THE MALTHUSIAN TRAP

'For nation shall rise agains nation, and kingdom against kingdom: and there shall be famines, and pestilences, and earthquakes, in diverse places. All these are the beginning of sorrow.'[1] Thus in the melodious words of the Jacobean translation of the gospel, the state of a humankind hammered on the anvil of pain was realistically described. This book is about one aspect of the unexpected and unprecedented escape from that world, a transformation which has for the first time set certain parts of the human race free from much pain and the fear of early death.

As we stand at the end of the twentieth century we see a world in which many millions have escaped from a daily fear of war, famine and disease. For the privileged living in parts of Europe, America and Asia, there is wealth and stability undreamt of by peoples in most civilizations. It is easy to assume that because this has happened, it had to happen. Yet when we regard the many millions who are still trapped in poverty and disease and the fear of war, and when we remember that the escape into relative security has only occurred within the last two hundred years, we are reminded that things are not that simple. In order to gain a full sense of how unlikely the events which unfolded were it is helpful to go back to the writings of a man who stood at the transition point between the old world and the new.

In 1798 Thomas Malthus published his **Essay on the Principles of Population**. In this short essay, and in the greatly expanded second edition of 1803 and other writing, he laid out the reasons why agrarian civilizations were trapped in misery. Alongside Adam Smith's **Wealth of Nations**, it is the clearest analysis of the structural tendencies of **ancien regime** societies and their intrinsic limits to growth.

Very briefly, the Malthusian theory is as follows. Malthus drew attention to three facts. The first is that human beings are very strongly motivated by a desire for sexual intercourse, or, as he wrote, 'the passion between the sexes is constant' and very strong. 'The passion between the sexes has appeared in every age to be so nearly the same, that it may always be considered, in algebraic language, as a given quantity.'[2] All else being equal, men and women will mate as soon and as frequently as possible after puberty. If such mating is only permitted within marriage, 'such is the disposition to marry, particularly in very young people, that, if the difficulties of providing for a family were entirely removed, very few would remain single at twenty-two.'[3]

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[1] Matthew, 24:7-8.

[2] Malthus, Population, 1, 312

[3] Population, ii, 52

The second fact is the high fertility of humans and other animals. He wrote that 'In taking a view of animated nature, we cannot fail to be struck with a prodigious power of increase in plants and animals.'[4] If this high fertility is combined with a reasonable rate of mortality, such early and frequent mating will lead to rapid population growth. He cited examples of populations which had doubled in twenty years or less. In fact, he deliberately erred on the conservative side. As Sauvy points out, 'a population not practising contraception and benefiting from present-day medical science could in an extreme case double in thirteen years...'[5] This is because of the natural fecundity of human beings, which is again summarized by Sauvy. 'If a couple comes together at puberty, stays together until the woman's menopause, and has no recourse to contraception, its average number of children will be about ten. In a population living in the best possible conditions this would probably increase to twelve.'[6] As Petersen describes it, 'If a woman married at age 15 and, throughout her fecund period, had the same number of children that Hutterites do in each age interval, she would bear an average of 12.6 children during her lifetime.'[7] Benjamin Franklin gave an example from America. He thought that in New England, there were on average eight births per family 'of which, if one half grow up, and our marriages are made, reckoning one with another, at twenty years of age, our people must at least be doubled every twenty years.'[8] Numbers can thus easily double in each generation and this means that by 'geometrical' or exponential growth, a vast population will build up very quickly. It has only taken 32 doublings of population to reach the present world population from the supposed mating of Adam and Eve.

The third 'fact' is that economic resources, and in particular food, cannot keep pace with this population growth within a basically agrarian economy largely dependent on human labour. This is due to the law of diminishing marginal returns, which, along with Ricardo, Malthus invented. While there may be periods when rates of growth in agriculture rise to three or four percent **per annum**, which is equivalent to a doubling of food in a generation, such periods cannot be sustained for more than a few decades.

