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The Malthus delusion

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Greg Clark is a master of the art of using one-liners in telling stories and *Farewell to Alms: A Brief Economic History of the World* is no exception. It offers the Malthusian hypothesis of population growth leading to misery as an all-purpose vehicle for all human history, except for the last 200 years. However,

his Malthusianism is at times more evangelical than empirical and analytical. He dismisses Angus Maddison's painstaking efforts (e.g. Maddison 2001, 2003) at providing an empirical basis for long-run income estimates (p. 19) as inconsistent with the *logic* of the Malthusian economy. When the historical record contradicts Greg Clark it is not allowed to stand in the way of his noble aim and declared intention of writing *big history*. At least in one respect he has succeeded: this book is the widescreen version of the Postan Thesis, although M. M. Postan (1966, 1972) is remarkably missing in the credits. The book is also big in rhetorical gestures, starting with the title, and a reader must be forgiven for occasionally asking whether the author should be interpreted literally, or whether statements should simply be deflated by common sense. I have decided to go nominal on Clark.

1. A brief introduction to Clark's world

1. *On humans and plants*. 'Before 1800 there was no fundamental distinction between the economies of humans and of other animal and plant species'. (p. 32)
2. *On the Malthusian equilibrating mechanisms and the endogeneity of income*. '...short term gains in income through technological advances were inevitably lost through population growth.' (p. 1) 'But the increased income reduced the death rate, births exceeded deaths, and population grew. The growth of population only ended when income returned to subsistence.' (p. 29)
3. *On long term evolution of per capita income*. 'The average person in the world of 1800 was no better off than the average person of 100,000 BC' (p. 1); '...according to the broadest measure of material life, average welfare, if anything, declined from the Stone age to 1800'. (p. 2, see also p. 19); 'Thus while inequality could not make the *median* person better off in the Malthusian world, it could raise *average* income per person.' (p. 36, my italics)
4. *On technology and income*. 'Before 1800 technological advances in all economies were so low that income could not escape the Malthusian equilibrium.' (p. 30); 'In the millennia leading up to 1800 there were significant improvements in production technologies, though these improvements happened slowly and *sporadically*'. (p. 29, my italics)

2. Plants and equilibrium

One of the major flaws of the Malthusian hypothesis, true to the original and as it is presented by Clark, is that it lacks a micro-foundation in human optimizing behaviour. The analogy between humans, other animals and plants endorsed by Clark highlights this. However, it is well known,

and admitted by Clark, that humans do in fact indirectly or directly make fertility decisions. No known society of humans in the past reproduced at the biological maximum, and the marriage rate and age at marriage responded to economic prospects, specifically so in western Europe in the pre-industrial era. Restraints on fertility thus vary over time but usually through the intermediation of marriage patterns, which is effective since births out of wedlock were low in the past. Clark denies that these responses are the result of rational choice of households and instead refers to 'social customs'. However, social customs are but behavioural regularities. (Do plants have 'social customs'?) Behaviour is often directed by a 'rule of thumb', that is an automatic response to a recurrent event identified as 'typical'. You can think of people relying on automatic responses to recurrent events as a means of saving on decision costs. That does not make decisions less rational. In periods of transition, when what is *typical* is changing and when the rule-of-thumb response is becoming inadequate, an established rule of thumb can become obsolete and irrational, but eventually new rules will replace the old.

A priori it is difficult to sustain the idea that modern man is capable of rational behaviour while pre-industrial man was not. The time that has elapsed between pre-industrial, say, pre-1800, and modern times is certainly too short for evolutionary forces to have an impact on human faculties in this respect.

