



# LUND UNIVERSITY

## Measuring institutional quality in ancient Athens

Bergh, Andreas; Lyttkens, Carl Hampus

*Published in:*

Journal of Institutional Economics

*DOI:*

[10.1017/S174413741300043X](https://doi.org/10.1017/S174413741300043X)

2014

[Link to publication](#)

*Citation for published version (APA):*

Bergh, A., & Lyttkens, C. H. (2014). Measuring institutional quality in ancient Athens. *Journal of Institutional Economics*, 10(2), 279-310. <https://doi.org/10.1017/S174413741300043X>

*Total number of authors:*

2

### General rights

Unless other specific re-use rights are stated the following general rights apply:

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Read more about Creative commons licenses: <https://creativecommons.org/licenses/>

### Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

LUND UNIVERSITY

PO Box 117  
221 00 Lund  
+46 46-222 00 00

# Measuring institutional quality in ancient Athens

Andreas Bergh and Carl Hampus Lyttkens

Department of Economics  
Lund University

14 400 words including footnotes and references

## Abstract

We use the Economic Freedom Index to characterise the institutions of the Athenian city-state in the fourth century BCE. It has been shown that ancient Greece witnessed improved living conditions for an extended period of time. Athens in the fourth century appears to have fared particularly well. We find that economic freedom in ancient Athens is on level with the highest ranked modern economies such as Hong Kong and Singapore. With the exception of the position of women and slaves, Athens scores high in almost every dimension of economic freedom. Trade is probably highly important even by current standards. As studies of contemporary societies suggest that institutional quality is probably an important determinant of economic growth, it may also have been one factor in the relative material success of the Athenians.

**JEL classification:** N43, N93; O17, P52

**Keywords:** institutions; quality; growth; ancient Athens

## I. INTRODUCTION

We use the Economic Freedom Index to compare the institutional structure of ancient Athens in the classical period to modern economies. Our conclusion is that the level of economic freedom in Athens in the fourth century BCE is on level with contemporary Singapore and Hong Kong. It has been argued that ancient Greece witnessed significant economic growth, and our analysis suggests that the institutional setup should probably be considered as one among many possible explanations.

This paper is motivated by several facts. First, Morris (2004; 2005) suggests that real income per capita in ancient Greece increased by 50-100% in the period 800-300 BCE, representing a yearly per capita growth of 0.07-0.14%. This means while there is an almost ten-fold increase in population, aggregate consumption increased even more. Ancient Greek society is also highly urbanised (Hansen, 2006). There are indications that the health of the population increased and that the ancient Greeks reached historically high levels of physical well-being (Kron, 2005; Morris, 2004; Ober, 2010), although the evidence is not strong (Scheidel, 2010a).

The Athenians seems to have been particularly successful. Ober (2008, chapter 2) argues that the Athenians outdid their contemporary rivals in terms of prosperity, measured as aggregate material flourishing. This material success was not restricted to the periods of Athenian imperial power. It was present also in the second half of the fourth century. Scheidel (2010b) estimates that the real daily wage in Athens increased from 8-9 litres of wheat in the late fifth century to 13-16 litres in the late fourth century.<sup>1</sup>

Second, from 700 BCE onwards, fundamental institutional changes occurred in the Greek city-states (*poleis*). Coinage was introduced, short-term officials governed the state, the standing of foreigners was clarified, and several *poleis* introduced democratising measures. Athens, for example, gradually developed into what was, for its male citizens, a far-reaching direct democracy. From 508/7 and through the fifth and fourth centuries, Athenian political, judicial and economic institutions underwent a metamorphosis.

Third, among the potential determinants of economic growth, considerable attention is now directed towards institutional factors. Institutions provide the rules of the game in a society and, by shaping incentives, determine economic performance (North, 1981; 1990). Potentially

---

<sup>1</sup> Other indications of Athenian prosperity are the expansion of the Athenian fleet during the fourth century (Hansen, 1999, p. 111) and the increase in the pay for attending the Athenian Assembly, from 0.5 drachmas soon after the Peloponnesian War to 1-1.5 drachmas by Aristotle's time.

efficient institutions do not necessarily lead to efficient economic activity, however, because a state strong enough to protect property rights is also strong enough to abuse them. Hence, the potential for the state to make credible commitments has increasingly been emphasised (North and Weingast, 1989), a problem that can potentially be solved by political institutional change (Acemoglu and Robinson, 2006). Consequently, it is now often argued that there is a complex interplay between economic development and democratisation, with institutional change as a crucial factor (Greif, 2005).

Fourth, to empirically investigate the relationship between the quality of institutions, income and democracy, summary measures of institutional quality and democratisation are increasingly used. For example, economic institutions are often measured by the Economic Freedom of the World Index and the International Country Risk Guide, political institutions by the Freedom House Political Rights Index and the composite Polity index, and globalisation by the KOF-index introduced by Dreher (2006).

Against this background, it is tempting to apply a measure of institutional quality to the Athenian society of the classical period. We chose the Economic Freedom of the World Index for such an exercise (henceforth Economic Freedom Index or EFI). The question is whether ancient Athens should be placed at the lower end of the scale among the less developed nations of the modern world, or whether institutional quality is yet another area where the ancient Greek city-state was exceptional for its time.

Some important caveats should be noted. First, it must be emphasized that the Economic Freedom Index is not intended to capture political institutions, and does so only indirectly, through their effect on, for example, property rights and the integrity of the judicial system. In modern times, de Haan and Sturm (2003) have noted that political freedom seem to cause increases in economic freedom, and this may theoretically have been the case in ancient Athens as well. On the other hand, Athens may well be one of the few cases of societies that combine high levels of economic freedom with low political freedom (cf. Lawson and Clark 2010), because the subordinate position of women and slaves in ancient Greece has a limited effect on the EFI score. In any case, the results can only be suggestive, as we lack data that would allow us to compare Athens with other *poleis*.

Secondly, while some evidence (cf. section 2) suggests that economic freedom causes growth, there are many competing explanations (including a well-argued case for human capital by Glaeser et al. 2004). Separating the effects of e.g. political institutions or human capital from the

effect of economic institutions would require data more detailed than are currently available. We also do not wish to propose that institutional factors necessarily had the same effect in antiquity as today.

Finally, the Economic Freedom Index attempts to capture de facto institutions, in the sense that outcomes rather than statutory laws are typically used when the index is constructed. Some exceptions do exist, and the index makes use of, for example, the (statutory) top marginal tax rate and the de jure mean tariff rate.<sup>2</sup>

This study fills a gap in the expanding literature that on the quantification of different structural aspects of the ancient societies such as inequality (Foxhall, 1992; 2002; Melanovic, 2007; Ober, 2010; Osborne, 1992), wealth (Kron, 1996; Ober, 2008; 2010), or the level of prosperity compared to other historical periods (Ober, 2010; Scheidel, 2010b). Our quantification of institutional quality in ancient Athens can be seen as a way to operationalize Ober's (2010) argument that institutions are important factors in the relative success of the Athenians. Ober suggests that classical Athens benefited from egalitarian *polis* institutions that encouraged human capital formation and reduced transaction costs (standardised weights and measures, standardised and publicly available laws, etc.). While Athens often stands out, competition among *poleis* encouraged institutional innovation and imitation (Snodgrass, 1986; Ober, 2010) and suggests that the inter-*polis* differences would tend to remain limited.

## II. THE ECONOMIC FREEDOM OF THE WORLD INDEX

The Economic Freedom of the World Index consists of five dimensions representing various aspects of economic freedom. Economic freedom is not a well-defined concept, but the economic freedom index has often been used to quantify different aspects of institutional quality in a way that is relatively comparable over time and between countries. The five dimensions are:

1. Size of Government: Expenditures, taxes, and enterprises
2. Legal structure and security of property rights
3. Access to sound money
4. Freedom to trade internationally
5. Regulation of credit, labour and business

---

<sup>2</sup> However, it is arguably an important dimension of institutional quality that de facto and de jure institutions are aligned. In authoritarian regimes, they are often not (cf. Melton, 2012).

Each dimension consists of several components that are scored (0-10) and weighed together (with equal weights), which gives a score between 0 and 10 for each dimension. The aggregated economic freedom is the average of the score in the five dimensions (equally weighted).

There is some disagreement on how economic freedom is related to growth. In neo-classic growth models, long-run growth is exogenous and can only be increased temporarily by increases in economic freedom. According to endogenous growth theory, however, levels of for example education and openness matter for long-run growth. In cross-country regressions, the economic freedom index has repeatedly been found to be highly correlated with growth (Doucouliagos and Ulubasoglu, 2006). Several results concern the mechanisms by which institutions foster growth. Abdiweli (2003) shows that judicial efficiency, low levels of corruption, well-organised public bureaucracy, and well-defined private ownership co-varies with high levels of growth. Berggren and Jordahl (2005) find that property rights and the integrity of the legal system is the dimension most robustly related to growth. Bjørnskov and Foss (2008) show that the size of government (dimension one) and sound money (dimension three) is correlated with entrepreneurial activity.

There is also some evidence that the association between economic freedom and growth is causal in the sense that institutions cause growth rather than the other way round (Heckelman, 2000; Dawson, 2003; Justesen, 2008). Note that de Haan and Sturm (2000) find a robust relationship with growth for changes in economic freedom but not for levels.

The index is available for over 100 countries for every fifth year starting in 1970, and since 2000 it is updated yearly and can be downloaded from [www.freetheworld.com](http://www.freetheworld.com). Every five years, the construction of the index is revised to improve the accuracy and comprehensiveness of the index, but also as a result of changes in data availability. To see how sensitive the evaluation of Athens is to such changes in the index, we begin with the 2010-version (Gwartney et al. 2010, where the most recent data are from 2008), and then discuss separately how the changes introduced in 2012 (Gwartney et al. 2012) affect the score (section IV).

Finally, as discussed by De Haan et al. (2006), we acknowledge that the economic freedom index has been criticized for being ideologically biased, but it has nevertheless been extensively used in research as a descriptive device. As such, the index can be used without implying the normative position that more economic freedom is better. We will describe the index and its components in more detail as we now proceed to quantifying the economic institutions of ancient Greece.

