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New ways of studying incomes in the Roman economy

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Abstract: This paper very briefly considers three ways of expanding the study of Roman income levels beyond the limits of empirical data on costs and wages, by considering the determinants of real incomes, the use of proxy data for real incomes, and the potential of cross-cultural comparison.

In his contribution to the conference on 'Approaches to quantifying the Roman economy' held at Oxford on September 27, 2006, Dominic Rathbone highlighted many of the problems that undermine modern attempts to reconstruct price and income levels in the Roman world.[1] In my comments, I touch very briefly on three ways of expanding the scope of our studies beyond the limits of the existing and mostly inadequate data on costs and wages, by considering the determinants of real incomes; the use of proxy data for real incomes; and the potential of cross-cultural comparison.

Determinants of real incomes

Real wages are strongly influenced by demographic conditions, given that they tend to be fairly sensitive to deviations from an economic system's equilibrium level of population size. A classic exposition of this principle is provided by Ron Lee's analysis of the correlation of real wages and demographic growth rates in pre-industrial England (Fig. 1).[2] Papyrological evidence from Roman Egypt offers an opportunity to study this relationship in an ancient economy. However, my earlier attempt to explain an apparent increase in real wages (and concurrent drop in land rents) in third-century CE Egypt with reference to population losses incurred in the 'Antonine Plague' of the late second century CE (Table 1) has met with some skepticism due to that fact that even in that region, the available data may be insufficient to test this assumption in a rigorous fashion.[3] These uncertainties, in turn, effectively rule out comparable empirical studies of other, less well documented parts of the Roman empire.

But all is not lost. Even in the absence of reliable or representative wage and price data, it may nevertheless be possible to identify factors that are likely to affect real incomes, and to surmise their probable consequences. In a first step, I have set up a matrix of variables which – judging from comparative evidence – can reasonably be expected to have mediated real income levels in Roman Italy (Table 2).[4] This approach, necessarily fraught with uncertainties about the precise properties and relative weight of each variable, works best in those cases where consistent trends emerge from the record, that is, when all or most factors are either putatively favorable or unfavorable to real income growth. As I have argued elsewhere, this method predicts real income growth at the end of the Republican period and a reversal thereafter. It is true that this model critically

[1] D. W. Rathbone, 'Earnings and costs: living standards and the Roman economy', OXREP conference 'Approaches to quantifying the Roman economy', Oxford, September 27, 2006. This paper is based on my introduction to the session on wages and costs of the subsequent workshop on the same overall topic (held on September 28, 2006). It will also posted on the web site of 'The Oxford Roman economy project' (OXREP).

[2] R. Lee, 'Population homeostasis and English demographic history,' in R. I. Rotberg and T. K. Rabb (eds.), *Population and economy* (Cambridge, 1986), 75-100. For similar as well as different correlations elsewhere, cf. D. S. Reher and J. A. Ortega Osona, 'Malthus revisited: exploring medium-range interactions between economic and demographic forces in historic Europe', in T. Bengtsson and O. Saito (eds.), *Population and economy* (Oxford, 2000), 183-212.

[3] W. Scheidel, 'A model of demographic and economic change in Roman Egypt after the Antonine Plague', *Journal of Roman Archaeology* 15 (2002), 97-114; R. S. Bagnall, 'The effects of plague: models and evidence', *Journal of Roman Archaeology* 15 (2002), 114-120.

[4] W. Scheidel, 'Real income growth in Roman Italy', under review (preprint self-archived at www.princeton.edu/pswpc/).

depends on specific assumptions, most notably about underlying trends in population size, and that significantly different assumptions would occasion substantial revisions. Even so, in as much as modern observers will find it less taxing or hopeless to reconstruct general contextual conditions (such as the ones listed in Table 2) than to measure wages and costs per se, this approach, however conjectural, opens up a new avenue in the study of economic development that allows us to overcome impasse created by the pervasive scarcity of income data.

Proxy data for real incomes

Information on the cost of unfree labor may also shed some light on real incomes in the economy as a whole. Thus, we might conjecture that high slave prices are indicative of high wages overall, or vice versa. Willem Jongman advances this argument in his chapter on consumption in the early Roman empire for the forthcoming *Cambridge economic history of the Greco-Roman world*, arguing that the substantial manumission premiums recorded at Delphi point to fairly high nominal as well as real wages for non-slave workers.[5] We must bear in mind that much of this argument hinges on the representative nature of these freed slaves: if they were atypical – i.e., more highly skilled or otherwise more privileged than the average slave –, their fees need not tell us a great deal about basic income levels. Moreover, my own survey of slave prices and free wages reveals further complications: broadly speaking, it appears that slaves in classical Athens were rather cheap (relative to wage levels), whereas in Roman Egypt (and probably in other parts of the empire as well) they were relatively more expensive (Table 3).[6] This suggests that the relationship between slave prices and wages was more complex and mediated by secondary factors such as turnover risk, i.e. the stability of labor markets.[7] Nonetheless, at least in principle, this indirect approach once again permits us to extend our studies beyond the narrow confines of existing data sets on wages.