Once it is accepted that humans are capable, unlike plants and most other animals, of abstract thinking, of planning for the future and of taking precautionary action, the existence and outcome of Malthusian equilibrating mechanisms become less clear. The claim that an income increase would necessarily spill over into an increase in the *number* of children born entails an arbitrary restriction on the choice set of households.¹ Why would the household spend the income on *more* children rather than *fewer* and *better* children or on other goods? Malthusians do not have a good answer to that question, but have to rely on 'animal spirits'. Treating all societies as likely candidates for the Malthusian predicament is also unsatisfactory. Pre-industrial western Europe seemed, by and large, better at equating the private

¹ Sophisticated Malthusianism as developed in 'unified growth theory' explicitly acknowledges that households have utility functions over quality *and* quantity of children. It is argued that demand for and rewards to human capital in modern economies are triggered by high rates of technological progress that make households choose quality rather than quantity. In the absence of technological progress, quantity dominates over quality of children. Clark does not think that the theoretical expectations are corroborated by the historical record, however (see pp. 223–9). Besides, pre-industrial economies had quite substantial skill premia. There is also a theoretical objection to the otherwise ingenious construction in 'unified growth theory'. Acknowledging that households are capable of planning for the future, why would they, if in a state above subsistence, deliberately choose to increase the number of children, which lowers expected income in the future, instead of investing in the skills or wellbeing of their offspring and keeping an above subsistence income? Slightly perverse preferences, in my view. See Galor (2005).

and social costs of population growth. Excessive population growth is mostly a problem where private costs are smaller than social costs.

After having developed the irresistible logic and general applicability of the Malthusian hypothesis in the first chapters of the book, Greg Clark then turns to an empirical verification on the basis of English demographic and income data from the sixteenth to the seventeenth century. A lot of people have tried to do that before him, and have failed. Clark applies simple and crude statistical methods, but it does not help. He has to admit that there is *not* a significant response of fertility to income although the sign is right (p. 82) and mortality has, if anything, the wrong, but insignificant, sign (p. 96). The end of big history? No! Clark does not surrender. Facts are not allowed to kill big history. Instead he chooses to bolster up the Malthusian hypothesis with reference to *cross section* data. This is not convincing. Malthusian equilibrating forces are about time: income above subsistence is supposed to increase fertility and depress mortality, and population growth is supposed to depress income because of diminishing returns until the economy settles at the subsistence equilibrium. There is in fact a vast literature (e.g. Bailey and Chambers 1994; Lee 1973, 2003; Weir 1984) which by and large is unable to corroborate the existence of the long-run Malthusian equilibrium.² These results were established early on and recent studies have added econometric sophistication and robustness. Clark cannot be unaware of this large body of work but he chooses to ignore it, apart from a footnote reference to David Weir's 1984 paper. One important implication of the Malthusian hypothesis is that demographic variables and real wages must be endogenous: real wages drive population growth, but the opposite is also true, since the population is supposed to depress real wages. This has led recent econometric studies (e.g. Nicolini 2007; Møller and Sharp 2008) to make use of the VAR model which, when unrestricted, assumes that all variables are endogenous in a stationary system. An important point, however, is that if variables are sufficiently persistent, then it is not possible to assume stationarity. Shocks to the system imply *at best* a very gradual return to the Malthusian equilibrium. It has been recognised in the literature that demographic interactions are extremely persistent. And yet without stationarity, the Malthusian equilibrium simply cannot exist. *Big history* is belittled.

3. What happened to income in the long run?

As should be clear from the series of quotes above (point 3), Clark is not entirely clear about what happened to per capita income. Having first

² It is worth quoting Lee and Anderson's (2002) concluding remark in a recent article: 'As for the vital rates, we have found that most of the long-term changes in fertility and mortality was non-Malthusian in origin (that is unrelated to changes in wages), and instead was a response to other influences such as weather, disease, or institutional change.'

declared that average income did not change or even fell over time, he concedes that average income increased while *median* income did not. In principle median income can remain constant despite an increase in average income, but only given special assumptions about income distribution. Since we have little information on income distribution, it is very difficult to discuss what happened to median income and I will therefore concentrate on average income or GDP per capita.