### III. MEASURING ANCIENT ATHENS

We investigate institutional quality in Athens in the classical period (480-322 BCE). Substantial changes take place during these two centuries (Hansen, 1999). We will focus on the middle of the fourth century. The greatest period of Attic rhetoric begins in 355 BCE, and for the following decades we have an unparalleled number of sources for Athenian public life such as the speeches of Aischines, Demosthenes and others, as well as the writings of Aristotle and his school. The choice of Athens among the *poleis* is obvious both because of the superior information available and because of the relative success of the Athenians.

Furthermore, it is likely that the institutions of the Athenians were particularly important in the fourth century. During much of the fifth century, the Athenians benefited substantially from their so-called “Empire”. Some important changes in economic legislation took place towards the end of the fourth century.

To quantify institutions in ancient Greece, we investigate the various components of the five dimensions that make up the EFI. To calibrate our quantification, we check the score against various contemporary reference countries. This allows us to anchor the quantification to well-known situations in modern countries. For example, if freedom to trade in ancient Greece can reasonably be described as at least as great as in contemporary United States, the score for ancient Greece in the fourth dimension should be at least as high as it is for the US today.

In five tables that follow, we characterise institutions in Athens in the five different dimensions of the index. We also report the reference countries used to translate the characteristics of ancient Athens into a 0-10 score. Sometimes it seems reasonable to suggest a range for the scores in the index. Thus, our empirical estimates sometimes entail a sensitivity analysis. In the interest of brevity, we have chosen to rely on a limited number of secondary sources (and some primary). This means that we intentionally ignore many controversies surrounding specific details. We believe that these controversies have little impact on the overall Athenian score.

#### *1. First dimension: size of government*

Clearly, the Athenians score very high on the first dimension in the Index. There were some interventions but taxes were low and government activities were a small part of the economy.

- 1a: government consumption

A tentative overview of Athenian public finance is provided in the Appendix. The upper limit for government consumption is normally public revenue (but see below). Around 340 BCE, public revenue amounted to 400 talents in Athens.<sup>3</sup> This is usually taken as a solid fact, and we treat it as such. This means that the calculations below, which involve considerable guesswork, are firmly anchored in ancient evidence at least in this dimension. Note that according to the Attic standard 6 obols equal 1 drachma, and 6,000 drachmas equal 1 talent.

<b>Table 1. Size of government in Athens</b>		
<b>1. Size of government</b>	<b>Athens score</b>	<b>Comments</b>
<b>1a. Government consumption as a percentage of total consumption</b>	9.8 [8.2, 10]	Baseline = 5.5% (7.0%, liturgies included) Range: [1.6, 10.0] or [2.4, 12.2], liturgies included. References: Myanmar with 4.5% scores 10. Central African Republic with 6.5% scores 9.8. Hong Kong with 12.1% scores 8.2.
<b>1b. Transfers and subsidies as percentage of GDP</b>	9.8 [9.4, 10]	Baseline: 1.3%. Range: [0.4, 2.7]. With a food crises: maximum 4.2% (but with reduced government consumption). References: Thailand with 1.96% scores 9.6. Azerbaijan with 2.8% scores 9.4.
<b>1c. Government enterprises and investments as percentage of GDP.</b>	10	Baseline = 3.0%. Range: [1.2, 5.2]. Reference: Countries with shares below 8% are all given the score 10.
<b>1d. Top marginal tax rate</b>	10	
1d.i. Top marginal income tax rate	10	No personal income tax in Athens (but taxes on wealth, trade, and per capita).
1d.ii. Top marginal income and payroll tax rate	10	No personal income tax and no payroll tax in Athens.
<b>Athens total score on Item 1.</b>	<b>9.9</b> <b>[9.4, 10]</b>	

The major expenditure items in Athens were military expenses, the costs of running the democracy (assembly pay, pay to councillors and jurors), the great festivals (the City Dionysia, the Great Panathenaia), and some transfers. We do not know how much the Athenians spent on

<sup>3</sup> Demosthenes 10.38. Public revenue varied considerably through the fourth century. Important items were volatile, e.g., taxes on exports and imports and transit trade, and leases of the publicly owned silver mines. Revenue was reduced to 130 talents shortly before our date (Demosthenes 10.37), in connection with the defeat in the Social War 357-355. Revenue soared to 1,200 talents after 338 (Hansen, 1999, p. 260). Domestic revenue (i.e., excluding the imperial tribute) was 400 talents also in the beginning of the Peloponnesian War (Pritchard, forthcoming).



public buildings (temples, stoas, etc.), water supply, roads, etc.<sup>4</sup> In our baseline estimate, we assume 45 talents for investments<sup>5</sup> and that transfers amounted to c. 80 talents yearly (Item 1b), leaving c. 275 talents as government consumption. The lower limit for government consumption we take to be 158 talents (retaining the costs of the democratic institutions, and 65 of 111 talents of military expenditures). The upper limit for government consumption corresponds to a minimum level of transfers (39 talents, cf. Item 1b) and only 25 talents of investments for a total consumption of 336 talents.

It is, however, arguable that part of public expenditures never features in the public accounts. In classical Greece, it was considered a duty and an honour for rich citizens to contribute to the common good, to perform so called liturgies. Each normal year there were about 100 festival liturgies (Davies 1967), the most well-known being to stage a dramatic production (*choregia*). The trierarchy was a military liturgy – to commission and command a warship for a year. It remains an open question to what extent the liturgies should be seen as a tax. To some extent the system was enforced by social norms, which would place it outside the Index, and there was always an honorific element. However, even if the system started as voluntary, it had largely ceased to be so by the fourth century. Liturgists could be nominated by others, and once they were appointed it was punishable to avoid the obligation.<sup>6</sup>

Hence as an alternative we add the cost of liturgies to government consumption. A festival liturgy costs between 300 and 3,000 drachmas, while known costs of a trierarchy range from 4,000 to 6,000 drachmas.<sup>7</sup> To be added to government consumption are the costs of 100 festival liturgies and the trierarchies. We guess the former represented a total expenditure of 150,000 drachmas or 25 talents. When Athens was not at war, the expenditure of a trierarch was

---

<sup>4</sup> We know the building costs of exactly one temple in this period. The temple to Asklepios in Epidaurus was built around 370 BCE at a cost of 23-24 talents. The Athenian temples were often much much more expensive (Burford, 1965).

<sup>5</sup> Some expenditures and revenues are roughly estimated in the literature. Ober (forthcoming) provides estimates which in general agree with the figures we present. Hansen (1999) gives the following figures: assembly pay 45 talents, expenditures of the Assembly 10 talents, the Council 15 talents, law courts 23-37 talents (we assume 23). We calculate the support of disabled citizens to c. 12 talents and the theorika to c. 67 talents (Item 1b). Hansen (1999, p. 316) suggests that the training of the ephebes cost 25 talents and fodder for horses 40 talents. To this we must add other military expenditures, even if we assume peaceful conditions (cf. below). Pritchard (forthcoming) estimates the cost of the whole program of city-sponsored festivals to 100 talents yearly. Assuming that the liturgies (cf. below) represent the same proportion of festival spending for the whole program as for the Great Panathenaia (28%), this means 72 talents of pure public expenditure. This leaves 45 talents for unspecified investments (inscribing honorary decrees on stone probably cost some 10-20 talents yearly) and savings. Ober suggests public building activities in the range of 25-200 talents.

<sup>6</sup> According to Gabrielsen (1994), the Athenians viewed the trierarchy as a tax (*telos*). They used private initiative to ensure that the burden was fairly allocated; cf. Lyttkens (1994) and Gabrielsen (1987) on the *antidosis* procedure.

<sup>7</sup> Davies (1971), pp. XXI-XXIV.

presumably modest: say 1,000 drachmas on average for 300 trierarchs, for a total of 50 talents, and an aggregate liturgical expenditure of 75 talents.

We need an estimate of overall consumption. This roughly equals GDP less investments and savings. The notion that there were no consciously made productive investments in classical Greece has been disproved.<sup>8</sup> In addition, individuals often resort to hoarding, placing money in temples for safekeeping, etc. However, we have no way of knowing the size of investments and savings. Our somewhat arbitrary baseline assumption of overall consumption is 85% of GDP, including both private and public consumption. We assume that the lower limit for overall consumption is 80% of GDP and the upper limit is 90%.

This brings us to an estimate of GDP, which is a difficult (read impossible) task if one hopes for accuracy. Goldsmith (1987) suggests a GDP around 5,000 talents, a figure obtained by multiplying the labour force (140,000) with the average wage (1 drachma) and the number of working days (250). Note that slaves famously were paid just as much as free men (Loomis, 1998).<sup>9</sup> Given the problems involved when estimating GDP in today's developing countries, vividly described by Deaton (1995), such a crude method may well be defended.

With the same method, but adjusting the population figures to that of Hansen (1999), pp. 92-94, we estimate a baseline GDP of c. 5,900 talents. To arrive at this figure, we assume 30,000 free adult male citizens, 30,000 female citizens, 40,000 metics (i.e. resident foreigners, half of which were female), and 100,000 slaves. We assume that the number of working days is 195 (Hansen, *op. cit.*, 186), but that slaves work 300 days.

With respect to the number of slaves, not much is known in reliable detail. We follow the salutary comment of Hansen (1999, p. 93), that the Athenians themselves did not know the number of slaves, only that there were more slaves than free in Attica. Andreau and Descat (2011) suggest that the number of slaves in Athens were around 200,000-250,000, but they note that this figure is in the higher range of the various proposals in the literature. Therefore we use a more conservative estimate as our baseline case—100,000 slaves. In the sensitivity analysis we use 50,000 as a lower limit and 250,000 as an upper limit. We assume that 1/3 of the slaves do household work and therefore do not count in GDP.

---

<sup>8</sup> Land was being bought as an investment to improve and resell (Xenophon, *Oeconomicus* XX. 22-26), and deliberate investment for profit becomes visible (Davies, 2007, p. 357).

<sup>9</sup> To be precise, Goldsmith uses 5 obols rather than 1 drachma to account for the fact that some slaves worked in households. From the expenditure side Goldsmith calculates a GDP of 4,000 talents and Amemiya (2007) suggests 4430 talents.