The result of these facts was a powerful tendency for population to outstrip resources. 'Population, when unchecked, increases in a geometrical ratio. Subsistence increases only in an arithmetical ratio. A slight acquaintance with numbers will show the immensity of the first power in comparison of the

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[4] Malthus, Summary, 223

[5] Sauvy, General, 410

[6] Sauvy, General, 349

[7] P etersen, Malthus, 65

[8] Franklin, Writings, 2, 313

second.'[9]The tendency of population growth is much more powerful than man's productive power. 'Assuming then my postulata as granted, I say, that the power of population is indefinitely greater than the power in the earth to produce subsistence for man.'[10] Whenever there is a respite for man in the form of windfall benefits or other increases of resources, the population will rise to absorb them and indeed over-shoot the mark. There is the 'tendency in population to keep pace with the means of subsistence.'[11]It has 'this constant tendency to increase beyond the means of subsistence.'[12]Malthus noted the 'comparatively rapid increase which has invariably taken place' whenever there has been an increase in the means of subsistence.[13] History bore witness to this. 'That population does invariably increase where there are the means of subsistence, the history of every people that have ever existed will abundantly prove.'[14] He did not find this particularly cheering. Yet it was a law of nature. 'It is, undoubtedly, a most disheartening reflection that the great obstacle in the way to any extraordinary improvement in society is of a nature that we can never hope to overcome. The perpetual tendency in the race of man to increase beyond the means of subsistence is one of the general laws of animated nature which we can have no reason to expect will change.'[15]

There were two major types of check to population which might operate before or after the population had outstripped resources. There were the 'preventative' checks, that is those which lowered the birth rate. These were divided into two major types. There was 'moral restraint', which meant delayed or non-marriage. Or there was 'vice', that is to say all kinds of artificial birth control.

Secondly there were the checks which raised the death rate, what Malthus termed the 'positive' checks. These were again divided into what he termed 'vice', that is man-made destruction, and 'natural' disasters. He distinguishes them thus: 'Of these positive checks, those which appear to arise from the laws of nature may be called exclusively misery; and those which we bring upon ourselves, such as wars, excesses of all kinds, and many others,which it would be in our power to avoid, are of a mixed

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[9] Malthus, Principle, 71

[10] Malthus, Principle, 71

[11] Population, 2, 130

[12] Population, 1, 6

[13] Population, 1, 304

[14] Principle, 79

[15] Malthus, Principle, 199

nature. They are brought upon us by vice, and their consequences are misery.'[16] He included in the positive checks a very wide range of causes of death. 'The positive checks to population include all the causes, which tend in any way prematurely to shorten the duration of human life, such as unwholesome occupations; severe labour and exposure to the seasons; bad and insufficient food and clothing arising from poverty; bad nursing of children; excesses of all kinds; great towns and manufactories; the whole train of common diseases and epidemics; wars, infanticide, plague, and famine.'[17] These 'positive' checks tended to act in concert. 'The vices of mankind are active and able ministers of depopulation. They are the precursors in the great army of destruction; and often finish the dreadful work themselves. But should they fail in this war of extermination, sickly seasons, epidemics, pestilence, and plague, advance in terrific array,and sweep off their thousands and ten thousands. Should success be still incomplete, gigantic inevitable famine stalks in the rear, and with one mighty blow levels the population with the food of the world.[18]

Here we begin to approach a central feature of Malthus' early work. He believed that unless people espoused the path of 'moral restraint', delaying their marriages or not marrying, all other measures would be in vain. For instance, all attempts to eradicate poverty would be hopeless. 'It is not in the nature of things that any permanent and general improvement in the condition of the poor can be effected without an increase in the preventive check; and unless this take place...everything that is done for the poor must be temporary and partial: a diminution of mortality at present will be balanced by an increased mortality in future.'[19] Likewise, attempts to eradicate particular forms of misery, whether war, famine or disease, would merely deflect mortality into another 'channel'.

The idea of the 'channel' of disease is an important one in Malthus' thought. He seems to have taken the concept from Heberden. 'Dr. William Heberden published, not long since, some valuable observations on this subject deduced from the London bills of mortality. In his preface, speaking of these bills, he says, 'the gradual changes they exhibit in particular diseases correspond to the alterations which in time are known to take place in the channels through which the great stream of mortality is constantly flowing.[20] To tamper with particular channels is therefore a waste of time. 'Now if we stop up any of these channels it is perfectly clear that the stream of mortality must run with greater force

