem of endogeneity in explanation, see King, Keohane, and Verba 1994: 185–94. Another test would be to ask if other, non-Greek, societies that shared the advantageous location were also economic standouts in 800–300 B.C.E. (or other periods); Cyprus, Thrace, and Sardinia are possible test cases.

including historically innovative forms of chattel slavery.[41] Athens gained very substantial revenues from subject states in the fifth century, during the period of the Athenian Empire (Morris 2009). Moreover, the Greek world gained indirectly from forms of political domination and economic exploitation in regions at its periphery. In at least some cases, domination and exploitation by native elites in these peripheral regions arguably emerged because of, and were sustained by, Greek consumption. Grain exported to Athens at below-market prices by friendly Thracian dynasts may be construed as Athenian rents (Moreno 2007).

Yet if we are to explain Greek economic performance by reference to rent extraction via exploitation and domination, we need to answer a prior question: why were the Greeks (or the Athenians in the imperial period) able to extract more rents than other premodern societies? It seems implausible to explain this (hypothetical) rent-advantage as a matter of will, by claiming that Greeks (or Athenians) had fewer moral qualms about exploiting and dominating in their own interest than did people in other premodern societies. If, on the other hand, something distinctive in Greek institutional development facilitated more effective rent-extraction, then we are back to square one. If we posit that exceptional growth was based on exceptionally effective rent extraction, we must explain how the Greeks managed to gain rents that were "left on the table" by other ancient societies, which were no less willing to dominate and exploit.

One explanation of why Greeks were able to exploit others as slaves or serfs is that the relatively large "middling" population of the Greek world rendered exploitation more effective, because close cooperation among many middling citizens enabled them to dominate outsiders more efficiently. Sparta, with its many helots, and democratic Athens, with its many chattel slaves and imperial subjects, might be cited as two, somewhat different, cases in point. Similarly, we might suppose that high real wages and a large "middling class" of consumers made widespread slave-owning more economically feasible (Scheidel 2008a: 123–25). Yet we are once again confronted with an endogeneity problem: the large middling (supra-subsistence) population of the Greek world is an aspect of the general wealthy-Hellas phenomenon we are seeking to explain. So to the extent that coordination among middling citizens or high real wages are part of the exploitation-based explanation, exploitation becomes inadequate as a stand-alone causal factor.

Due attention to location and exploitation must be part of any serious attempt to explain the performance of the Greek economy. Yet each of these fac-

[41] Slavery and unfree labor: Scheidel 2005, 2008a; Bang 2009.

tors seems inadequate, in and of itself, to explain the phenomenon of wealthy Hellas. Below I suggest two other explanatory hypotheses. First is that Greek "rule egalitarianism" (by which I mean a commitment to equal standing of persons in respect to major public institutions) drove economic growth, first by creating incentives for investment in the development of human capital, and next by lowering transaction costs.[42] The second hypothesis is that economic growth was fostered by continuous innovation. Competition among states within the dispersed-authority city-state ecology created incentives for institutional innovation (i.e., for developing new and more effective forms of intra- and inter-polis cooperation) and promoted inter-state borrowing of "best practices."

I do not claim that the institutional hypotheses I offer below are adequate to explain wealthy Hellas. I am aware that each of my hypotheses is subject to the endogeneity problem to which I alluded above. That is to say, the phenomenon I am seeking to explain, Greek wealth, eventually became a driver, as well as a product, of egalitarian rules and of competitive innovation and learning. Institutions cannot be the whole story. But without understanding how distinctive Greek institutions promoted increases in productivity and in the value of exchanges, we cannot explain why and how Hellas became wealthy. Reiterated *caveat*: in the following two sections I illustrate (which is far from proving) the hypotheses with examples of Greek institutions. Because of the nature of our evidence, I employ Athenian examples. Athenian institutional development was exceptional in many particulars, but the general institutional features on which I focus were not unique to Athens.