We assume in our baseline that 5,000 (metic) women work outside the household (195 days). There must be such a group since the Athenians collected a metic tax (*metoikion*) that only applied to men and independent women (Andreades, 1979[1933], p. 278). We do not impute any income to the other women in Athenian society, presuming that they were engaged in household work, which traditionally is not included in the GDP measure.

We use 1 drachma as an average daily wage, which is conventional and seems reasonable. Loomis shows that after the Peloponnesian War wages (for publicly financed work) seem to settle around 1 drachma until they rise substantially in the period after 330. Obviously there were some who did not produce anything (and perhaps received a dole from the government, cf. Item 1b), and some who earned more. We implicitly assume that the incomes of these groups cancel out.

Total labour income in our baseline amounts to  $[(30,000 + 20,000 + 5,000) \times 195] + (100,000 \times 300 \times (2/3))$  drachmas or 5,120 talents. Note that this method bypasses the problem of estimating income in the informal sector by imputing an income to self-sufficient farmers which is then counted in GDP. This makes Athens more comparable to industrialised current societies than if we had ignored self-sufficient production.<sup>10</sup>

Then there is return to capital. If you owned more than 3-4 talents you belonged to the group of liturgists, and Hansen (1999, pp. 110ff) suggests that there were at least some 1,200 such persons. We assume that the liturgists on average possess a fortune of 8 talents, for a total of 9,600 talents. Assume further that the rate of return is 8%, which is conventional (Lyttkens, 1992; Ober, 2010). The total income from capital then comes to 758 talents, which together with the labour income (5,120 talents) comprises Athenian baseline GDP. An alternative would be to use the figure that the Athenians arrived at when they assessed the wealth in Attica: 5750 talents in 378 (cf. Hansen, 1999, p. 113). This is sure to be an underestimation of wealth, however, since it is based on self-reporting and the tax system encouraged holding wealth in “invisible forms,” which included depositing at a bank. For this reason the figure 9,600 talents may also be considerably too low.

---

<sup>10</sup> An alternative would be to exclude the non-market part of the economy from the GDP estimate. Until recently, this would have been taken to suggest that perhaps 80% or more of the Athenians production would be excluded. However, Hansen (2006) shows that the population of ancient Greece considerably exceeded the carrying capacity of the land (the number of people that could be fed). He argues that the best measure of the carrying capacity of Attica was 100,000 persons (p. 90), while the actual adult population comes to 250,000 in our baseline. This means that grain for more than 2/3 of the population had to be imported and consequently belonged to the market part of the economy.

As mentioned above, our baseline estimate of GDP is thus  $5,120 + 758 = 5878$  talents (we use 5,900 in the calculations). For a *lower* limit for GDP we assume that there were 50,000 slaves (with again 1/3 doing household work), bringing GDP to  $4,211 \approx 4,200$  talents. For the *upper* limit for GDP, we assume 250,000 slaves, and a GDP at 10,900, *mutatis mutandis*.

As a comparison, Ober (2010) provides estimates of the earnings of different groups in Athenian society in an analysis of the income distribution. He assumes that the subsistence level (S) corresponds to 100 drachmas per year (as a male income which equals household income), that a relatively comfortable middling status corresponds to  $2.4-10 \times S$ , and that the rich elite earned in excess of  $10 \times S$ . If we assume, given the above figures, that the income of the *average* middling family is  $5 \times S$  (500 drachmas/year), and that the *average* elite household has an income of  $20 \times S$  (2,000 drachmas/year), then the GDP of Athens falls between 5,590-6,660 talents depending on the assumed proportion of middling versus subsistence-living ordinary citizens. Note that Ober assumes only 80,000 slaves in Attica.

Our baseline measure of government consumption as share of total consumption is 5.5% with liturgies excluded and 7.0% liturgies included. Depending on how we treat the liturgies, this places ancient Athens just below or above the Central African Republic, which with 6.5% is given the score 9.8 in the Economic Freedom Index (cf. Table 1). This is our baseline score for Athens. In the sensitivity analysis, we combine the maximum level of government consumption (336 talents) with the lower limit for overall consumption (80% of a GDP of 4,200 talents) and *vice versa*. The upper limit for the share of public consumption is then 12.2% (liturgies included, score 8.2) and the lower limit is 1.6% (liturgies excluded, score 10).

Finally, an important feature of the Economic Freedom Index is that it captures modern economies *in peace – not a war*. For the last 60 years, peace has been the normal condition for high-income countries. Consequently since we wish to compare the results for Athens with modern states, peaceful conditions must necessarily be assumed.

However, Athens was often at war: “From the end of the fifth century to the middle of the fourth, Athens is a society at war, relieved by occasional short periods of peace” (Hansen, 1999, p. 116).<sup>11</sup> Since war was so frequent, our use of peacetime conditions will underestimate the size and economic influence of government in Athens relative to modern states.

---

<sup>11</sup> “The Athenian demos, in fact, waged war more often in the fourth century than previously: they campaigned incessantly from 396 to 386 and then from 378 to 338 with only year-long interruptions” (Pritchard, forthcoming).

Waging war was very expensive, but we lack exact figures. For example, according to Thukydides (2.70.2) a two-and-a-half year siege of Potidaia cost the public purse 2,000 talents. Pritchard (forthcoming) estimates that policing the Aegean in peace with a naval force during 6 months cost 67 talents in running expenses for the trierarch and the public purse combined. To finance military expenditure the Athenians could reduce other government expenditures or raise extraordinary revenues: they could impose a special wealth tax (the *eisphora*), increase the burden on the trierarchs, and plunder their adversaries.

Pritchard (forthcoming) has provided careful estimates of the military expenditures in Athens in the 370s. We apply these to the 340s as the best approximation available.<sup>12</sup> For the 370s, a decade dominated by war, Pritchard estimates that the annual average military expenditures (public and private) were 522 talents and that the increase compared to peace is 378 talents.<sup>13</sup> In order to estimate government consumption in war, we add this figure to our estimate of peacetime government consumption plus peacetime liturgies. This gives us  $378 + 275 + 75 = 728$  talents. We assume, however, that 100 talents could be raised for military spending by reducing other government consumption. Total government consumption in times of war would then be 628 talents, more than a doubling of the peacetime figure (275 talents). If we were to use this together with our baseline assumptions the score for Athens in the first dimension (Size of government) would fall from 9.9 to 9.5 and the overall score would fall by 0.1. [KORREKT!]

- 1b: transfers and subsidies

The diobelia were payments of two obols per day to disabled citizens who could not support themselves, which is attested for the late fifth century and seems to have been replaced by a similar support in the fourth century (Hansen, 1999, p. 98; Loomis, 1998, p. 231). If 2% of the citizen population were recipients (600 males) and the support was paid every day of the year, then the yearly expenditure was 12 talents (baseline and upper limit).

The theorika was a payment of two obols per day (Loomis, 1998, pp. 225-226), introduced in the middle of the fourth century originally as “theatre money” to allow all citizens to afford entry to the theatre on those festival days when tragedies and comedies were performed. It was gradually extended to other festivals. With 30,000 citizens, and assuming everybody received the payment,

---

<sup>12</sup> Pritchard emphasises that there likely were differences. The Athenians reorganised the financing of military matters after losing the Social War (357-355). Pritchard notes however that already by the year 353/2 military expenditures had jumped back to their 360s levels.

<sup>13</sup> Pritchard estimates that 144 talents of military expenditures would occur also in times of peace, which is similar to our peace time calculation of 111 talents of military expenditures (cf. the Appendix).

the cost was 1.7 talents for each day it was paid. We assume as baseline that it was paid 40 days in a year with a total expenditure of 67 talents.

The theorika could be paid frequently, effectively exhausting the public budget. In the latter case a reasonable maximum (allowing for some unspecified consumption and investments) seems to be 100 talents (a quarter of the revenues). As a minimum for the theorika, given that it is seen as “the glue of democracy” (Hansen, 1999, p. 316), we assume 20 days of payment or 33 talents.

The lower limit for the diobelia that we use is 6 talents (300 recipients). We allow GDP to vary as described above for Item 1a. To get a maximum range for our sensitivity analysis, we combine high GDP with small subsidies and *vice versa*.

When there is a food crisis the Athenians sometimes used public means to subsidise grain. However, this only marginally affects the Athenian score. The reason is that transfers plus subsidies cannot increase substantially beyond the highest figure assumed for the theorika above. A reasonable maximum for transfers and subsidies together is 250 talents (no investments and consumption at a minimum), some 4.2% of baseline GDP. Note, however, that this entails a reduction in government consumption and hence a higher score on Item 1a.<sup>14</sup>

- 1c.: government enterprises and investments

Despite low transfers and low public consumption, there was some significant government involvement in the Athenian economy. The Athenian state owned the silver mines in Attica. They were leased out and the revenue per contract was 200-1,500 drachmas per year. In 340, when the mining operations were at their peak, between 420 and 980 leases were in operation at the same time, because there were 140 new leases per year and each lease lasted 3 or 7 years (cf. Isager and Hansen, 1975, pp. 42ff and 105ff). For our baseline we assume that half the leases were for 3 years and half for seven years, so that the number of mining operations at any specific time is  $210 + 490 = 700$ . We also assume that the price for the average lease is 850 drachmas, which brings the total revenue to 99 talents. In the sensitivity analysis, we use revenues of 64-142 talents. We assume that the revenue from leasing “other government property” is one third of the baseline mining revenue (33 talents). Our baseline estimate for government investments is 45

---

<sup>14</sup> Government expenditure could be increased by using previous savings. This occurred repeatedly during the Peloponnesian War: between 431-422, 5,600 talents were borrowed from the sacred treasuries, to be compared with a total hoarded wealth on the Acropolis of 6,000 talents just before the beginning of the war (Gabrielsen, 1994, pp. 175-176).

talents (to correspond with the baseline in 1a).<sup>15</sup> GDP varies as in the previous cases.