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[16] Malthus, Summary, 250

[17]Malthus, Summary, 250

[18] Malthus, Principle, 118-19

[19] Malthus, Population, 2 252

[20] Malthus, Population, 2, 180

through some of the other channels; that is, if we eradicate some diseases, others will become proportionally more fatal. In this case the only distinguishable cause is the damming up a necessary outlet of mortality.'[21] This means that 'we should reprobate specific remedies for ravaging diseases and those benevolent, but much mistaken men, who have thought they were doing a service to mankind by projecting schemes for the total extinction of particular disorders.'[22]

This leads Malthus from what Boulding calls the Dismal Theorem to the Utterly Dismal Theorem. 'Since equilibrium, between resources and population can be maintained only be misery and/or vice, and since population tends to rise to the limit of available subsistence, any improvements leading to an increase in the production of food must increase the equilibrium population, and hence, presumably, increase the sum of human misery and vice.'[23] Malthus half seriously contemplates the corollary of this. If people are not prepared to use the preventive checks, they should try to diminish misery by encouraging the 'positive' checks to operate as soon as possible, when population levels are relatively low and less people will suffer. 'To act consistently, therefore,we should facilitate, instead of foolishly and vainly endeavouring to impede, the operations of nature in producing this mortality; and if we dread the too frequent visitation of the horrid form of famine, we should sedulously encourage the other forms of destruction which we compel nature to use.'[24] Thus 'Instead of recommending cleanliness to the poor we should encourage contrary habits. In our towns we should make the streets narrower, crowd more people into the houses, and court the return of the plague.'[25]

This is indeed Utterly Dismal. Yet it flows directly from his argument that, without the preventive check, 'distress and poverty multiply in proportion to the funds created to relieve them.'[26] This may be a bitter pill to swallow, as he admits. Yet there is no point in trying to avoid the facts; 'discouraging as the contemplation of this difficulty must be to those whose exertions are laudably directed to the improvement of the human species, it is evident that no possible good can arise from any endeavours to

[21] Malthus, Population, 2, 181

[22] Malthus, Population, 2, 179

[23] Malthus, Principle, 47

[24] Malthus, Population, 2, 179

[25] Malthus, Population, 2, 179

[26] Malthus, Population, 1, 274

slur it over or keep it in the background.'[27] Governments can attempt to make the checks on population act more equably, but 'to remove them is a task utterly hopeless.'[28] The Utopian vision of Condorcet, Godwin and others which Malthus was attacking was flawed. 'This natural inequality of the two powers of population and of production in the earth, and that great law of our nature which must constantly keep their effects equal, form the great difficulty that to me appears insurmountable in the way to the perfectibility of society.'[29] 'There is no way out of the trap. 'All other arguments are of slight and subordinate consideration in comparison of this. I see no way by which man can escape from the weight of this law which pervades all animated nature.'[30] All we have to do is to look at nature to see the results of these laws. 'Among plants and animals its effects are waste of seed, sickness and premature death. Among mankind, misery and vice. The former, misery, is an absolutely necessary consequence of it.'[31] The study of history and other civilizations bore the same message. 'And that the superior power of population cannot be checked without producing misery or vice,the ample portion of these too bitter ingredients in the cup of human life and the continuance of the physical causes that seem to have produced them bear too convincing a testimony.[32] It is not surprising that this vision of endless struggle and death should have independently inspired both Darwin and Wallace and provided them with the basis for the theory of natural selection.

Malthus was not alone in outlining the world of misery within which agrarian societies appeared to be trapped. His ideas were fully consistent with many of the other great classical economists and social scientists. Those who first began to analyse with precision what was happening were the brilliant set of political economists in Scotland - Ferguson, Millar, Kames, Robertson, Hume and Smith. It was obvious to such thinkers that humankind was caught in a trap, whereby population would always

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[27] Malthus, Principle, 199

[28] Population, 2, 150

[29] Malthus, Principle, 72

There is no way out of the trap. 'All other arguments are of slight and subordinate consideration in comparison of this. I see no way by which man can escape from the weight of this law which pervades all animated nature.'s, Principle, 72

[30]Malthus, Principle, 72

[31]4   lthus, Principle, 72

[32] Malthus, Principle, 79

outstrip resources. David Hume pointed out that 'Almost every man, who thinks he can maintain a family, will have one; and the human species, at this rate of propagation, would more than double every generation. How fast do mankind multiply in every colony or new settlement.'[33] The harder people worked, and the more technologically ingenious they were, the more their numbers would grow. As Ferguson wrote, 'If a people, while they retain their frugality, increase their industry, and improve their arts, their numbers must grow in proportion.[84]