7. First Hypothesis: Rule Egalitarianism, Human Capital, and Transaction Costs

It seems uncontroversial to say that Greek society was characterized by historically exceptional levels of equality in terms of access of native males to

[42] My neologistic phrase "rule egalitarianism" (conceptually similar to what North, Wallis, and Weingast 2009 call "impersonality") is modeled on the term "rule utilitarianism," commonly used by ethicists. The rule utilitarian focuses on social rules (as opposed to individual acts) that will maximize aggregate welfare. The rule egalitarian focuses on rules that maximize individual equality of standing (as opposed to equal distribution of goods). Rule egalitarianism may be thought of as a limited form of opportunity egalitarianism: limited because equality of access is in respect to institutions and information, not to all valuable goods. Of course a rule egalitarian may *also* be an outcome egalitarian and/or a full-featured opportunity egalitarian. The point is that it is possible for an individual or society to be committed to equality in respect to rules governing standing without being committed to equality of outcomes or all social opportunities.

key public institutions. The norms and rules of Greek communities tended to treat native males as deserving of some level of standing before the law, participation in decision-making, and dignity in social interactions. No Greek community was ever rule-egalitarian "all the way down"—women, foreigners, and slaves were never treated as true equals. But among native males, the level of equality was remarkable when compared to other premodern (indeed pre-twentieth century) societies. Evidence of a turn to relatively strong forms of egalitarianism begins in the eighth century (Morris 1987). In many Greek poleis of the later archaic and classical eras, rule egalitarianism among native men was codified in the form of republican government, eventually including Athenian-style democracy. Some Greek communities were, of course, considerably more rule-egalitarian than others. But even Greek oligarchies were strikingly egalitarian by the standards of premodern societies (Runciman 1990). Likewise, the constitutional development of individual polis communities was certainly not uniformly in the direction of greater equality of access for natives. Yet it seems uncontroversial to say that, with the increasing prevalence of democracy, the median Greek polis was more rule-egalitarian in ca. 300 B.C.E. than it had been 500 (or even 200) years previously.[43]

Human Capital

Social norms and rules that treat individuals as equals can have substantial effects on economic growth by building aggregate human capital (i.e., by increasing both median skill levels and the societal store of knowledge). Relative equality in respect to access to institutions (e.g., law and property rights) encourages investments by individuals in learning new skills, and increases net social returns to employment of diverse skills. It does so because norms and rules that protect legal standing, property rights, and dignity lessen fear of the powerful. When I believe that my person, property, and standing are secure (in that I have institutional recourse if I am affronted or assaulted), I am less afraid that the fruits of my efforts will be expropriated arbitrarily by those more powerful than myself. In this case I have better reasons to seek my fortune and to plan ahead. It is reasonable for me to invest in my own future by seeking out domains of endeavor in which I can do relatively well—that

[43] Greek egalitarianism: Morris 1996; Raaflaub 1996; Cartledge 1996. Runciman 1990 emphasizes the historically remarkable level of Greek egalitarianism. Foxhall 2002: 218 by contrast, regards "substantial inequalities in landholding" as a "paradox" that "I have never been able to resolve in my own mind." The paradox arises, of course, if one supposes that egalitarianism requires either equal outcomes or equal opportunities (measured by equal access to all valuable resources). But, per above, rule egalitarianism assumes neither.

is, to seek a relative economic advantage. I also have a higher incentive to invest effort in becoming more expert within that domain. I will rationally choose to defer some short term returns by spending time and energy gaining information and developing skills that I believe will enable me to do better in the long run.[44]

This sort of rationally chosen individual investment in human capital development will, in the aggregate, have positive economic effects through increasing specialization and productivity (Harris 2002). By investing in learning, each individual becomes correspondingly better at whatever endeavor he or she is engaged in.[45] Individuals who have good reasons to invest in themselves, who have freedom to seek out different domains of endeavor, and who have specific natural capacities (e.g., high intelligence) have both the opportunity and motivation to seek out those domains (e.g., some sort of knowledge-intensive work rather than manual-labor-intensive subsistence farming) in which their capacities can be more effectively exercised. Overall societal productivity increases because greater specialization of economic function produces goods more efficiently and because workers in each specialized domain, having invested in gaining expertise, are individually more productive. Thus better goods are produced at a lower cost, thereby enabling more people to consume better goods at a higher level.