Comparative evidence

In his paper, Rathbone raises the question of how the salaries of Roman government officials compared to those of Han China. A simple comparison shows dramatically higher levels of income as well as inequality among Roman imperial functionaries (Table 4). In the first century CE, the top Han officials – the 'Three Excellencies' and the Regent – received some 63 tonnes of wheat equivalent per annum, or perhaps closer to 100 tonnes including the emperor's annual gifts. This compensation amounts to maybe 5 per cent of the annual pay of top proconsuls in the Principate or the praetorian prefects in late antiquity. The next-most-senior Han functionaries – the 'Nine Ministers', functionally equivalent to the top procurators of the mature Principate – received 32 or perhaps rather 50 tonnes of wheat equivalent, about a tenth of the annual income of their Roman

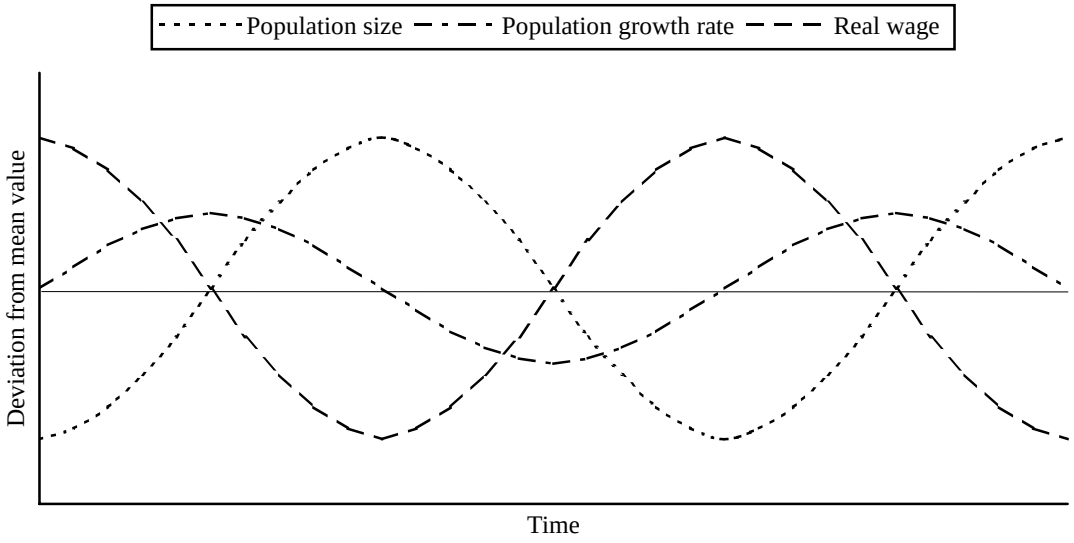
[5] W. Jongman, 'The early Roman empire: consumption', in W. Scheidel, I. Morris and R. Saller (eds.), *The Cambridge economic history of the Greco-Roman world* (Cambridge, 2007, in press).
[6] W. Scheidel, 'The comparative economics of slavery in the Greco-Roman world', in E. Dal Lago and C. Katsari (eds.), *Slave systems, ancient and modern* (Cambridge, 2007, in press), based on data discussed in W. Scheidel, 'Real slave prices and the relative cost of slave labor in the Greco-Roman world', *Ancient Society* 35 (2005), 1-17.
[7] Discussed in Scheidel, 'Comparative economics' (n.5).

counterparts. The Han equivalent of a Roman provincial governor was paid some 22 tonnes, around one-fifth of the income of the most junior Roman procurators, and similar to the base pay of a mere Roman centurion: this is remarkable given that the average Han governor was in charge of half a million people while a centurion commanded only 80 soldiers. Han officials in charge of *civitas*-sized districts received significantly less than a Roman centurion.