The most forceful expression of the argument was by Adam Smith. His **Wealth of Nations** was the blueprint for a new age and in many places suggested, the 'Natural Progress of Opulence'. Yet his message is inconsistent, for in relation to the laws of population he seems to have realized that it was impossible for sustained economic growth to occur. He realized that there was a built-in contradiction which would forever trap agrarian societies and prevent their escape from eternal misery. It was clear that 'every species of animal naturally multiples in proportion to the means of their subsistence, and no species can ever multiply beyond it.' Mankind was just another species in this respect, for 'men, like all other animals, naturally multiply in proportion to the means of their subsistence.' He pointed out that an improvement in wealth would lead to a decline in mortality among the common people, hence more children would survive and the population would increase. Likewise, increased wealth through increased wages would lead to increased fertility. 'The liberal reward of labour, therefore, as it is the effect of increasing wealth, so it is the cause of increasing population', or, as he put it in a marginal note, 'high wages increase population.'[35]

Wrigley has summarized the position of the classical economists. As far as Smith was concerned 'his view of the prospects for growth in general induced him to discount the possibility of a prolonged or substantial improvement in real wages, and to fear that the last state of the labourer would prove to be worse than the first...'[36] His successors 'developed arguments that served to reinforce the pessimism that Smith displayed about the secular prospects for real wages.'[37] Thus 'looking to the future, they saw no likelihood of significant further advance and some danger of regression.'[38] The capitalism they described

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[33] Hume, Essays, 224

[34] Ferguson, Essay, 142

[35] Smith, Wealth, i, 89, 163, 90

[36] Wrigley, Two Kinds, 99

[37] ibid, 101

[38] ibid, 103

'Was not expected by them to produce the changes now termed the industrial revolution.' For while they predicted increases in output 'they expected them to be broadly matched by increases in population, leaving the ratio between the two little changed.'[39] In other words, there was no escape from the circle of misery. The only question was whether a country would be 'trapped' at a low or high equilibrium, in other words with sparse or dense populations. As Wrigley notes, pre-industrial societies were by definition in a position of negative feedback. Each period of economic growth was eventually cut short before reaching the point at which it was self-sustained and preogressive.' [40]

These were views which were shared by the leading demographic analysts in the far-off civilization of Japan in the same period. Honda believed in even more rapid natural growth rates for population than Malthus, the astonishing figure of a 19.75 times increase every thirty-three years.[41] Hung outlined the problem of resources and population. 'To sum up, when there has been protracted peace, heaven and earth cannot but produce people, and the substance produced by heaven and earth for the nourishment of man will never equal his numbers. When there has been protracted peace, the princes and ministers naturally cannot keep people from reproducing, and that which they supply for the livelihood of the people cannot meet their needs.'[42]

Malthus' first edition of the **Essay** provided little in the way of proof for the theory, though this was to be supplied in the much expanded second edition. Yet the Malthusian analysis has largely been borne out as a description of most classical civilizations before the nineteenth century. Almost all agrarian societies have conformed to his predictions. If there were gains in resources, these were soon swallowed up by rapidly rising population through a high fertility rate and lowered death rates. This would lead to denser populations which in turn led to the negative feed-back of a rise in mortality. This cycle prevented long-term and sustained economic growth. As Landes summarized the evidence 'An amelioration of the conditions of existence, hence of survival, and an increase in economic opportunity had **always** (my italics) been followed by a rise in population that eventually consumed the gains achieved.'[43]

We may represent the Malthusian argument by way of two diagrams.

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[39] ibid, 103

[40] Wrigley, Population and History, p.111.

[41] Keene, Discovery, 115

[42] Keene, Discovery, 113

[43] quoted in Chambers, Economy, 10

Diagram 1.

Diagram 2.

Two Patterns

The Malthusian model of the natural tendencies or agrarian civilizations needs to be refined by distinguishing the two main forms of 'positive check'. Much of the work in elaborating this has been done by Wrigley.