[44] The locus classicus for the correlation of ambition and freedom is Hdt. 5.78 (speaking of augmented Athenian military capacity, in 506 B.C.E.): "while they were oppressed, they were, as men working for a master, cowardly, but when they were freed, each one was eager to achieve for himself." If we are to judge by their literature, ancient Greeks had a good "folk" understanding of how individuals make choices in light of strategic calculations of interests centered on expected utility and anticipation of others' behavior (now called Rational Actor Theory): see Ober 2009 for examples. Cf. North, Wallis, and Weingast 2009, who emphasize the behavioral implications of individuals being treated impersonally in institutional contexts. Note that I assume here not only formal equality but some degree of freedom of choice. Obviously in practice this varied considerably, but it is the overall effect of differences in opportunities and incentives that produces the result of relatively greater investment in human capital.

[45] The introductory section of Plato's *Protagoras*, in which young Hippocrates is wildly eager to receive training from Protagoras, points to a culture of self-conscious investment in one's own education. The slave-owner could, of course, invest in human capital by buying skilled slaves or training slaves in skills (Xen. *Mem.* 2.7.3–6); [Xen.] *Ath. Pol.* 1.11–12 notes that slaves will not be economically productive if they fear arbitrary expropriation. Xenophon's Socrates urges a friend to recognize the human capital represented by his female dependents (Xen. *Mem.* 2.7.7–10; note esp. 2.7.10: "everyone works most easily, speedily, best, and most pleasantly when they are knowledgeable in respect to the work"). Examples could readily be multiplied; the point is that the economic value of increasing human capital was manifestly appreciated by the classical Greeks.

Along with providing institutionalized security against arbitrary expropriation, some Greek states encouraged individual investments in learning skills relevant to the provision of valuable public goods.[46] In Athenian-style democracies, incentives, in the form of pay and honors, were offered for public service. The opportunity to do public service was made readily available to all citizens by opening access to decision-making assemblies to all citizens and by the use of the lot for selection of magistrates and jurors. At Athens, by the fourth century, incentives included pay for service as a magistrate, assemblyman, or juror. Incentives to gain the skills necessary to be an effective provider of public goods included not only pay but also honors and sanctions. Those whose service was deemed especially valuable to the community were rewarded by public proclamations and honorary crowns. Those whose service fell short, on the other hand, faced the potential of legal and social sanctions (Hansen 1991: 314).

A third set of rule-egalitarian incentives for human capital investment came in the form of institutions that limited risk. All things being equal, people are more likely to make investments with potential upside benefits when the risk of downside loss is limited. Suppose, for example, that I am a subsistence farmer; my family has a median "core range" income of 5.5 liters of wheat per day, i.e., 1.6S (see above, Section 6). I have the opportunity to take on a potentially lucrative new enterprise, but only if I invest in learning some new skill. There is a better-than-even chance that the enterprise will be successful and if it is successful, it will elevate my family to the relatively greater security of middling status (say, 3S). But the new enterprise means less time spent on subsistence farming. If there is a realistic risk that the failure of the new enterprise will leave my family beneath 1S (i.e., threatened with annihilation), I am unlikely to take on the new enterprise unless I have an exceptionally high tolerance for risk. If, however, I believe that the worst that can happen is that my family will fall to say, 1.3S, I am more likely to take on the new enterprise.