- 1d: marginal tax rates

Finally, we note that there were no personal income taxes in Athens. The Athenians certainly used taxes to raise revenue, but these taxes were on wealth (e.g., the *eisphora*, cf. above), trade and persons (e.g., resident foreigners paid a lump-sum per capita tax). Thus focussing exclusively on income taxes tends to underestimate government intervention. On the other hand, since landed property is more difficult to conceal than coins, a side-effect of taxes on wealth may have been to encourage market activities and specialisation rather than causing a deadweight loss (Lyttkens, 2013, Ch.6).

## *2. Second dimension: legal structure and security of property rights*

Overall property rights were well-defined and well protected in Athens, and the legal system was almost free from undue influence of interested parties. The big problem is that many of the inhabitants were owned by other inhabitants (slaves, informally women). This of course lowers the Athenian score.

- 2a: independence of judiciary

There was essentially no government to be independent of in Athens, as it was a direct democracy with decisions taken in the Assembly where all citizens could attend and vote. The first 6,000 to show up in the Assembly received 3 obols, so almost everybody could actually afford to attend. The public sector was run by magistrates selected by lottery. In theory, the lowest property class could still be excluded from some magistracies; however, in practice that rule ceased to function already in the fifth century.

Decisions on legislation were taken by boards of jurors, where the members were selected by lottery from among a yearly appointed panel of 6,000 citizens, where the members once again were selected by lottery. The rest of the courts were also manned by jurors selected by lot (using

---

<sup>15</sup> Obviously if government consumption is assumed to increase beyond 350 talents, investments will have to fall. There is a trade-off between the sums in 1a, 1b and 1c.

a lottery machine), making, for example, bribery very difficult. Jurors were paid like assemblymen and members of the Council.

<b>Table 2. Legal structure and property rights in Athens</b>		
<b>2. Legal structure and security of property rights</b>	<b>Athens score</b>	<b>Comments</b>
<b>2a. Judicial independence</b>	10	Both legislation and law courts were handled by jurors selected by lot. The judicial system was reasonably more independent in Athens than in current Sweden that scores 9.5.
<b>2b. Impartial courts (i.e., it is possible to challenge government actions)</b>	7.0 [5.0, 9.0]	Reference: Spain scores 8.0 and Malaysia 6.0.
<b>2c. Protection of intellectual property rights</b>	0	No protection.
<b>2d. Military interference in the rule of law and the political process</b>	10	No domestic interference (or only when Athens was under Spartan control after the Peloponnesian War). Athens had no professional army.
<b>2e-f. Integrity of the legal system and legal enforcement of contracts</b>	3 [1.0, 4.0]	Reference: South Africa scores 2.9 in 1990.
<b>2g. Regulatory restrictions on the sale of real property</b>	10	None.
<b>Athens total score on Item 2</b>	<b>6.1</b> <b>[5.3, 6.7]</b>	References: Iran scores 6.1, Brazil scores 5.3, Taiwan scores 6.7.

- 2b: impartial courts

From 594, it was possible to challenge the decision of a magistrate. There were established procedures for such challenges and for bringing a complaint to the Council which notably also was filled with citizens appointed by lot (Hansen, 1999, p. 221).

In the second half of the fourth century, changes in legislation were undertaken in order to facilitate commercial activity, in particular for foreigners. The procedures for hearing commercial disputes now allowed adjudication within a month, and individuals were admitted into courts without regard to their nationality (Burke, 1992; Cohen, 1992).

As regards impartiality in general, the relevant divide was between the rich and poor. Judging by the speeches delivered in courts, if you were rich, it was expected that you contributed to the



common good (liturgies) and paid your taxes. So you may have had an advantage if you had been generous, but you may equally be at a disadvantage if your opponent could show that you had been stingy. Note that the jurors were selected by lot and were ordinary citizens.<sup>16</sup>

The only real problem with regard to the impartiality of courts was the repeated complaint that the poor in a democracy might exploit the rich in political trials. A trial could lead to heavy fines or outright confiscation of property. The revenue from the courts could make a large contribution to state revenue, but as argued by Ober (1989, pp. 200-202), it is not known to what extent rich persons actually suffered in the courts. In an oration spoken after 338, “There were three examples of how the Athenian courts did *not* fall into the temptation of condemning a number of rich mining-concessionaires. On the other hand [...] in those very same years, the richest of all [...] Diphilos, is condemned [...] and his fortune of 160 talents distributed among the citizens” (Hansen, 1999, p. 315).

Probably the best interpretation is that this was not a problem in normal times, but in crises it could perhaps be somewhat risky being rich if you ended up in a court (cf. Hornblower, 1983, p. 172, citing Lysias 30.22). In modern societies the problem is usually the opposite, namely that the rich have an advantage in the courts.

- 2c: intellectual property

There were no formal laws protecting intellectual property rights. Ancient Greece, however, witnessed a tremendous surge in recognising the origin of intellectual accomplishment. For the first time in history, we find artists known by name, and also signing their works with their name (for example some of the artists behind the black-figured ceramic in Athens, in the second half of the sixth century BCE), reputedly we find artists adding their self-portrait to public works of art (Pheidias), authors and play writers are known to us by name, and the speeches of famous orators have been preserved under their own names.

All of this must represent a major leap in the perception of intellectual property rights (it provides incentives to engage in such work). If informal rules and social norms were at least to some degree a substitute for formal institutions, these improvements may be important. Still, as far as formal institutions go the score must be 0. We note as an important characteristic of the index that it only quantifies formal institutions.

---

<sup>16</sup> The composition of the courts is a contested issue, whether it was mainly the more affluent citizens who volunteered for these assignments. We follow Hansen (1999, pp. 183ff).

- 2e-f. Integrity of the legal system and legal enforcement of contracts

Property rights were in general very well protected. The first action of an archon when he took up office was to swear that “all men shall hold until the end of his office those possessions and powers that they held before his entry into office” (Aristotle, *Athenian Constitution* 56.2). In other words, the importance of protecting property rights was established yearly by the highest ranked official. In 403/2, a rule was established that only written law was admissible in court.

Slaves did not have exclusive rights to their own body (and no political rights). However, their legal personality at least began to be defined in the fourth century. They were now allowed to give evidence like free men. They could enter into contracts on their own behalf and be personally prosecuted. Freedmen (manumitted slaves) were included with the resident foreigners (metics). They could not own landed property.

This seems also to be the most appropriate place to consider the restricted judicial and political rights of women. Women could not appear in court, and were for many purposes treated as the property of their husbands. They could, however, divorce their husbands whenever they wanted, with the restriction that they needed a male relative to act on their behalf. In case of divorce, the woman took her dowry with her, as it was always her own property. Women had no political rights.

How much weight the restricted position of women and slaves should be given in this particular context is not altogether obvious. Perhaps South Africa is illuminating, as it scores 2.9 in 1990, which increases to 6.1 in 1995. Contrary to the South African racial regime, slaves in Athens could rise socially and in their rights, as they could be manumitted and their children could become citizens. In special cases this privilege was conferred also upon first generation freedmen.

- 2g. Regulatory restrictions on the sale of real property

There are no documented restrictions on the sale of real property, suggesting the score (10). It is worth noting, however, that from 594 BCE Athenian citizens could no longer be enslaved in Attica and consequently you were no longer allowed to put your own body up as security for a loan. Strictly speaking, you were thus not allowed to sell yourself – arguably a restriction on the

sale of property compared to the previous practice. Additionally, a male citizen who sold the use of his body (prostitution) lost his citizen rights (Aeschines 1.160).

- 2: total score

Though we arrive at the score 6.1, the Athenian score on Item 2 is a field open for suggestions. In a modern perspective, Athens score very high on Items 2a, 2b and 2d, and very low on 2c. The main downside is the treatment of women and being a slave society. However, as we understand the index, these disadvantages can only appear under Item 2e and therefore have a limited influence on the total score.

### *3. Third dimension: access to sound money*

In the ancient economy there was no fiat money and money at this time and place essentially meant silver coins. The Athenians were fortunate in having silver mines. They were also fortunate in having a coinage (the famous “owls”) that was widely regarded as very sound money. In the fourth century; the Athenian tetra-drachms were the greenbacks of the eastern Mediterranean (Engen, 2005). Athenian coins are found over large distances, and sometimes the Athenian coins were imitated by other states in order to benefit from the reputation of the owls. The imitations often contained the same amount of silver as the originals. The Athenians did not manipulate the composition of their coins. On the contrary, the Athenians choose to retain a comparatively less aesthetically pleasing and archaic coin in order to build upon its reputation.

In 375/4, the law of Nikophon was enacted, which charged an official in Athens with the task of taking out of circulation debased Athenian-looking coins. Traders were thus ensured that Athenian coins obtained in Athens were of certified value, thereby encouraging trade. The Athenians were aware of the beneficial effect of trade on their prosperity (Xenophon, *Ways and means* 3).

- 3a: Growth of money supply less growth in GDP.

If and when there was a major change in the money supply in Athens (in Athenian coinage), the main source would have been the Athenian silver mines. The output from these mines declined in the fifth century (Cohen, p. 194), but increased again from around 355, and probably peaked

roughly at the time we are dealing with (Isager and Hansen 1975). The Athenians leased the mining concessions to contractors, who could take the silver ore to the mint, where they paid a minting charge. In this context, the important fact is that an increase in money supply at the same time was equivalent to an increase in GDP of the same magnitude since silver was also a valued good. In this setting it seems unlikely that growth of the money supply in terms of coinage would outpace growth of GDP. In fact, the presence of a minting charge suggests that GDP increased more than the money supply. To this we should add that the Athenian banks (cf. below) provided credit of various sorts thereby expanding the money supply (Cohen, 1992, pp. 14-18). In view of this, we score Athens on level with modern economies where growth of money supply slightly exceeds GDP growth.