The world which Malthus described, where population is held in check by high mortality balancing high fertility, has recently been termed a 'high-pressure' regime by Wrigley. That is to say, it is one 'where fertility and mortality are high, population is large relative to available resources and growth is curbed principally by the positive check.'[44]

In fact, within the long period when 'high-pressure' regimes dominated there were two distinct patterns. The conventional demographic transition theory assumed that in the thousands of years up to the 'transition', since mortality and fertility were clearly balanced, this was achieved by 'perennial malnutrition and everyday disease.' The 'classic' model thus suggested that year in and year out mortality ran at about the same level as fertility, that is both were at a very high level.[45] This 'classic' model has more recently been termed the 'west African' model by Wrigley because it has been observed in that part of Africa. He describes it as a situation where 'mortality was always high because the disease environment was so unfavourable... in this sense high mortality could be said to have 'caused' high

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[44]Wrigley, Population, xxiv

[45]Wrigley, Population and Resources, 305

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fertility.'[46]

There are, however, very few cases of this pattern in recorded history. Much more common is what I called the 'crisis' regime. I quoted a description of it by the anthropologist Kunstadter. 'A more nearly accurate model of demographic conditions...within which most non-modern men have lived may have been high fertility (beyond the level needed for replacement in normal years) with low-to-medium death rate, with occasional or periodic variations in death rates due to natural disasters (floods, earthquakes, climatic fluctuations..., insect plagues, crop failures...etc.) and probably more recently, epidemic diseases.'[47]

More recently, Wrigley has termed this the 'Chinese' model, after Malthus who first outlined it. 'In a "Chinese" situation, on the other hand, the disease environment was less deadly but social conventions made early and universal marriage mandatory. As a result, fertility was high and because rapid growth had to be short-lived, mortality was high too. In the "Chinese" case high fertility "caused" high mortality.'[48] What Wrigley implies but does not fully explain is that the mortality now took a different form. Instead of perennial high mortality, in most years mortality was considerably below fertility, but every few years or generations the growing population would be hit by a 'crisis', one or more of the Malthusian positive checks, namely war, famine and disease.
        These two models and their consequences can be illustrated by the following diagrams:

Diagram XXX

(Fig. 16.2 on p.306 of Resources; see also diagram in Wrigely, No Death, (xerox).)

If we leave on one side hunter-gatherer and tribal societies, and concentrate on agrarian civilizations we find that they have almost all been characterized by the 'crisis' or 'Chinese' regime. The model and the evidence for it was summarized lucidly by Cipolla. He wrote that '...the material available tends to

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[46]Wrigley, Population History, xxiv-xxv

[47]in Harrison and Boyce, 315

[48]ibid, XXX

suggest that any agricultural society - whether sixteenth-century Italy, seventeenth century France, or nineteenth-century India - tends to adhere to a definite set of patterns in the structure and movements of birth- and death-rates. Crude birth-rates are very high throughout, ranging between 35 and 50 per thousand....Death rates are also very high, but **normally** lower than the birth-rates - ranging generally between 30 and 40 per thousand.' As a result of these usual figures, the 'population of an agricultural society is characterized by a normal rate of growth of 0.5 to 1.0 per cent per year.' Such a growth rate would mean, over long periods, a staggering growth of population. If it had occurred, for instance, since 10,000 B.C., population 'would form today a sphere of living flesh many thousand light years in diameter, and expanding with a radial velocity that...would be many times faster than light.'[49]

This continued growth has clearly not happened, not because of perennially high mortality, but rather as a result of periodic 'crises'. It has been avoided 'because throughout the demographic history of agricultural societies, death-rates show a remarkable tendency to recurrent, sudden dramatic peaks that reach levels as high as 150 or 300 or even 500 per thousand.' These peaks were the result of wars, epidemics and famines, Cipolla notes, which 'wiped out a good part of the existing population.' It was the 'intensity and frequency of the peaks' that 'controlled the size of agricultural societies.'[50]

Since this is the core model for agrarian civilizations, it is worth including one further summation by Cipolla, specifically applied to a threshold which Europe seemed to have hit in the 'century of crisis' in the seventeenth century. 'Between 1550 and 1660 high birth rates and high mortality rates were the rule everywhere. The rate of 'normal' mortality remained generally below the birth rate, so that in 'normal' times there was a natural rate of increase in the region of 5-7 per thousand per year.' As we have seen, however, such build up of population brought its own inevitable nemesis. 'The mortality rate, however, fluctuated violently because of the occurrence of frequent and recurrent peaks of "extraordinary" mortality. these peaks were due to famines and various types of epidemics, but it was usually the plague which produced the highest peaks which could reach 200 or 300 per thousand.'[51]

Cipolla noted in 1960 that the detailed demographic records for agrarian societies were still 'poor'. In the following years information improved greatly and a good deal of it was summarized by Hollingsworth in 1969 in his work on **Historical Demography**. The evidence he assembled there on India, China, Egypt and other great agrarian civilizations fully supported the picture which Cipolla had outlined.