State institutions that insure citizens against catastrophe will, therefore, enable individuals to take on somewhat riskier investments. Although such policies raise the specter of moral hazard ("privatizing gains and socializing losses"), if the risk-limiting insurance institutions are properly designed (i.e., only part of the loss is socialized), they serve an equalizing function. The playing field is leveled because the stakes for the poor are lowered from extinction

[46] This sort of investment in political, rather than specifically economic, skills may be a driver of increased use of slaves and other forms of unfree labor: Scheidel 2008a: 115–23. Xen. *Mem.* 3.4 points out that that certain skills required for success in private business affairs are also valuable for managing public affairs.

to survivable loss. And so the poor man can reasonably afford to take a risk that would previously have been open only to a somewhat wealthier man. Assuming (as we have in the hypothetical above) that high-benefit enterprises are readily available and the chances of success are better than even, such policies will, over time, lead to more people advancing to middling status. Although some risk-takers will suffer losses, and so their families will be poorer, the net effect is obviously growth positive. Athenian "public insurance" institutions included grain price stabilization and subsidization, welfare provisions for invalids, and state-supported upbringing of war orphans.[47]

Examples of economically valuable individual human capital investments in the Greek (and a fortiori Athenian) world that could plausibly have been promoted by rule-equality include literacy, numeracy (Netz 2002), and mastery of banking and credit instruments (Cohen 1992). Other, perhaps less obvious investments in human capital included military training, mastering various aspects of polis governance (e.g., rhetoric and public speaking, public finance, civil and criminal law), and individual efforts to build bridges from one social network to another (Ober 2008, Ch. 4).

Transaction Costs

An important determinant of economic performance is the cost of exchanging goods and services. Voluntary transactions obviously enhance welfare insofar as they benefit both parties; that is, insofar as each party fares better than if the transaction had not taken place. Under such conditions, the more transactions are undertaken, and the greater the benefit to each party, the better the economy will do as a whole. All things being equal, the more it costs each party to undertake a transaction, the less likely it is that a mutually beneficial transaction will take place. So, once again holding all other factors steady, higher transaction costs are growth negative; lower transaction costs are growth positive.[48]

Inequality, in respect to access to information relevant to a transaction, or in respect to institutions potentially affecting a transaction, drives up transaction

[47] Risk aversion of subsistence farmers and individual risk-buffering strategies in Greek agriculture: Gallant 1991. Public insurance and risk: Burke 2005; Möller 2007: 375–83; Ober 2008: 254–58. Mackil 2004 shows how a somewhat similar risk insurance mechanism operated in some inter-polis relations.

[48] Transaction cost economics applied to antiquity: Kehoe and Frier 2007; Ober 2008: 115–16, 214–20, 234–39. This topic was the subject of a 2009 workshop sponsored by the Center for Hellenic Studies; the proceedings are being edited by the workshop organizer, Uri Yiftach-Firanko (Hebrew University, Jerusalem).

costs. Relevant sorts of information include, for example, the laws governing market exchanges; weights, measures, and quality standards; and the value of the currency being offered. Relevant institutions include property rights, contracts, and dispute resolution procedures. In the case of unequal access to information or institutions, the disadvantaged party must raise the price of the goods or services in question to discount for the missing information or lack of institutional support. As the price goes up to cover these inequality costs, the benefit to the other party drops accordingly. And thus, either the transaction between the parties is carried out with less aggregate benefit, or it fails because no mutually beneficial price could be arrived at. In the opposite situation, where information and access to institutions are more equal, transaction costs are lower and thus economic growth is (at least potentially) higher. As North, Wallis, and Weingast 2009 demonstrate, the high transaction-cost, access-limiting social order is historically common. Such societies can be stable, but they are economically unproductive relative to societies characterized by more open access to information and institutions.