<b>Table 3. Access to sound money in Athens</b>		
<b>3. Access to sound money</b>	<b>Athens score</b>	<b>Comments</b>
<b>3a. Growth of money supply less growth in GDP</b>	9.4	It seems unlikely that growth of money supply is greater than growth of GDP. Reference: Contemporary Greece with money growth at 3.4% scores 9.3, Japan with 2.7% growth scores 9.5.
<b>3b. Variation in the inflation rate</b>	9.4	Could hardly have been significant, given the stability of the silver coinage. We suggest the standard deviation would not have exceeded 2. References: South Korea with a standard deviation of 1.66 scores 9.3; Romania with 1.9 scores 9.2; Greece today with 0.2 scores 9.9.
<b>3c. Recent inflation rate</b>	9.4	Unlikely to have exceeded 3%. References: Ireland with a recent rate of 3.9% scores 9.2 in the index; France with 2.8% scores 9.4.
<b>3d. Freedom to own foreign currency</b>	10	No restrictions. It is easy to get hold of foreign currency as money changers were common in the agora.
<b>Athens score on Item 3</b>	<b>9.6</b>	New Zealand scores 9.6.

- 3b and 3c: Variation in the inflation rate and recent inflation rate

Once again the nature of money as silver coinage is important. Inflation could occur for two reasons. One possibility is that the silver content of the coinage in question is manipulated. This did not happen with Athenian coinage in our period. The other possibility is that the relative

price of silver changed. However the relative price of silver is arguably determined in the “international” market and the increase in Attic mining would have had a limited effect.

There are indications that the wage of unskilled labour increased by a factor 2 from the end of the fifth century to the end of the fourth. This could be a sign of inflation, but Scheidel (2010b) sees this as an increase in the real wage. Inflation is also relatively unlikely since it is the wage of the whole trading regions that matters, which means that variations in Athenian mining and minting have a limited impact. Note that Alexander has not yet conquered and released the Persian treasury – an act that probably affected the relative prices of both gold and silver. Furthermore, most of the Attic silver was exported (Isager and Hansen, 1975).

#### *4. Fourth dimension: freedom to trade*

The Athenians taxed imports and exports at 2%. Despite being modest by today’s standards, revenue from this tax was an important part of public revenue (Athens had considerable transit trade). Trade was otherwise not regulated, with the notable exception of trade in grain (cf. below).

- 4bi: hidden trade barriers

Since the Athenians would have starved without the import of grain, several regulations applied. One law forbade anyone living in Athens or Attica (whether citizen or metic) to lend money to a ship importing grain into any other place than Athens. Another law forbade anyone living in Attica to transport grain to any other harbour than Peiraieus, and two thirds of the grain had to be disposed of in Athens. The grain trade was the only one regulated in this way (cf. also below Item 5ci). A modern day counterpart to this regulation is the export ban on rice introduced in India in 2008, which is noted in the index as a decrease in the score for non-tariff trade barriers by 0.4 (from 6.1 to 5.7), decreasing the total score for regulatory trade barriers by 0.2. In other words, the trade restrictions on grain seem prominent because trade was otherwise free in Athens. The effect of the regulation on the score for freedom to trade is marginal (around 0.1).

<b>Table 4. Freedom to trade in Athens</b>		
<b>4. Freedom to trade internationally</b>	<b>Athens score</b>	<b>Comments</b>
<b>4a. Taxes on international trade</b>	9.4	
4ai. Revenue from taxes on trade as a percentage of exports plus imports	8.7	2%. Both exports and imports were taxed at the rate 2%. Reference: South Africa with 2.14% scores 8.64.
4a.ii. Mean tariff rate	9.6	2%. Reference: Georgia with 1.4% scores 9.7.
4a.iii. Standard deviation of tariff rates	10	0.
<b>4b. Regulatory trade barriers</b>	9.6 [9.4, 9.8]	
4bi. Hidden barriers or only published tariffs and quotas.	9.2 [8.8, 9.6]	No hidden barriers, but regulation of the grain trade. Reference: The score for India is reduced by 0.4 when they ban rice exports.
4bii. Combined effects of tariffs, fees, administration, etc. raise costs of importing by more than 10%?	10	No.
<b>4c. Actual size of trade sector compared with expected size</b>	9.0 [8.5, 9.5]	Arguably considerably larger than expected. References: Hong Kong scores 10, Hungary scores 9.
<b>4d. Difference between official and black market exchange rate</b>	10	No difference (no official exchange rate).
<b>4e International capital market controls</b>	10	
4ei. Citizens' access to foreign capital markets and vice versa	10	No restriction
4eii Capital market exchange with foreigners	10	No restriction
<b>Athens total score on Item 4</b>	<b>9.6</b> <b>[9.5, 9.7]</b>	

- 4c: size of trade sector

For modern economies, the score on this item in the index is based on a regression model that estimates the expected size of the trade sector given the size and location of the country. If a nation trades a lot more than the model predicts, then it is concluded that the policy regime must be favourable to trade and vice versa (Skipton and Lawson, 2004). Without any ambition to enter Athens into such an exercise, we nevertheless suggest that the Athenians relied on trade to a considerably greater extent than could be expected, given the size, location and time period.<sup>17</sup>

Isager & Hansen (1975, pp. 51-52) suggest that trade was important in the everyday life of the Athenians, and that at least half the population was engaged in trade (p. 51). Following their method, we know that in 401/0, the tax farmer who bought the contract for the collection of the import/export dues of 2% paid 36 talents for the contract and still made a “small” profit (Andokides 1:133). This was shortly after the end of the Peloponnesian War, when the volume of trade probably was unusually low. If the profit rate was 5%, the total volume of trade implied is  $(1.05 \times 36) / 0.02 = 1890$  talents. Assuming that 50% of this was transit trade and that we should add 500 talents worth of grain imports (which was taxed separately), total imports plus exports amounted to  $500 + (1890 \times 0.5) = 1,445$  talents or 8,670,000 drachmas. With 50,000 free adult males (citizens and metics), this corresponds to 173 drachmas per adult male or 89% of his income from his own work, assuming 195 working days at 1 drachma per day (as in Item 1a). Alternatively, if the grain tax is included in Andokides’ figure and people worked 225 days per year, imports represents 50% of yearly income. We believe this amounted to a much greater reliance upon trade than expected. The reliance on imports arguably increased during the course of the fourth century.

##### *5. Fifth dimension: regulation of credit, labour and business*

Not surprising perhaps for a state of this period in history, these different sectors were in principle not regulated. The fact that distinguished Athens was that, for example, the banking sector existed at all, which was arguably a function of the relative security of property rights, the relatively modest tax rates, etc. Athens of the fourth century witnessed the world’s first private banks (Cohen, 1992). These commercial banks took deposits and provided credit to private individuals (cf., e.g., Migeotte, 2009, pp. 125-127; Cohen, 1992). Greek law at the time did not

---

<sup>17</sup> It can be argued that the Athenians enjoyed a beneficial location that attracted transit trade, but so did several of her competitors, Corinth, Aegina and Rhodes to name a few.

however, recognize banks as legal entities. Instead the bank was identified with its owner. Having deposited money with the bank was expressed as having left it with the banker.

- 5ai: deposits in private banks

The major problem here is the fact that sanctuaries in ancient Greece (most notably in Athens and on Delos) sometimes performed banking functions (Chankowski, 2005, 2007; Davies 2001). Both individuals and states deposited wealth for safe keeping with temples. City-states could sometimes borrow from temples. During the Peloponnesian War, the Athenians used the reserves built up on the Acropolis and this money was viewed as loans to the state. It appears however that in Athens the sacred loans were used exclusively for waging war (Gabrielsen, 1994; Pritchard, forthcoming). We also hear of individuals borrowing from temple funds to finance their sacrifices at the temple (Cohen, 1992, p. 42 n. 2). In Athens, private individuals could borrow from Deme sanctuaries (Chankowski, 2005; Davies 2001) and had to pay an interest on the loan. There were however important differences between the commercial banks and the sanctuaries. If you wanted to earn an interest on your deposit you probably had to go to the private banks with your money. A famous scandal ensued in Athens in the first half of the fourth century when the Treasurers of the temples burned down a part of the sacred complex on the Acropolis in order to hide the fact that they had lent some of the sacred monies to a bank.<sup>18</sup> This implies that a private bank could be used to earn an interest on deposits, while this is not necessarily possible in the same way with money in the temples. For this reason, in our baseline scenario we set the score to 7.5, but in the sensitivity analysis we use scores of 5 and 10 as alternatives.<sup>19</sup>

- 5aii: competition from foreign banks

The banks (bankers) in Athens were a mixed lot.<sup>20</sup> We find among them freed slaves and metics (resident foreigners) but also Athenian citizens (Cohen, 1992, p. 174). The banking business relied on personal contacts, and so a foreign bank(er) would have had to go to Athens to compete with the banks already there, except possibly if they were based in a nearby *polis*. We

---

<sup>18</sup> Cohen (1992), pp. 114, 221ff.

<sup>19</sup> There is in any case no way of knowing the relative shares of deposits for banks and temples. We can add that the city-states did not exactly *own* the sanctuaries (note that they *loaned* money from the temples).

<sup>20</sup> Cf. Cohen (1997), pp. 79-80, 88, 145, 174, Hansen (1999), p. 119).



note that we happen to know of the existence of at least one bank(er) in nearby Aegina (Cohen, 1992, p. 80).

The fact that we find resident foreigners among the bankers in Athens indicates that the banks in Athens were subject to competition, but perhaps we should think of this as a contestable market rather than a competitive one. Competition would be somewhat attenuated due to the need to travel (costs of entry). Foreigners as bankers would also suffer from the disadvantage that they could not own landed property, which could be offered as security for a loan. This disadvantage is relatively limited however, both because lot of banking business was often part of the invisible (non-taxed) part of the economy (Cohen, 1992, Ch. 5-6) and hence avoided showing off landed property, and also because the problem with real estate was solved by using intermediaries (Cohen 1992, pp. 133-136 and 145). So to conclude the answer in this section is arguably “yes”, Athenian banks had to contend with competition from foreign banks.

- 5aiii: percentage of credit extended to private sector

Essentially the commercial banks gave credit to the private sector, while some sanctuaries gave credit to cities and some gave credit to private individuals (cf. above item 5ai). We use a score of 7.5 in our baseline calculation and vary this in the sensitivity analysis.

- 5biv: social benefits and incentives to work

Citizens without any means to support themselves received 2 obols (it is unclear whether they had to be disabled.) The daily wage was probably 1 drachma (cf. Item 1a). Ober (2010) argues that the sustainable minimum for an adult male (with a family to support) was 3-3.5 obols.