The history of China was a classic case of the 'high-level equilibrium trap'. China in 1700 was well

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[49]Cipolla, World Population,76.

[50]Cipolla, 76-7

[51]Glass, ed Population, 573

abreast of Europe in terms of technology, as Needham and his collaborators have shown.[52] . Its population at this date was about 160 million. The peace and stability of the Chi'ing dynasty, combined with an apparent absence of widespread epidemic and endemic disease, allowed the Malthusian tendency towards rapid growth to occur. The population doubled to about 310-330 million in the hundred years to 1800 and increased to 420-440 million by about 1850.[53] The result, according to many, was the growing misery of the bulk of the population. People had to work harder and harder, for 'Despite enormous growth in population and food supply, the Late Imperial era saw a decline of productivity per labourer in agriculture.[64]

There was thus a paradox which Malthus noted. 'The Jesuit Premare, writing to a friend of the same society says, 'I will tell you a fact, which may appear to be a paradox, but is nevertheless strictly true. It is, that the richest and most flourishing empire of the world is notwithstanding, in one sense, the poorest and the most miserable of all. The country, however extensive and fertile it may be, is not sufficient to support its inhabitants. Four times as much territory would be necessary to place them at their ease.'[55] In the words of Nakamura, the tendency was 'to push the level of per capita income down towards the subsistence level - that is, there was no escape from the Malthusian trap.'[56] The 'crisis' came in the form of famines and the devastation of the Taiping rebellion of the mid nineteenth century in the aftermath of which many millions died.[57]

Turning to the west, it would appear that most of Europe had hit the Malthusian ceiling in the late sixteenth century. Research on European populations supported the universal and devastating nature of the 'crisis' model. Braudel noted the effects of the 'biological **ancient regime**...the balance between births and deaths, very high infant mortality, famine, chronic undernourishment, virulent epidemics...'[58]

[52] Needham et al., Science and Civilization.

[53] Bairoch, Cities, 35-7; Nakamura, Population (xerox), 247; Fairbank, Paradox (xerox), 168

[54] Fairbank, Paradox (xerox), 170

[55] Malthus, Population, 1, 130

[56] Nakamura, Population (xerox), 264

[57] Spence, Search for China,pp.170-184.

[58] Braudel, Capitalism, 53

De Vries asks 'Could Europe have reached an economic ceiling in the early seventeenth century in which a precarious balance between population and food supply was constantly threatened by inadequate harvests?'[59] He answered in the affirmative, pointing to the fact that 'In Ireland, Germany, Poland, Denmark and the Mediterranean countries varying combinations of plagues and chronic warfare and insecurity caused a substantial decline in population.'[60] In a recent survey of the evidence, Livi-Bacci has given a similar description. 'The situation for the various European countries is not much different from that of Sienna. The sixteenth, seventeenth, and early eighteenth centuries are characterized by subsistence crises, with the attendant adverse demographic consequences, at a rate of two, three, or more per century.'[61]

  Italy was a particularly dramatic example. 'Italy in the decade 1620-30 embarked on a long period of economic decline which lasted beyond the middle of the eighteenth century and during which levels of living progressively deteriorated.'[62] 'During the first half of the seventeenth century, Italy as a whole declined from 13 to 11 million inhabitants, while northern Italy, the industrial heartland of Europe, lost a quarter of its population.'[63] France was in the same predicament. 'The population of the French kingdom within its frontiers of 1700, whether we look at it as a whole, or in its age groups...oscillates vigorously from minimum to maximum around a sort of equilibrium position representing possibly 19 million Frenchmen. In 1700 it probably stood nearer the minimum than the maximum point.'[64] In the early eighteenth century, France may have been trapped in the usual positive feed-backs of war, famine and epidemic: 'decisive changes did not occur in France before the second half, and maybe not before the end, of the eighteenth century',[65] though Weir, has challenged this picture, at least for the eighteenth century. [66]Even prosperous Holland seems to have been hitting some kind of Malthusian ceiling in the

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[59] De Vries, Economy, 6/7

[60] De Vries, Economy, 184

[61] Livi-Bacci, 81

[62] Glass (ed), Population, 574

[63] De Vries, Economy, 4/5

[64] Glass (ed), Population, 473

[65] Glass (ed), Population, 473

[66] Weir, Life Under Pressure (xerox).

middle of the seventeenth century.[67] In Mediterranean Europe, for instance in parts of Spain, parish register evidence suggests that 'crisis mortality continued to be important well into the nineteenth century.'[68]

The positive checks to population.