Relatively egalitarian institutional regimes, like those of Greek city states, ought, according to the transaction-cost argument developed above, to be (all else being constant) more economically productive than inegalitarian regimes. Moreover, the transaction cost benefit ought to increase if access to information and institutions is made more equal over time. Greek weights and measures were standardized in several widely-adopted systems in the archaic and classical periods. In the case of democratic Athens, access to information and institutions became somewhat more open and equal, as the laws were increasingly standardized (e.g., in the legal reforms of 410–400 B.C.E.), better publicized (e.g., by being displayed epigraphically in the Agora), and more efficiently archived (Sickinger 1999). The Athenian state provided traders with free access to market officials and specialists in detecting fraudulent coins (Stroud 1974). Parties to certain commercial transactions were put on a more equal footing with the introduction of the special "maritime cases" (*dikai emporikai*) in which metics, visitors, and probably even slaves had full legal standing (Cohen 1973).

8. Second Hypothesis: Innovation, Inter-Community Competition and Learning

Innovation is a primary driver of economic growth; a society that depends on rent extraction rather than continuous innovation will eventually face a hard ceiling restricting its economic growth (Baumol 1993). Today, we often think of economically productive innovations as technological; improved energy capture (e.g., the use of fossil fuels) was, for example, an obvious factor

contributing to the historically remarkable rates of economic growth in the nineteenth and twentieth centuries (Morris 2010). Although the archaic/classical Greek world certainly saw many technological advances, it was not, on the face of it, a standout in premodern technological development; it is unlikely that technological innovation, in and of itself, was a primary driver of Greek economic performance.[49] Technology is, however, only one domain in which continuous growth-positive innovation is possible, and economic gain from technical innovation is contingent upon institutional infrastructure (North 1981, 1990). The Greek world was arguably exceptional in its development of new social institutions that served to increase the level and value of social cooperation. Valuable institutional innovations were spurred by high levels of local inter-community competition and spread by inter-community learning.

Just as it is uncontroversial to say that the Greek world was comparatively egalitarian in its norms and rules, so too it is uncontroversial to say that the Greek world was characterized by high levels of local competition. The competition among Greek communities was a high-stakes affair, potentially ending in the loss of independence, loss of important material and psychic assets, or even annihilation (Ober 2008: 80–84). The high level of competition between rivals placed a premium on intra-community cooperation. One of the basic lessons Thucydides offers his readers (positively in Pericles' Funeral Oration in Book 2, negatively in the Corcyra narrative in Book 3) is that communities capable of coordinating the actions of an extensive membership had a better chance to do well in competitive situations (Ober 2010).

Social institutions can provide both incentives for people to cooperate with one another and mechanisms facilitating their doing so (Weingast 1997). Classical Greeks were well aware of the collective performance advantage offered by public institutions that successfully promoted cooperation (Ober 2009). One result of endemic Greek inter-community competition was, therefore, a proclivity to institutional innovation: a state that succeeded in developing a more effective way to capture the benefits of cooperation across its population gained a corresponding competitive advantage vis-à-vis its local rivals. Not all Greek communities were equally innovative, but the Greek world saw what appears to be a strikingly high level of institutional innovation across the ecology of states over the 500 years in question: major domains of continuous institutional innovation include citizenship, warfare, law, democracy, and federalism.

[49] Technology in the Greek world: Greene 2000; Schneider 2007; Oleson 2008. Ian Morris points (per litt.) to the oil lamp, terra cotta roof tile, and wine as three examples of technologies that spread very rapidly through the Greek world (and beyond) and had very significant impacts on human welfare.