- 5bv: military conscripts

Two years of military training and service (ephebic service) was compulsory by (at least) 336/5, and this practice may have originated early in the fourth century (Hansen, 1999, p. 109).

However, the Athenians often needed the service of many more men than these two age cohorts could provide. It was expected of a citizen that he was willing to take part in military actions, whether as a foot soldier, sailor and so on. In other words, participation was enforced by a social norm.

<b>Table 5. Regulation of credit, labour and business in Athens</b>		
<b>5. Regulation of credit, labour and business</b>	<b>Athens score</b>	<b>Comments</b>
<b>5a. Credit market regulations</b>	8.8	Range
5ai. Percentage of deposits in privately owned banks	7.5 [5, 10]	Reference: Both Greece and Italy score 8.
5aii. Competition from foreign banks	10	Yes.
5aiii. Percentage of credit extended to private sector	7.5 [6, 9]	Reference: Japan scores 7.5
5aiv. Interest rate controls	10	No controls, but rates were remarkably stable over time (Migeotte, 2009, p. 126).
<b>5b. Labour market regulations</b>	8.2	
5bi. Impact of minimum wage on wages	10	No minimum wage.
5bii. Hiring and firing practices	10	No regulation.
5biii. Collective bargaining	10	No collective bargaining.
5biv. Unemployment benefit preserves incentive to work	8	Yes probably.
5bv. Conscription to military service	3	Eventually two years' compulsory training and service. Service is subject to a social norm. Reference: Sweden scores 3.
<b>5c. Business regulations</b>	8.8	
5ci. Price controls	8	Mainly indirect and imprecise regulation of grain prices. Reference: Denmark scores 8.
5cii. Administrative obstacles for new businesses	10	No restrictions
5ciii. Time spent dealing with government bureaucracy	9.5	A small amount of time is spent dealing with magistrates who control the dealings in the agora (market place), such as weights and measures.
5civ. Starting a new business is easy	10	No restrictions
5cv-cvii. Various obstacles	8	Foreigners were not allowed to own real estate.
<b>Athens total score on Item 5</b>	<b>8.6</b> <b>[8.2, 8.9]</b>	New Zealand scores 8.5.

However, the fact that sailors and soldiers were paid both in the fifth and in the fourth centuries, and that payment continues even in periods of crises (Loomis, 2010) suggests strongly that there is also an element of voluntariness in military service. Furthermore, in the fourth century Gabrielsen (1994) shows that trierarchs often paid others to do the actual captaining of a ship. The fourth century also witnessed the (renewed) use of mercenaries, now also in the wars between the *poleis* (Hornblower, 1983), which may imply that military service was not compulsory. Gabrielsen (1994) notes that conscription was only used exceptionally. We suggest that Athens scores somewhere around Sweden. Currently in Sweden, military training is in practice voluntary, but military (domestic) service is compulsory once you have trained.

- 5ci: administrative obstacles for new businesses

Magistrates controlled that “unground corn in the market is on sale at a fair price, and next that millers sell barley-meal at a price corresponding with that of barely, and bakers loaves at a price corresponding with that of wheat” (Aristotle, *Athenian Constitution* 51.3). Also, grain retailers were not allowed to buy more than a certain quantity of grain at a time in order to prevent speculation. Sometimes individuals were lauded for selling at not much above usual price despite there being a shortage (Hansen, 1999, p. 98). This suggests that such benefaction was an unusual practice and a possibility. In other words, the price regulation was not very strict. It also implies that subsidies were not always available or adequate.

#### IV. AND THE TOTAL SCORE FOR ANCIENT ATHENS IS...

- **8.8!**

This is between Singapore’s 8.75 and Hong Kong’s 9.02, the two top countries in the index in 2008. The range for the Athenian total score is [8.4, 9.0], cf. Table 6.

As mentioned in section II, the 2012 version of the Index introduced some changes in the indicators used. As it turns out, these changes would consistently increase the score for Athens. For example, the trade dimension (EFI 4) replaces the measure ‘Actual size of trade sector compared with expected size’ (which was based on a gravity model) with a more straight forward measure of black-market exchange rates. In Athens there was no black market for currency, and thus the score would increase. The regulation dimension (EFI 5) introduces a measure of

working-hours regulation, and drops the indicator on price-controls (due to lacking data). There were no working-hours regulations in Athens but there some price regulations, so both these changes increase the score. The overall outcome of our analysis is that despite that most people (including us) might be surprised of the high economic freedom score for Athens when we used the 2010 version of the Economic Freedom Index, we can with certainty say that using the most recent version would increase the score even more.

<b>Dimension</b>	<b>Athens score</b>
Size of government	9.9 [9.4, 10.0]
Legal structure and security of property rights	6.1 [5.3, 6.7]
Access to sound money	9.6
Freedom to trade	9.6 [9.5, 9.7]
Regulation of credit, labour and business	8.6 [8.2, 9.0]
Total score	8.8 [8.4, 9.0]

## V. DISCUSSION

Classical Athens is famous for its achievements in many areas: art, literature, rhetoric, philosophy, to name a few. The intellectual accomplishments have few parallels in history. As mentioned in the introduction, Morris (2004) estimates that standards of living (per capita consumption) increased by on average 0.07-0.14% per year over the 500-year period 800-300 BCE. While not impressive by modern standards, Morris (2004) emphasises that this is in the same order of magnitude as economic growth in Holland 1580-1820, together with England the golden standard for pre-modern economies. Scheidel (2010b) argues that real wages in late fourth century Athens were clearly above subsistence. This is rare anywhere prior to the nineteenth century and the Greek economy of ca. 800-300 BCE also outperformed the Roman economy in 100 BCE-200 CE (Ober, 2010).

Such extended growth almost necessarily presupposes a well-functioning economy. We have shown that in terms of economic freedom, Athens is to be found at the very top compared to modern economies. The total score for fourth century Athens in the index is 8.9, which is between Singapore at 8.75 and Hong Kong at 9.02.

If we consistently use the most unfavourable figures in the sensitivity analyses, the total index score for Athens becomes 8.6, which still puts it in third place worldwide in 2008. Further, if we instead use the most favourable figures, the total index score (9.1) comes out on level with that of Hong Kong, which was in the top of the ranking with 9.02 in 2010. It compares well with the all-time high which is 9.22 for Hong Kong in 1980.

As a further sensitivity analysis, we focus on some factors where the level of uncertainty is particularly high; for these factors we have picked the lower limit and combined it with our baseline assumptions for all other factors. The chosen factors are: the number of slaves (50,000; items 1a-c), public consumption as in times of war (628 talents; 1a), integrity of the legal system (score 1 on 2e), the credit market (score 5 on 5a). With these assumptions, the Athenian score falls to 8.3. If we only replace the figure for government peace-time consumption with war-time consumption the Athenian score reduces to 8.7. Because the index is constructed as a unweighted average of the subdimension, the total score is not very sensitive to small changes in one or a few items.

We obviously cannot claim to have proven causality in the sense that the high level of economic freedom is the factor that led to the considerable prosperity of ancient Athens. Even regarding modern times, there is some disagreement regarding if economic freedom is causally related to growth. There are also several other important factors that we have not dealt with here, such as the extensive use of slavery, and we cannot compare Athens to other *poleis*. There may have been *poleis* with better institutions but worse economic performance and vice versa.

Tentatively, we suggest, however, that we may have uncovered one of the mechanisms through which the institutional structure lies behind the material and cultural success of Athens described by Ober (2008; 2010). It is worth pointing out that the Athenians were perfectly capable of constructing complex administrative procedures and to regulate behaviour in various ways. Consequently, the high degree of economic freedom should not automatically be explained by the absence of regulations as we go back in history. On the contrary, we strongly suspect that the Athenians would have invented such regulations had they seen it as beneficial. “Never before or since has such an elaborate network of institutions been created and developed in order to run a

quite small and fairly simple society” (Hansen, 1999, p. 319). The Athenians were also aware of the importance of specialisation and trade for their own prosperity.<sup>21</sup> In recent scholarship, it is increasingly being argued (*pace* Finley and others) that markets and market relationships were important in ancient Greece, in particular in fourth century Athens.<sup>22</sup>

An important caveat for the interpretation of our results is that we should not necessarily expect the same effect (in absolute or relative terms) of a particular institutional set-up across history and across societies. The effect of a particular institution will vary with the overall institutional structure, with level of technological development, sometimes with the institutions in other countries, etc. In principle, this applies to any cross-country comparison – even today – and is an inbuilt limitation of the index approach.

We chose the 340s BCE for our investigation of the institutions in classical Athens, since this is a point in time for which our information is unusually good. Nevertheless, since we argue that institutional quality may have contributed to the growth and prosperity reported for Greece and Athens, one might reasonably ask how the timing of changes in the institutional structure relates to the periods of growth. Causality requires that institutional changes antedate the increases in prosperity.

While a precise answer to the issue of causality is prohibited by lack of data, the overall picture is consistent with institutional change leading to increased living standards. Institutional quality increases over time and so does economic performance. The data presented by Morris on the sizes of houses in ancient Greece is the nearest we come to a relevant time-series for this purpose. All things considered, the size of houses is not a bad proxy for standards of living, though we cannot control for changes in the number of persons living under the same roof. The development of the median size of houses over time is presented in Table 7.<sup>23</sup>

This material clearly suggests that economic growth was more prominent in the later part of the period 800-300 BCE relative to the former part. Using several indicators, Morris (2007) concludes that recovery after the Mycenaean collapse was under way by the eighth century but that the most important economic take off occurred 550-500, with accelerating per capita income in the sixth century and then further in the classical period.

---

<sup>21</sup> Xenophon *Ways and means* 3-4. One important aspect of the increase in trade is of course the influx of labour in the form of slaves, which may be an important factor in the prosperity of ancient Greece and the Athenians. A modern day counterpart could be the migration of Mexican workers to the US.

<sup>22</sup> Cf., e.g., Lyttkens (2010) and references therein.