Malthusian theory suggests that population growth will suppress wages. Technology will not alter that trajectory; it will only increase the level of population. Can we corroborate that statement? Before answering that question we should dwell a little on the timing of diminishing returns. Surely diminishing returns could not be a problem around the Neolithic revolution when the world had some 8 million inhabitants. Did it set in during the Roman empire when the world had some 250 million inhabitants or later at the time of Malthus when world population had almost reached 1 billion? Proclaiming the Malthusian hypothesis as valid for all times seems to imply that the land constraint has always been binding, which surely is not plausible. At the present population level of almost 8 billion it is estimated that some 80 to 90 per cent of cultivable land is actually cultivated. By implication the Malthusian subsistence equilibrium must be associated with fairly recent (eighteenth- and nineteenth-century Europe?) periods of land shortage and if anything income per capita should fall over time.

Clark presents evidence relating to real wage data from England, but also from other parts of Europe where available. His English data indicate an increase after the Black Death, a fall setting in during the Little Ice Age (beware of global cooling!), and a gentle rise after the mid seventeenth century when population had reached pre-Black Death levels. Clark maintains that real wages stagnate during the Industrial Revolution.

Is this the ultimate proof of the Malthusian hypothesis? Not really. Real wages are not a good indicator of real GDP per head because real wages are very sensitive to changes in income distribution. In fact Clark argues (sometimes) that average income is increasing in agrarian economies but that the increase is not helping the working classes out of poverty because of the exploitation by the ruling landowning elite. That gives a Marxian twist to the Malthusian story, but it is not entirely consistent. People now remain poor even if technological improvements make them produce more because they are ripped off by the landowners. If so, people are not driven into eternal poverty by their irresistible drive to increase in numbers as Malthus originally suggested.

The swings in real wages might reflect changes in the bargaining position of workers. The fall in population after the Black Death improved the bargaining position of farm-workers, but that favourable position was later eroded when the plague retreated, permitting population growth to pick up. However, the fall in real wages by the end of the sixteenth century is still

not fully understood. It might simply be the effect of the negative climate change, global cooling. We know that a fall in summer temperature has a disproportionately large negative effect on grain yields. A lot more research on the determinants of real wages is called for.

Estimates of income per head give a different picture and explicitly address the question of whether subsistence income was the rule in pre-industrial economies. That does not seem to be the case. Let us first begin with some estimates of income per head in the Roman era. It is of course a remarkable civilization with high urbanization ratios and a vast array of urban skills. It turns out that even conservative estimates indicate income per head well above subsistence minimum. Expressing income per head in international (1990) dollars (\$PPP), as has become the convention, the biological subsistence is about 355\$PPP, while a more convenient adjusted subsistence concept is suggested at 400\$PPP. Roman-era income estimates are sensitive to estimation methods, but even the most conservative estimate suggests an income more than twice the adjusted subsistence income, and more optimistic estimates land at four to five times the subsistence income (Milanovic 2006; Goldsmith 1984).³ Income fell considerably with the disintegration of the Roman empire and the fall in population and urbanization. Europe probably did not reach similar income levels until the end of the Middle Ages. Using Gregory King's social tables (1688), Milanovic, Lindert and Williamson (2007) find that income per head is close to Maddison's estimate at about 3.5 times the adjusted subsistence income, or 1,400\$PPP. Income in the Netherlands is generally considered to have been higher than in England, at least until the mid eighteenth century.

