P. TEMIN, *THE ROMAN MARKET ECONOMY*. Princeton: Princeton University Press, 2013. Pp. xiv + 299. ISBN 9780691147680. £24.95/US$35.00.

Recent work on the Roman economy has been driven by controversy about the rôle of empire in growth and integration: was economic expansion primarily sustained by fiscal and rentier demand and predation or by market forces unleashed by imperial peace? Both factors were undoubtedly influential but their relative significance remains contested. A seasoned economist operating from a neo-classical perspective tempered by at least some appreciation of institutional constraints, Temin enters the fray with gusto and verve by emphasizing the market dimension of the Roman economy. His key claim is that 'there were enough market transactions to constitute a market economy, that is, an economy where many resources are allocated by prices that are free to move in response to changes in underlying conditions' (6), on a scale comparable to other pre-modern market economies such as England and the Netherlands. T.'s book develops this proposition in three parts that deal with prices, markets in different goods, and growth and GDP.

In keeping with social science principles, T. seeks to devise testable hypotheses to make his case. Drawing on six grain prices from different parts of the Empire dating from the mid-second century B.C. to the late first century A.D. and crude geographical metrics, he argues that prices were inversely correlated with distance from Rome, a city whose massive demand he deems to have determined prices elsewhere *if* there was sufficient market integration. Unfortunately, this turns out to be a poor test case: price denominations from different centuries should not be treated as equivalent and the real cost of grain transport via different media does not in fact yield the correlation observed by T. (as I show in *JRA* 27 (2014); for other problems, see G. Bransbourg, http://dlib.nyu.edu/awdl/isaw/isaw-papers/3). More suitable evidence would have been available. Slave prices appear consistent with the notion of a unified market for these mobile high-value goods that could readily be traded over long distances. One might also ask whether the growing geographical peripheralization of Roman military recruitment was a consequence of fixed nominal army wages across the Empire. In the future, geospatial and agent-based modelling promise novel opportunities for testing assumptions about the principal determinants of economic exchange. The much more abundant grain prices from Hellenistic Babylon studied by T. provide stronger support for the importance of price-setting markets: this material is bound to be of interest to students of ancient Mediterranean economies. Perhaps less rewardingly, T.'s chapter on price behaviour in the Roman Empire above all succeeds in highlighting the intractable difficulties in accounting for monetary inflation from the late second century A.D. onward.

The chapters on labour markets and financial intermediation are the most engaging contributions in the second section. However, T.'s hyperbolic claim that the Roman world was endowed with 'a unified labour force' (114) is not borne out by the evidence adduced: moderate levels of nominal or real wage dispersion across the Empire do not support this scenario unless there is a credible counterfactual scenario that could disprove it, an alternative which T. fails to develop and which does not actually seem historically feasible. Low wage dispersion may just as well have been the result of broadly similar levels of regional development — common in agrarian societies — combined with a unified market in precious metals and the absence of exotic local land/labour ratios that might have supported much higher real wages. Conversely, T.'s conceptualization of Roman slavery in terms of labour market relations is stimulating: institutionally, the Roman slave system was well equipped for rewarding obedience and skills with positive incentives (through compensation or manumission), as his explicit comparison with much more restrictive New World slave regimes makes abundantly clear. Yet T. glosses over his second precondition for the presence of a labour market — workers' freedom 'to change their economic activity and/or their location' — which does not readily apply to Roman-style chattel slavery (even though the implicit bargaining tool of flight might profitably have been analysed in these terms). He also neglects to consider whether the conspicuous accumulation of human capital in the domain of skilled slave labour depressed wages and interfered with market mechanisms. In ch. 8, a comparative perspective leads T. to conclude that in some respects Roman financial institutions rivalled or surpassed those of eighteenth-century England, the Netherlands and France, an index of sophistication unavailable to conventional 'within-case' studies of Roman conditions.

In the third part, T. offers a short primer on growth theory and very helpfully sets out a Malthusian framework for the study of Roman economic development, a perspective that has been receiving growing support from recent studies of trends in real wages and body height. In the final chapter, T. retreats from his earlier minimalist estimate of Roman GDP.