Not only were real salaries much higher in Rome, but wage compression was much more pronounced in China: the income ratio between a Chinese district administrator and the most senior state official was only 1 to 6 or 8, compared to a ratio of 1 to 17 or 18 between a junior procurator and a top senator or between a provincial military commander and a praetorian prefect. We may conjecture that the much greater degree of stratification in Rome may have been a legacy of its oligarchic tradition that channelled benefits to its ruling class. This comparison furthermore suggests that owing to these income differences, the numerically more limited bureaucracy of the Later Roman Empire (of some 30,000 officials) need not have been less expensive overall than the much more numerous Han bureaucracy.[8] This, in turn, raises the possibility that at least *in terms of cost*, the mature Roman empire cannot necessarily be regarded as less bureaucratized than the Han state. This last example takes us beyond the issue of wages and costs in the Roman empire but shows how direct and indirect evidence for income levels can be used to generate new insights outside economic history as well.

[8] C. Kelly, *Ruling the later Roman empire* (Cambridge MA, 2004), 111 and 268 n.9; M. Loewe, 'The structure and practice of government', in D. Twitchett and M. Loewe (ed.), *The Cambridge History of China*, I, (Cambridge, 1986), 466 (120,285 officials at the end of the Western Han period, prior to staffing reductions at the beginning of the Eastern Han dynasty).

Figure 1: Model of population regulation driven by exogenous change in the population growth rate



Source: R. Lee, 'Population homeostasis and English demographic history,' in R. I. Rotberg and T. K. Rabb (eds.), *Population and economy* (Cambridge, 1986), 75-100

Table 1: Standardised index of real wages in Roman Egypt (2nd c. CE = 100)

Ratio	Period	Mean	Median
Daily wage/wheat	2nd c.	100	100
	3rd c.	121 (111)	102
Monthly wage/wheat	2nd c.	100	100
	3rd c.	115	134
Daily wage/wine & oil	2nd c.	100	100
	3rd c.	147 (134)	134
Monthly wage/wine & oil	2nd c.	100	100
	3rd c.	134	156

Source: W. Scheidel, 'A model of demographic and economic change in Roman Egypt after the Antonine Plague', *JRA* 15 (2002), 97-114

Table 2: Proxy variables for assessing the probability of real income growth in Roman Italy (favorable conditions in *italics*)

	300-200 BC	200-100 BC	100-30 BC	30 BC-
Demographic attrition	*High*	Moderate	*High*	Moderate
Geographical mobility	Moderate	Moderate	*High*	Moderate
Net free population growth	*Stagnant*	Moderate	*Stagnant*	Moderate
Net expansion of slavery	*Increasing*	*Strong*	*Strong*	?Stagnant
Redistribution	Moderate	Moderate	*Strong*	Moderate/low
Commercial development	Moderate	*Strong*	*Strong*	Slowing
Tributary inflows	Low	*Growing*	*Growing*	Shrinking
Preconditions for, and indices of, real income growth	mixed	mixed	good	poor

Source: W. Scheidel, 'Real income growth in Roman Italy', under review (preprint self-archived at www.princeton.edu/pswpc/)

Table 3: Regional variation in real slave prices in the Greco-Roman Mediterranean (male and female; in wheat equivalent)

Context	Wheat equivalent (in tonnes)		Unskilled rural labor
	Range	Rough mean	(in years)
(Delphi		)	
(2nd c. BC	?<3.5-4.7	?<4)	
(1st c. BC	?<3.8-7.2	?<5.5)	
Italy (1st/2nd c. AD)	2-9	5.5	
Roman legal (2nd/3rd c. AD)	3-7	5	
Egypt (2nd/3rd c. AD)	[3.5 or] 4.-4.5	4	3
(Levant, 2nd c. AD		similar?)	
(Dacia, 2nd c. AD		similar??)	
(Dura, 3rd c. AD		similar?)	
Price Edict (AD 301)	(2.5-3?)	(2.5-3?)	(2-2.5?)
Roman empire (1st-3rd c. AD)		~ 4 (+/- 50%)	
Classical Athens (5th/4th c. BC)		~ 1.2-1.6	0.3-0.5

Source: W. Scheidel, 'The comparative economics of slavery in the Greco-Roman world', in E. Dal Lago and C. Katsari (eds.), *Slave systems, ancient and modern* (Cambridge, 2007, in press)

Table 4: Annual salaries in the Roman and Han empires (in tonnes of wheat)

	Rome	Eastern Han	Ratio
Top official	1,700-2,000	63 (?100*)	20 : 1
Very senior administrator	500	32 (50*)	10 : 1
Governor	?	22	
Provincial military commander	110	22	5 : 1
City head	-	13-16	
Centurion / captain	20	12.6	1.5 : 1
Ratio	100 : 1	8 : 1	

* including annual gifts

Source: D. Rathbone, 'Earnings and cost: living standards and the Roman economy', OXREP paper September 27, 2006; H. Bielenstein, *The bureaucracy of Han times* (Cambridge, 1980)