It is not difficult to see how powerful the 'positive' checks were. The first and most destructive was war, not only because of deaths in battle, but much more significantly through the disruptions it caused leading to famine and epidemics. If we turn to famine, we find that its shadow hung over the world until very late. The position was well summarized by Helleiner. 'Certainly, as far as the demographic situation of this period is concerned, there was little if anything to herald the impending changes. Man was still very much at the mercy of the elements. As late as the 1690s a succession of poor and indifferent harvests created severe subsistence crisis in almost all countries of Europe. So far from growing, the population declined here and there, as dearth and starvation stalked through the lands from Castile to Finland, and from the Scottish Highlands to the foothills of the Alps.'[69] Such famine would in its turn make another kind of positive check more likely, namely disease.

McKeown and others have suggested that many diseases are density dependent: "we have given reasons for believing that in the early phase of human existence, from the beginning of the pleistocene up to about 10,000 years ago, infectious disease due to micro-organisms specifically adapted to the human species was almost nonexistent". (McKeown, Modern, 79) Thus there had been a contradiction attached to the first agricultural revolution, namely the domestication of plants and animals. There had been growing 'efficiency', but there were costs as well. This situation was only likely to worsen as populations continued gradually to build up. For instance "The aggregation of large, malnourished populations created the conditions required for the propagation and transmission of micro-organisms and so led to the predominance of infectious diseases as causes of sickness and death. This established a high level of mortality which limited the rate of population growth." (Rise, 162)

A particularly strong contradiction lay in the growth of urban communities. As a country's wealth and commerce grows, it is often most economically efficient to concentrate this in densely populated areas, towns and cities. In economic terms this is efficient, overcoming the 'friction of space' and bringing various advantages in terms of division of labour, economies of scale and so on.[70] Yet at the same time

[67] Daedulus, 610ff

[68] Smith, Demography, 1675

[69] Glass, ed, Population, 79

[70] cf Heer (ed), Fertility, 55; cf Boserup on

'Urban populations died at higher rates because the city was crowded and filthy, its streams and rivers polluted with industrial and human waste, its air thick with particles from wood and coal fires, and its streets strewn with waste.'[71] The situation was becoming much more severe with the build-up of large cities in western Europe from the sixteenth century. De Vries summarizes the growth. 'Paris, London and the **Randstad** in the 1570s collectively embraced some 370,000 inhabitants. In the next century each grew to surpass the 400,000 mark. By 1700 one and a half million people lived in them.'[72] By 1650 Paris and London were both approaching the half million mark, 'unprecedented in western Europe.'[73]

The outstanding example of this tendency in the English case was London. Malthus had quoted Graunt's mid-seventeenth century estimate that it required an annual influx of six thousand people a year just to make up for its population deficit.[74] Wrigley estimates that London always killed more than it produced, but that its relative size meant that it was mainly during the period between 1625 and 1775 that it had its decisive effect on national population. In the last three quarters of the seventeenth century it acted as a depressant on national growth and in the 'eighteenth century London continued to act as a severe drain on the surpluses being produced elsewhere; even as late as the second quarter of the century it offset about a half of the national baptism surplus...'(159). As Wrigley notes, it looks as if England had hit a buffer. 'The conditions for a relatively high-level equilibrium trap were beginning to become apparent in late-seventeenth century England.' (472).