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T.'s book frequently improves on his earlier articles from which it is largely derived. The deplorable fact that ancient historians continue to neglect social science approaches makes his intervention all the more welcome. T.'s main contribution lies in his repeated insistence on formal model testing and comparative historical analysis. The occasional misstep should not tempt ancient historians to dismiss Economics altogether. As T.'s own previous collaboration with D. Rathbone suggests, the future may well lie not so much in more single-authored contributions by economists but in more direct collaboration and joint publication across disciplines.

*Stanford University* WALTER SCHEIDEL
scheidel@stanford.edu
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A. BOWMAN and A. WILSON (EDS), *THE ROMAN AGRICULTURAL ECONOMY. ORGANIZATION, INVESTMENT AND PRODUCTION*. Oxford: Oxford University Press, 2013. Pp. xvii + 333, illus. ISBN 9780199665723. £75.00.

This third volume of Oxford Studies on the Roman Economy contains a substantial introduction by the editors and nine papers on different aspects and areas of agricultural production in the Roman world in the period *c.* 100 B.C. to A.D. 350. Kehoe's brief survey of the state's impact on agricultural production focuses on tenancy arrangements, especially the Mancian regulations in North Africa and fourth-century rules about loans to private farmers. His argument for a policy of protecting small farmers is optimistic because, as he also demonstrates, the primary aim of these rules was to protect state revenues. The unexamined reverse of the coin is Rome's peculiarly strong ideology of private ownership, which favoured the growth of large private estates whose élite owners lobbied effectively for increasing exemptions from civic burdens.

The other eight papers all adopt a quantitative approach. Three analyse the results of regional field surveys. De Vos summarizes the findings of a survey project around Thugga in the Medjerda (Bagradas) valley of Tunisia, chosen for its epigraphy of imperial and private estates, including the Mancian and successor 'laws', to which the survey has added important new finds. Although the rich data invite other questions, she concentrates on the emergence of large tenant-based estates, which she assumes represent productive investment. Particularly striking is the now precise delineation of the estates of the Statilii and the Passieni, which were subsumed under Nero into a large imperial estate. I suspect, however, that they were imperial properties from the 30s B.C., assigned as gift-estates to Statilius Taurus and the younger Sallust until reclaimed from their descendants, and that the Mancian regulations were attempts to maintain land in production against a chronic tendency to abandonment. Goodchild argues the merits of GIS-modelling of ancient landscapes using the example of the middle Tiber valley. Potentially the ability to map material findspots ('sites') onto land-types systematically and in detail is exciting, even if Goodchild modestly calls it no more than enhanced site-catchment analysis. The problem remains our dependence on ancient data: apart from the huge issue of the categorization of 'sites', the agronomists are unreliable — e.g. Goodchild cites Varro 1.44.1 and Columella 2.9.1 on sowing ratios, although they are contradictory. Friedman's analysis of survey data from the Wadi Faynan (Jordan, third–fourth century) shares the unhappy reliance on written 'facts', but presents a fascinating, if speculative, micro-story of mining stimulating agriculture and then destroying it by pollution.

Another trio of papers investigates the diffusion of technology. Marzano notes that although only 44 of the 338 'élite villas', and another 96 'farms', known in the hinterland of Rome have produced secure evidence of wine- or oil-presses, this should not undermine De Sena's argument from amphora studies for extensive wine and oil production in that area. In her second paper she collates and discusses the data for multiple presses in Gaul, Spain and the Black Sea area, which she finds peaked in the later first to second centuries. Wilson and Malouta study the Roman use of water-lifting machines, based on an analysis of documentary references from first- to seventh-century Egypt set in the context of a wider selective survey of archaeological evidence. This conclusively shows that there was widespread use of various types of water-lifting machines long before the Islamic period (but equally dense or not?), with an apparent peak in the long second century and then again in Byzantine Egypt. The questions which all three papers raise are specificity and significance of the surviving data. Lever-presses, with their unmistakeable material footprint, and especially multiple presses, were arguably linked to a phase of mass production of