<sup>23</sup> Following Morris (2007), we focus on the median rather than the mean in order to avoid influence from occasional very large buildings.

**Table 7. Median house sizes in Greece (mainland and Aegean Islands) 800-300 BCE (in m<sup>2</sup>)**

Period	Median	Percentage change in median from previous period	Absolute change in median from previous period
1025-900	70	n.a.	
900-800	43	-39	-27
800-700	51	+28	+8
700-600	49	-4	-2
600-500	70	+43	+21
500-400	149	+113	+79
400-300	230	+54	+81

Source: Adapted from table 8.2 in Morris (2007).

As regards the timing of institutional changes, the security of property rights - arguably the most important institutional factor in this respect – increased for the common people already from the eighth and seventh centuries. When recovery began after the fall of the centralised Mycenaean palace economies, it is striking that there was no return to a strongly centralised society. The society we meet in the Homeric poems is relatively egalitarian compared to the traditional societies in surrounding areas (Egypt, Mesopotamia etc.). Ordinary farmers controlled a relatively large part of their production. Bresson (2007) argues that this was the basis for the sustained economic growth that followed. The security of property rights continued to increase as society coalesced into city-states with written law and jurisdiction that had been taken out of the hand of the individual aristocrat. In Athens, the final step in 462 placed jurisdiction in the hands of popular courts.

Institutions conducive to growth accumulated during the sixth, fifth and fourth centuries, in particular in Athens. Coinage was introduced in the sixth century and probably from the fifth century the Athenian tetradrachms provided sound and stable currency, facilitating trade and specialisation. By the fourth century, weights and measures were standardised and controlled and fraudulent trading is outlawed in the public agora. In Athens, a magistrate had the task of taking

out of circulation any suspect coins. Also, in the second half of the fourth, foreigners in Athens were given the right to appear personally in court in commercial disputes, and foreigners were increasingly given the privilege of owning landed property. The latter changes are often seen as one of the reasons why public revenue in Athens increased to 1,200 talents in the 330s (Burke, 1992). The only problematic institutional change appears to be the risk that the rich were treated unfairly by the popular courts in the fourth century.

One might also ask how Athens of the 340s BCE compares with Athens in earlier times or with other Greek *poleis*. Any such comparison is hampered by lack of both data and qualitative information. However, an educated guess may be permissible. Moving back to Athens before 462 BCE, the year when most of the powers of the Council of the Areopagos were transferred to the Assembly, the Council and the law courts (Raaflaub, 2007),<sup>24</sup> major differences include: legislation and courts were largely in the hands of the elite (score 5 on Items 2a, 2b and 2f?),<sup>25</sup> the size of the trading sector is less impressive (score 7 on Item 4c?), and we doubt one can speak of a credit market (score 2 on Item 5a?). If we add a less well-established position for the tetra-drachms (score 8 on Item 3?), we get a total score of 7.7, which is more like Canada. By and large, we would suspect that similar differences present themselves between Athens of the 340s BCE and the contemporary competitors of the Athenians. However, women were more independent in some *poleis*, notably in Sparta, where on the other hand the male citizens were prohibited from taking part in any kind of economic activity.

Is the outcome of our investigation predetermined by construction? The index favours states with small government, and so one may think that it will inevitably yield a high score for practically any ancient state. This argument has some merit, but it ignores several important aspects. One such is the fact that governments in many that are too small will likely score low on institutional quality because this will leave the power in society with the rich and powerful. This will not, for example, protect the property rights of the common people. Many Greek city-states (typically smaller than Athens) probably had lower institutional quality in the sense of less protection of individual property rights for the poor because the state was too weak.

When we speak of the Athenian success, it should be understood mainly in relative terms, that is, as compared to its competitors in the inter-polis struggle. The lack of citizen rights for slaves, women and those not born of Athenian parents are common features of the time. It also

---

<sup>24</sup> The Areopagos consists of ex-archons, the most important magistrates of the Athenians, who before 457 BCE are selected from the two highest property classes.

<sup>25</sup> Around 700, Hesiod (*Works and Days*: 30-39) complained that the aristocracy gave crooked sentences and violated justice for the lure of gain. It was not until 403/2 that only written law was admitted.



2014-11-07

happens to play a minor role in the Economic Freedom Index. In a more comprehensive evaluation of ancient Greek society, this would obviously have to be considered. Similarly, Scheidel (2010a) notes that when ancient Athens is compared to other historical societies, the Athenians score high on social welfare as long as we restrict our analysis to free adult male citizens, but less so if we include other groups in society. We hope that this example will encourage other scholars to investigate institutional quality in other historical societies such as, for example, the Roman republic.

2014-11-07

## ACKNOWLEDGEMENT

Financial support from The Gyllenstiernska Krapperup Foundation is gratefully acknowledged. We are grateful for helpful comments from the reviewers of JOIE, Nicholas Kyriazis, George Trimadas and the participants at the European Public Choice Society meeting in Rennes 2011.

**APPENDIX:** A tentative overview of public revenues and expenditures in Athens around 350-340 BCE. All figures in talents, rounded off.\*

REVENUE		EXPENDITURE		CATEGORY
<b>Regular</b>		<b>Regular</b>		
Harbor tax	108	Assembly meetings	45	Consumption (C)
Metoikion	45	Assembly expenditure	10	C
Pornikon	15**	Law courts	23	C
Leasing of silver mines	99	Council	15	C
Leasing of other public property	33**	Diobelia	12	Transfer (T)
Fines and confiscations	20**	Theorika	67	T
Minting fees	70	Military expenditure (horses for the cavalry, ephebes, etc.)***	111	C
<i>Eisphora</i>	10	Festivals	72	C
		Public buildings and other Investments	45**	Investments
Total revenue	400	Total expenditure	400	
<b>Informal</b>				
Festival liturgies	25			C
Trierarchies	50			C
<b>Occasional</b>		<b>Occasional</b>		
<i>Eisphora</i>	60-120			
Trierarchies	0-300			
		Subsidised grain		T
Sources: Hansen (1999), Isager & Hansen (1975), Pritchard (forthcoming), own calculations.				

\* This should not be seen as a budget and the list of expenditures is not exhaustive. The Athenians allocated certain sources of revenue to certain purposes. The revenue from the harbor tax was slightly above 36 talents just after the Peloponnesian War (Andokides 1.133-134). We assume here that it was triple that amount in the middle of the fourth century. The head tax for resident foreigners (the *metoikion*) was 12 drachmas per year for males and 6 drachmas for independent females. Nothing is known about the rate at which prostitutes were taxed, and the revenue may have been higher than 15 talents (Lyttkens, 2013, p. 107 and 161 n. 38). Ober (forthcoming) suggests that minting fees brought 35-300 talents per year. From 347/6 there was an annual *eisphora* of 10 talents used to finance the naval station at Piraeus and city fortifications, cf. Brun (1983).

\*\* Just guessing.

\*\*\* Horses and ephebes, see Hansen (1999). Wartime changes: Increased military expenditure, for a total of 552 talents. Revenue raised by special *eisphorai*, reallocation of some peacetime expenditures, increased burden on the liturgists.

## REFERENCES

- Abdiweli, A.M. (2003). Institutional differences as sources of growth differences, *Atlantic Economic Journal*. 31: 348-362.
- Acemoglu, Daron and James A. Robinson (2006). *Economic origins of dictatorship and democracy*. New York: Cambridge University Press.
- Amemiya, Takeshi (2007). *Economy and economics of ancient Greece*. Abingdon: Routledge.
- Andreades, A. M. (1979[1933]). *A history of Greek public finance*. New York: Arno Press.
- Andreau, J. and R. Descat (2011). *The slave in Greece and Rome*. Madison WI: The University of Wisconsin Press.
- Berggren, Niclas and Henrik Jordahl. (2005). Does free trade really reduce growth? Further testing using the economic freedom index, *Public Choice*. 122: 99-114.
- Bjørnskov, Christian; Foss, Nicolai J. (2008). Economic freedom and entrepreneurial activity: Some cross-country evidence, *Public Choice*. 134, 3-4 (March): 307-328.
- Bresson, Alain. 2007. *L'économie de la Grèce des cités. I. Les structures et la production*. Paris: Armand Collin.
- Brun, P. (1983). *Eisphora—Syntaxis—Stratitika. Recherches sur les finances militaires d'Athènes au IV<sup>e</sup> siècle avant J.-C.* Paris: Annales Littéraires de l'Université de Besançon, 284.
- Burford, A. M. (1965). The economics of Greek temple building, *Proceedings of the Cambridge Philological Society*, No. 191: 21-34.
- Burke, E. M. (1992). The economy of Athens in the Classical era: some adjustments to the primitivist model, *Transactions of the American Philological association*. 122: 199-226.
- Chankowski, Véronique. 2005. "Techniques financières, influences, performances dans les activités bancaires des sanctuaires grecs." *Topoi* 12-13:69-93.
- . 2007. "Les places financières dans le monde grec classique et hellénistique des cités." *Pallas* 74:93-112.
- Cohen, Edward E. (1992). *Athenian economy and society. A banking perspective*. Princeton: Princeton University Press.
- Davies, J. K. (2001). Temples, credit, and the circulation of money. In Andrew Meadows and Kirsty Shipton (eds.), *Money and its uses in the ancient Greek world*. Oxford: Oxford University Press 2007, 117-128.
- Davies, J. K. (1971). *Athenian propertied families 60-300 B.C.* Salem: The Ayer Company.
- . (2007). Classical Greece: Production, in: Walter Scheidel, Ian Morris and Richard Saller (eds.), *The Cambridge economic history of the Greco-Roman world*. Cambridge: Cambridge University Press: 333-361.
- Dawson, J. W. (2003). "Causality in the Freedom-Growth Relationship " *European Journal of Political Economy* 19:479-495.
- Dawson, J. W. (1998). Institutions, investment, and growth: New cross-country and panel data evidence, *Economic Inquiry*. 36: 603-619.
- de Haan, J., Lundstrom, S., Sturm, J.E., 2006. Market-oriented institutions and policies and economic Growth, a critical survey. *Journal of Economic Surveys* 20: 157–324.
- de Haan, J. and J-E. Sturm (2000). "On the relationship between economic freedom and economic growth." *European Journal of Political Economy* 16:215-241.
- de Haan, J. and J-E. Sturm (2003). "Does more democracy lead to greater economic freedom? New evidence for developing countries." *European Journal of Political Economy* 19:547-563.
- Deaton, Angus (1995). Data and econometric tools for development analysis, in J. Behrman and T. N. Srinivasan (eds.), *Handbook of development economics, vol. 3a*. Amsterdam and New York: Elsevier, North-Holland: 1785-1882