Other civilizations where urban populations were growing faced a similar Malthusian feed-back. A notable example was Japan. Japan by the seventeenth century was extremely densely populated. When Kaempfer visited it at the end of the century he found that 'The Country is populous beyond expression, and one would scarce think it possible, that being no greater than it is, it should nevertheless maintain, and support such a vast number of inhabitants.'[75] He found many large towns and cities. 'It hath many towns, the chief whereof may vy with the most considerable in the world for largeness, magnificence, and the number of inhabitants.'[76] The capital, 'Jedo' (later Tokyo) 'is so large, that I may venture to say,

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[71] Riley, Sickness (xerox), 122

[72] De Vries, Economy, 155

[73] De Vries, Economy, 151

[74] Malthus, Population, i, 243

[75] Kaempfer, History, 3, 306

[76] Kaempfer, History, 3, 307

it is the biggest town known', that is in the world.[77] He was right. With a population of about a million it was the largest city on earth. It is thus not surprising that Japanese demographic historians have detected a similar negative influence in Japan. The leading Japanese demographer, Hayami, argues that 'Owing to the high death rate in cities, which teemed with workers who had migrated from the depressed countryside, the Kanto and Kinki regions (which included Edo, Kyoto, and Osaka) were subject to the negative-feedback function and their populations stagnated.[78] The thesis seems to have been accepted by Hanley and Yamamura: 'while the evidence is only starting to come', what we do have 'confirms Hayami's hypothesis - and E.A. Wrigley's with regard to premodern Europe - that the cities drained the surrounding countryside of population, thus creating negative growth rates in the areas immediately surrounding cities...'[79]

The difficulty of the escape.

Thus we are left with a puzzle. It is difficult to see how the 'great transformation' from the world of high mortality and fertility occurred and how the 'Wealth of Nations' was achieved. In order to escape from the trap, societies had to increase their productive power, that is their agricultural and manufacturing wealth. As they did so, they had to avoid the too-rapid population growth and the rise of the preventive checks of war, famine and disease that seemed inevitably to emerge as populations became more dense. The nature of the growing burden of disease and malnutirtion as humans moved from hunter-gathering through the phase of early civilizations to the early modern period has been excellently outlined by Cohen. [80] The growing levels of epidemic disease associated with civilization are well surveyed by Kiple.[81]

The difficulty of achieving this transformation is well described by Ronald Lee. In a synthesis of the work of Malthus and Boserup, he points out the contradiction. On the one hand, in order to move from one technological level to another, populations must be dense. 'Entrance to a higher ellipse can be gained only from the population densities and levels of technological attainment characteristic of the

[77] Kaempfer, History, 3, 307

[78] Hayami, Population, 293

[79] Hanley, Economic, 304

[80] Cohen, Health, passim, esp. pp.53-4, 130-2, 140-2.

[81] Kiple, Ecology, 358-362; see also Polgar,'Evolution and the Ills of Mankind, xerox and Crosby, Ecological, pp.29,31.

highest development of the previous technology.[82] On the other hand, such density normally leads to technological stagnation and rising mortality. 'Populations such as the Chinese, entrapped in a medium-technology agricultural regime, through prematurely dense population, would not be well situated to make the transition to an industrial economy.[83] Thus a country like China '...after first accelerating, then decelerating...comes to rest at a high-technology-high-population stable equilibrium, beyond which neither increases in population nor technology can be sustained.'[84] Some variant of the Chinese fate was a common one, and many were stuck at an even lower level: '..many populations would get stuck at relatively low-level equilibria, and thus make no further progress. The more obvious and cheaper technological developments would occur, but those requiring larger collective investments and higher living standards might not.'[85]

Only in very exceptional circumstances would the various feed-back mechanisms elaborated by Smith and Malthus be avoided. 'Only populations blessed with the most advantageous institutions governing reproduction, surplus extraction, and use of surplus, would be able to pass through the neck of the hyperbola and continue to progress into the next higher technological regime.'[86] For instance, 'Premature population growth, or premature restraint, might render the passage from one stable equilibrium to a higher one much less likely.'[87] It is all a matter of balance, and the factors that allow that balance are many and delicate. What is significant is the narrowness of the room for manoeuvre.[88]

In order to establish what factors were important and the ways in which the balance was achieved, we need to examine cases where the transformation occurred. The examination of one case will give some possible clues. But if two cases, widely separated in culture and geography, and largely independent historically, could be found, we might be able to penetrate more deeply into the necessary and sufficient causes of the unlikely transformation.

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[82]in Coleman, ed, Population, 12

[83]ibid, 122

[84]ibid, 128

[85]ibid, 122

[86]ibid, 123

[87]ibid, 128

[88]see the diagram ed (ed), Coleman, 123