Greek communities readily learned from one another. Every new institutional innovation was tested in the competitive environment of the city-state ecology. Many innovations were presumably performance-neutral—that is, they had no significant effect on the community's relative advantage in competitions with rivals. Other innovations would, over time, prove to be performance-negative. If, however, an innovation adopted by a given polis was believed to have enhanced that polis's performance, there would be prima facie reason for other poleis to imitate it. There were, of course, many reasons for polis B *not* to imitate polis A's performance-positive institution. Most obviously, the new institution might be disruptive to polis B's social equilibrium, a disruption that would, among other undesired outcomes, result in a net loss of cooperative capacity. Yet in other cases, the perceived chance to improve polis B's performance, and thus do better relative to its rivals, would be a sufficient incentive to adopt polis A's innovation. Some innovations would be adopted regionally; some highly successful innovations would, over time, be widely adopted across the polis ecology. In addition to the institutions mentioned above, widely (although never universally) adopted institutional innovations included coinage, euergetism, the "epigraphic habit," diplomatic arrangements (*proxenia*, *asylia*, etc.), theater, and cult.

While a regional hegemon might encourage or discourage adoption of a given institution (e.g., mandatory oligarchy in the fifth-century Peloponnesian League: Thuc. 1.19; monetary and weight standards in the Athenian empire: Figueira 1998), there was no central authority in the Greek city-state ecology to mandate when or how widely a given innovation was adopted. The extended city-state environment thus operated as something approaching an open market for institutions. Opportunity for imitation was facilitated (transaction costs lowered) by the ease of communication across polis borders, which was, in turn, facilitated by the shared culture of the Greek world. Some impediments to institutional learning between modern nations, e.g., differences of language and religion (Laitin 2007), were much less salient in the Greek world. Because this "market in institutions" favored the development and dissemination of more effective modes of cooperation, Hellas grew wealthier.[50]

9. Conclusions and Prospect

The rule-egalitarianism and continuous-innovation hypotheses, taken together, suggest an explanation, not only to for why Hellas grew wealthy, but also for the "Greek miracle"—the cultural efflorescence during the archaic

[50] Innovative adaptations of the institution of coined money is a good case in point; for some striking examples, see Mackil and van Alfen 2006.

and classical periods, which resulted in the development of new and influential forms of art and architecture, literature, visual and performance art, scientific and moral thought. The "Greek miracle" may be partially explained by the conjunction of high investment in human capital, low transaction costs, continuous competitive innovation, and widespread cross-community learning. Individuals benefited from economic specialization and exchanges of goods and services; the chance to gain more benefit (fame and honor as well as wealth) drove incremental improvements in existing domains (e.g., hoplite tactics, lyric poetry), and led innovators to pioneer new domains (e.g., peltast tactics, tragedy and comedy). Innovations spread readily across the ecology (e.g., Doric and Ionic architectural orders, epic poetry). Advances in communications technology (e.g., alphabetic writing) were quickly adapted to multiple domains (e.g., poetry, philosophy, law, contracts). Goods and services developed in the high human capital/low transaction cost/innovation-and-learning driven Greek context were readily exported to regions on the periphery of the Greek world (e.g., red-figure pottery, mercenary soldiers, doctors, architects). In return the Greeks imported grain, raw materials (timber, copper)—and slaves.

In order to be of real explanatory value, hypotheses must be at least potentially testable and falsifiable. The two hypotheses offered here, could, at least in principle, be tested by examining changes over time in the Greek world as a whole, and differences among communities within the Greek world. The explanandum (dependent variable) is the growth of wealth, in Hellas as a whole and in individual poleis, across the period 800–300 B.C.E. The first hypothesis would be falsified if, as wealth increased, egalitarian institutions declined across the Greek world. Likewise, it would be falsified if, when we compare poleis, there proved to be a negative correlation between wealth and egalitarian institutions. If the least egalitarian poleis were also the wealthiest, the hypothesis must be wrong. The second hypothesis can be falsified by showing a negative correlation between innovation and wealth: if the most innovative poleis are the poorest, then continuous innovation cannot be the right explanation for why Hellas was wealthy. Since the existing evidence seems to support neither falsification condition, I suppose the hypotheses can stand—which is, of course, a long way from claiming that they have been proved right.