- Doucouliafos, C., and Ulubasoglu, M.A. (2006). Economic freedom and economic growth: Does specification make a difference? *European Journal of Political Economy*. 22: 60-81.
- Dreher, A. (2006). The influence of globalization on taxes and social policy – an empirical analysis for OECD countries, *European Journal of Political Economy*. 22: 179-201.
- Engen, Darel Tai (2005). 'Ancient greenbacks': Athenian owls, the law of Nikophon, and the Greek economy, *Historia*. 54: 359-381.
- Foxhall, Lin (1992). The control of the Attic landscape, in: Berit Wells (ed.), *Agriculture in ancient Greece: Proceedings of the seventh international symposium at the Swedish Institute at Athens, 16-17 May, 1990*. Stockholm.
- . (2002). Access to resources in ancient Greece: the egalitarianism of the polis in practice, in: Paul Cartledge, Edward E. Cohen and Lin Foxhall (eds.) *Money, labour, and land: approaches to the economies of ancient Greece*. London: Routledge: 209-220
- Gabrielsen, Vincent (1987). The *antidosis* procedure in Classical Athens, *Classica et Mediaevalia*. 38: 7-38.
- . (1994). *Financing the Athenian Fleet*. Baltimore: The Johns Hopkins University Press.
- Glaeser, E. L., La Porta, R., Lopez-de-Silanes, F., and Shleifer, A. (2004). Do Institutions Cause Growth? *Journal of Economic Growth*, 9:271-303.
- Goldsmith, Raymond W. (1987). *Premodern financial systems*. New York: Cambridge University Press.
- Greif, Avner (2005). Commitment, coercion, and markets: the nature and dynamics of institutions supporting exchange, in: Claude Ménard and Mary M. Shirley, *Handbook of new institutional economics*. Dordrecht: Springer: 727-786.
- Gwartney, J., Lawson, R. and S. Norton (2010). Economic Freedom of the World: 2010 Annual Report. The Fraser Institute. Data retrieved from [www.freetheworld.com](http://www.freetheworld.com).
- Gwartney, J., Lawson, R., and Hall, J.C. (2012). Economic Freedom of the World: 2012 Annual Report. The Fraser Institute. Data retrieved from [www.freetheworld.com](http://www.freetheworld.com).
- Hansen, Mogens Herman (1999). *The Athenian democracy in the age of Demosthenes : structure, principles, and ideology*. Norman Bristol: Univ. of Oklahoma Press ; Bristol Classical Press.
- . (2006). *The shotgun method. The demography of the ancient Greek city-state culture*. Columbia: University of Missouri Press.
- Heckelman, Jac C. (2000). Economic freedom and economic growth: A short-run causal investigation, *Journal of Applied Economics*. 3: 71-91.
- Hornblower, Simon (1983). *The Greek world 479-323 BC*. New York: Methuen.
- Isager, Signe and Mogens Herman Hansen (1975). *Aspects of Athenian society in the fourth century B.C.* Odense University Press.
- Justesen, Mogens K. (2008). The effect of economic freedom on growth revisited: New evidence on causality from a panel of countries 1970-1999, *European Journal of Political Economy*. 24: 642-660.
- Kron, Geoffrey. 1996. *Landed and commercial wealth at classical Athens 500-300 B.C.* PhD thesis. Toronto: University of Toronto.
- . (2005). Anthropometry, physical anthropology, and the reconstruction of ancient health, nutrition, and living standards, *Historia*. 54:68-83.
- Lawson, R. A. and J. R. Clark (2010). "Examining the Hayek–Friedman hypothesis on economic and political freedom." *Journal of Economic Behavior & Organization* 74: 230-239.
- Loomis, William T. (1998). *Wages, welfare costs and inflation in Classical Athens*. Ann Arbor: University of Michigan Press.
- Lyttkens, Carl Hampus (1992). Effects of the taxation of wealth in Athens in the fourth century B.C., *Scandinavian Economic History Review*. 40: 3-20.
- . (1994). A predatory democracy? An essay on taxation in Classical Athens, *Explorations in Economic History*. 31: 62-90.

- (2010). Institutions, taxation and market relationships in ancient Athens, *Journal of Institutional Economics*. 6: 505-527.
- (2013). *Economic analysis of institutional change in ancient Greece. Politics, taxation and rational behaviour*. Abingdon: Routledge.
- Melanovic, Branko, Lindert, Peter H., and Jeffrey G. Williamson (2007). Measuring ancient inequality. The World Bank.
- Melton, James (2012). Do Constitutions Matter?: The Relationship between De Jure and De Facto Human Rights Protection. Paper presented at University of Oxford's Conference on Do Constitutions Matter?, Oxford, United Kingdom, June 29, 2012.
- Migeotte, Léopold. 2009. *The economy of the Greek cities. From the archaic period to the early Roman Empire*. London: University of California Press.
- Morris, Ian. (2004). Economic growth in ancient Greece, *Journal of Institutional and Theoretical Economics*. 160: 709-742.
- (2005). Archaeology, standards of living and Greek economic history, in Ian Morris & J. G. Manning (eds.), *The Ancient Economy. Evidence and Models*. Stanford: Stanford University Press: 91-126
- (2007). Early iron age Greece. Ch.8 in Scheidel, W., Morris, I., Saller, R. (eds.), *The Cambridge Economic History of the Greco-Roman World*, Cambridge, Cambridge University Press, pp. 211-241.
- (2009). The greater Athenian state, in: Ian Morris and Walter Scheidel (eds.), *The dynamics of ancient empires*. New York: Oxford University Press: 99-177.
- North, Douglass C. (1981). *Structure and change in economic history*. New York: W. W. Norton & Company.
- (1990). *Institutions, institutional change and economic performance*. New York: Cambridge University Press.
- North, Douglass C. and Barry R. Weingast (1989). Constitutions and commitment: the evolution of institutions governing public choice in seventeenth-century England, *The Journal of Economic History*. 49: 803-832.
- Ober, Josiah (1989). *Mass and elite in democratic Athens*. Princeton: Princeton University Press.
- (2008). *Democracy and knowledge*. Princeton: Princeton University Press.
- (2010). Wealthy Hellas, *Transactions of the American Philological Association*. 140: 241-286.
- (forthcoming). Fiscal policy in classical Athens. In Walter Scheidel and Andrew Monson, *The Fiscal Regimes and Political Economy of Early States*.
- Osborne, Robin (1992). Is it a farm? The definition of agricultural sites and settlements in ancient Greece, in: Berit Wells (ed.), *Agriculture in ancient Greece: Proceedings of the seventh international symposium at the Swedish Institute at Athens, 16-17 May, 1990*. Stockholm: 22-27.
- Pritchard, David (forthcoming). Costing festivals and war in democratic Athens: Athenian funding priorities between 430 and 350 BC, in: H. van Wees et al. (eds.), *The business of state. Public finance in ancient Athens, 594 BC to AD14*. Oxford: Oxford University Press.
- Raaflaub, Kurt A. (2007). The breakthrough of demokratia in mid-fifth-century Athens, in: Kurt A. Raaflaub, Josiah Ober, and Robert W. Wallace (eds.), *Origins of democracy in ancient Greece*. London: University of California Press: 105-154.
- Scheidel, Walter (2010a). Human development and quality of life in the long run: the case of Greece. *Princeton/Stanford Working Papers in Classics*.
- (2010b). Real wages in early economies: evidence for living standards from 1800 BCE to 1300 CE, *Journal of the Economic and Social History of the Orient*. 53: 245-462.
- Skipton, C., and Lawson, R. 2004. Estimating the Size of the Trade Sector: An Explanation of the Methodology Used to Construct Actual and Expected Trade Sector Size for Component 4-C of the Economic Freedom of the World Index. Mimeo.
- Smith, Mol (2007). 42 - *The Answer to Life, The Universe, and Everything*. Onview books.

Snodgrass, A. (1986). Interaction by Design: the Greek City State, in: C. Renfrew and J. F. Cherry (eds.), *Peer Polity Interaction and Socio-Political Change*. Cambridge: Cambridge University Press: 47-58.

### **Ancient sources**

- Aeschines 1, in: *The speeches of Aeschines*, The Loeb Classical Library, London: Harvard UP 1968.
- Andokides 1 (*On the mysteries*), in: *Minor Attic Orators I*, The Loeb Classical Library, London: Harvard UP, 1982.
- Aristotle *The Athenian Constitution*, in: *Aristotle*, Vol. XX, The Loeb Classical Library, London: Harvard UP, 1981.
- Demosthenes 4 (*The First Philippic*), in: *Demosthenes* Vol. I, The Loeb Classical Library, London: Harvard UP, 1989.
- Demosthenes 10 (*The Fourth Philippic*), in: *Demosthenes* Vol. I, The Loeb Classical Library, London: Harvard UP, 1989.
- Demosthenes 59 (*Against Neaera*), in: *Demosthenes* Vol. VI, The Loeb Classical Library, London: Harvard UP, 1988.
- Lysias 30 (*Against Nicomachus*), in: *Lysias*, The Loeb Classical Library, London: Harvard UP, 1976.
- Thukydides I, in: *Thukydides*, Vol. I, The Loeb Classical Library, London: Harvard UP, 1991.
- Thukydides II, in: *Thukydides*, Vol. I, The Loeb Classical Library, London: Harvard UP, 1991.
- Xenophon, *Oeconomicus*, in: *Xenophon* Vol. IV, The Loeb Classical Library, London: Harvard UP, 1979.
- Xenophon, *Ways and means*, in: *Xenophon* Vol. VII Scripta Minora, The Loeb Classical Library, London: Harvard UP, 1984.