These numbers indicate persistent income per head well above subsistence minimum, and this is of course consistent with the fact that population growth has been positive. The question remains whether these income estimates can be supported by independent data. The most obvious alternative is to look at changes in the proportion of non-food-producing people in the population. Medieval and early modern Europe had city populations composed of the elite and urban professionals such as bankers, doctors, playwrights and comedians, lawyers, traders and, of course, artisans of all kinds. It is convenient to take the urbanization ratio as an approximation of the relative size non-food-producing sector. In a closed economy initially living at the subsistence level any increase in the urbanization ratio must be linked to an increase in income of the agrarian producers. It is possible to make precise estimates of the implied income change from a change in urbanization and to control for changes in income distribution and net

³ Branko Milanovic published a working paper in 2004 available from his homepage, with a larger set of estimates than the journal version from 2006, same title. Using Goldsmith's estimates of the purchasing power of the average income at contemporary Roman prices yields an estimate of Roman per capita income around 1,700\$PPP.

import of food. In an earlier paper I derived a formula from the national income identity which controls for changes in net import of food and changes in income distribution (Persson 1991). The better the elite is at expropriating the producers, the higher is the implied productivity increase than an increase in the urbanization ratio.

Imagine an economy with an initial urbanization rate at 5 per cent increasing to 20 per cent, which was much below the most sophisticated economies in Europe, such as England and Holland on the eve of the Industrial Revolution. Assume furthermore that the ratio of urban (including the elite) to rural per capita income, which was initially 2, increased to 4, and that the income elasticity of demand for food was 0.4. These numbers are a plausible description of what was going on in many parts of Europe after the revival in the eleventh century and onwards. The implied increase in agrarian labour productivity would be more than three-fold. Had the economy met part of the increased demand for food through imports, the implied increase would have been less: it would have risen by a factor of 2.2 if imports constituted 10 per cent of total food production. The proposition that average income was constant is simply inconsistent with known facts of the persistent high level of urbanization in pre-industrial Europe, and the fact that the level was rising in several parts of Europe.

4. The Malthusian subsistence equilibrium is a special case

I have no argument with Greg Clark regarding the *speed* of pre-industrial productivity change. It was slow, but was it sporadic and erratic as he maintains? I will argue that even when technological progress is slow, it can be *permanent*, and it matters whether it is permanent or not. For my *Pre-Industrial Economic Growth* (1988), Peter Skott (then at the University of Copenhagen, now at Amherst) and I developed a model which had the Malthusian demographic responses to income and Ricardian diminishing returns. However, we allowed for *permanent* technological progress. The background for the modelling was the dissatisfaction with the traditional Malthusian hypothesis and its prediction of economies at subsistence level with stagnating population, such as were nowhere to be found in second-millennium Europe. The most enduring empirical findings from pre-industrial Europe were that population was growing – except for periods with exogenous shocks such as the Black Death – and that per capita income hence was above subsistence and differed substantially between economies. There were irrefutable signs that a few economies managed to increase average income over time slowly, for example the Netherlands, while others remained at a constant above subsistence income with positive population growth for centuries, for example Italy.

That was the motivation. The model we developed became general in the sense that it entailed the traditional Malthusian hypothesis as a possibility,

but also allowed for the observed variety of pre-industrial experiences in Europe.

Here is the storyline: imagine an economy which is in a Malthusian equilibrium and experiences a technological shock so that there is a *permanent* positive rate of technological progress. It turns out that this economy would settle at a permanent, above subsistence, equilibrium income with positive population growth. Technological progress would simply match the forces of diminishing returns. A shock to a higher permanent rate of technological progress – other things equal – would lift the economy to a permanently higher level of income and population growth. Needless to say, this model entailed the conventional Malthusian hypothesis, which Clark believes is *big history*, as a special, *very special*, case with non-persistent income increases.

What makes this general model attractive is of course that it fits the current empirical and econometric critique of the Malthusian hypothesis, referred to above, since it actually demonstrates that an income increase need not be transitory but persistent.

Peter Skott and I worked on this in 1985/6 and did not, unfortunately, think of making technological progress endogenous. Observing, as we did, that densely populated areas seemed to have higher income and productivity levels, it would have made sense to link the rate of technological progress to population as has been done recently in New Growth Theory. That would have turned the Malthusian story upside down and focused on what really constrains pre-industrial economies: slow technological progress, which might be stimulated by population growth!

Big history relies on simple stories. It not big history we need but better history.

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