This article is barely a beginning. Much more work needs to be done before the "wealthy-Hellas" thesis can be regarded as proven. We need more proxies for well-being; finer-grained demographic evidence; better data on the distribution of wealth and income; better comparative evidence for economic performance from other eras of Greek history and other ancient societies. Before the hypotheses can be regarded as proven, we need to answer

problems about endogeneity and the direction of causation. Does equality drive investment in human capital and lower transaction costs, resulting in economic growth—as I have argued? Or might the direction of causation be the other way around? Am I right to say that competition drove economic growth via increased institutional innovation and inter-community learning? Or did increasing wealth drive inter-community competition? There were surely feedbacks between equality, human capital, transaction costs, competition, innovation, and learning—it seems likely that Hellenic wealth grew in the context of a "virtuous circle" among these (and no doubt other) factors. Yet that conclusion does not obviate the imperative of isolating primary causal factors before claiming that we have explained the performance of the Greek economy.

One final question: assuming the three premises are right, are *two* hypotheses actually needed to explain wealthy Hellas? In light of the analytic advantages of parsimony in causal explanation, might we be able to dispense with either rule egalitarianism or continuous innovation? I tend to think we must invoke both equality of access to institutions *and* institutional innovation if we are to understand what is distinctive about the performance of the Greek economy. But this in turn means that we ought to be able to test the interdependence of the hypotheses. One preliminary test would be to ask whether especially important and widely adopted institutional innovations tend toward or away from equality of access to institutions. The development of democracy as a particularly strong form of rule-egalitarian intra-polis cooperation and the development of the *koinon* as a strong form of rule-egalitarian inter-polis cooperation seem to me to offer particularly salient test cases. As I write, major advances are being made in empirical studies aimed at determining how prevalent democracy and *koinon* membership actually were, over time, across the Greek city-state ecology.[51]

In light of new opportunities for collaboration between humanists and social scientists, and in light of new technologies and methods for collecting and assessing data, there is good reason to hope and to expect that the wealthy-Hellas thesis will be properly tested. And I expect that it will be only one of many new theses about ancient economies that will be formulated, tested, and reconfigured in the coming years. The golden age of ancient economic studies has, I believe, only just begun.

[51] Frequency of democracy: a project in progress by David Teegarden (University of Buffalo) and Tim Johnson (Stanford University). Frequency of *koinon* membership for mainland Greek poleis: a book project in progress by Emily Mackil (University of California, Berkeley).

APPENDIX. ATHENS, LATE FOURTH-CENTURY B.C.E. INCOME DISTRIBUTION MODELS

	elite	*middling*	*subsistence*	*Total*
OPTIMISTIC				
citizen men	400	24,500	5,000	29,900
citizen women	400	24,500	5,000	29,900
children of citizens	1,000	61,250	12,500	74,750
metic men	200	7,500	2,500	10,200
metic women	200	3,750	500	4,450
children of metics	500	9,375	1,250	11,125
slaves (total)	0	8,000	72,000	80,000
TOTAL	2,700	138,875	98,750	240,325
% of TOTAL	1.1	57.8	41.1	100
PESSIMISTIC				
citizen men	400	19,500	10,000	29,900
citizen women	400	19,500	10,000	29,900
children of citizens	1,000	48,750	25,000	74,750
metic men	200	4,500	5,500	10,200
metic women	200	2,250	1,100	3,550
children of metics	500	5,625	2,750	8,875
slaves (total)	0	0	80,000	80,000
TOTAL	2,700	100,125	134,350	237,175
% of TOTAL	1.1	42.2	56.6	100

Assumptions:
Elite = liturgical fortune, which is >3–4T Davies 1971 and >10 x subsistence
Subsistence minimum = 100 drachmas/year
Middling = 2.4–10 x subsistence (Scheidel and Friesen 2009: 84)
The slightly lower "pessimistic" total population arises from an assumption that some metics were single males (actual or geographic bachelors) and that the likelihood of metic males having families in residence in Attica rises with their economic status.

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