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Optimum Population

A Paper

by

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PREFACE

This paper was first promulgated in 2003, and in this latest edition I have included some updated data from the sources quoted (but not in all cases). Although such later statistical information has become available, the trends and the conclusions reached in the original paper remain much the same.

In the intervening period, however, the aspects of population growth and its consequences seem to have been brought to public attention by the media and others much more than hitherto, an encouraging sign.

In consequence, my summary and explanation may seem unduly mundane to those who have already shown an interest in the subject. Nevertheless, I really hope there is enough meat left for most to appreciate the way that the human population, by its size, weighs heavily over all aspects of the world's ecological balance.



Now, in April 2009, governmental authorities, politicians and others are accepting climate change as a harsh fact and not just as a matter for debate. There are even signs of some panic. Yet even as this is realised, still very few pay attention to population as a factor in combatting this and other deleterious environmental prospects.

A regrettable development, in my opinion, is that the movement to encourage responsible population policies, most prominently the Optimum Population Trust (of which I am **no longer** a member), has been identified too closely with "green" movements and with political groups (they are legion) pressing for rationing of consumption. That is no part of my thinking in urging population reduction, nor is it my aim to call on individuals to curb their own family size with fewer children. Any such exhortations would be fatuous, interfering and indeed counter-productive because of the offence it might provide.

1 INTRODUCTION

1.1 This Paper addresses various issues with which I have for long been preoccupied on population matters. Basically, I am concerned at the lack of attention and of alarm by those in authority or who govern us, to the catastrophic consequences from over-populating the planet.

1.2 Just to set the scene, for people of my vintage, we have seen in our lifetime the world's population rise from about 2 billion to about 6.6 billion—over a 200% increase, this despite the ravages of war, disease and famine. During that time also, the affluence of the population on average has risen significantly, and technology has provided most of us with the means for ever-increasing consumption. In fact, it is these two factors of affluence (consumption) and technology which are as important to the planet's well-being as that of the numbers of human-kind.

$$I = PAT$$

1.3 A convenient way of expressing this is an equation: $I = P \times A \times T$, being the impact (I) as dependent on the 3 factors of population (P), affluence or per capita consumption (A), and technology (T). The last-mentioned factor could however be less than 1 (ideally so) if the relevant technology actually reduced the impact of consumption and population. The equation is theoretical in that it is not expected one could precisely quantify the A and T factors or express them in the same terms as the population—but it is a way of reminding us to broaden our attention to all factors.

Eco-footprint

1.4 From that, we can adopt another convenient abstract marker and this is the effect that each one of us has on the rest of the world. This can be expressed in economic terms, or in any other way pertaining to the ecology of the planet, even, for instance and most importantly, as to the amount of carbon dioxide we each add by our consumption levels. Biologically, we take up a certain amount of space, as measured in population densities, but ecologically we have a different footprint. It is this **ecological footprint** which can be useful in highlighting the effect of our presence.

1.5 It may be expected that a forest native living a primitive life has an eco-footprint far less than that which Bill Gates (as an extreme instance) occupies. The eco-footprint may be viewed from different vantage points, such as the effect of wearing and using cotton products—the growing, processing and making-up of such extending far beyond the biological location of an individual consumer. To the extent that many developed countries rely upon resources from abroad, the eco-footprint is expanded (utilizing some of the biological capacity of the suppliers).

Optimum

1.6 Using these concepts, those with scientific and statistical skills can try to measure our effect on the earth and assess the **maximum carrying capacity**. This can show us when we have exceeded the level of sustainability at which point resulting disaster in some form or another would be a likely consequence. But that is not the only concern. The maximum carrying capacity may be such that we could live cheek by jowl with our neighbours as in the favelas of São Paulo but that is not what any person (that I know of) would aspire to. No, we wish to have enough space and the least competition for survival in order to enjoy our existence. So,

in terms of the comfort level we require, there is an **optimum population**. That is what I believe we should be focussing on.

- 1.7 I am not trained to conduct research on the subject and must therefore rely upon those who have such skills to assess the position: historically, presently, and as may be expected in the future.
- 1.8 The observations which I make later in this Paper are derived from views of and from facts provided by those sources.¹ I consider that the world has a gigantic problem to tackle and it is no less urgent that we do tackle it just because the dire effects which could come to pass may not occur within our lifetime. I know there are and have been many Domsday cranks predicting that the end of the world is nigh but my message is not that. Instead, I make a plea for something better than we have now—simply:

let's have fewer, enjoying more.

¹ This is not an academic treatise and I have not tried to cross-reference every item with the source. However, I have added a few acknowledgements and given the address of some web-site links for anyone disposed to making further enquiry on the subject.

2 WHERE ARE WE NOW?

6.6 billion

- 2.1 Look at any chart showing the increase in population numbers over the years and we see that for many centuries, humans in terms of numbers had little impact on the globe. Until the 16th Century, the world had not exceeded 500 million (having risen from about 300 million at the time of Christ/Mohammed). The curve then started to steepen but even by 1934—the most important year in my life, when I was born—the world’s population had just quadrupled to something over 2 billion.
- 2.1.1 Just 40 years later, in 1974, the population had doubled to 4 billion and today, over 30 years after that, it has increased by another 2.6 billion to an estimated 6.6 billion; we see a growth curve of geometrical progression, a curve which is approaching the perpendicular!
- 2.1.2 Within my lifetime, a period of just over 70 years, the world’s population has increased by over eight times the **total** population of the world 500 years ago.

Fertility

- 2.2 World growth of course depends on birthrate and death-rate, and the population size can be affected also by the age at death (infant mortality on the one hand and increasing life-expectancy on the other). If births were held at about 2 per woman,² then this would ensure a stability in the size of population and anything less would reduce population. All things being equal, this should be so, but there are other circumstances which can muddy the picture (such as age structure and variations in average life-expectancy).
- 2.3 In most developed countries and in recent years this Total Fertility Rate (TFR) has fallen well below the accepted replacement level of 2.1, as for instance Western Europe which averages at about 1.40. In many less developed countries however, it is higher with Africa averaging at about 4.97, South America at 2.55, and Asia at 2.47 (but an exception is China with just 1.7, brought about in part by the really Draconian one-child State policy).

Annual growth rates

- 2.4 Regardless of the regional fertility rates, the global picture is alarming. It is easier perhaps just to look at annual growth rates³ and the effect these have over time. The United Nations Population Division indicates that the present growth rate is around 1.2% and **the global net gain this year is about 76 million persons**. It means that we have the population of the world increasing by some 24 persons every 10 seconds.
- 2.5 So in just the three and a half years since I first wrote this paper, the world’s population has increased by about a quarter of a billion people—that is some four times the present population of the United Kingdom.

² Replacement level is actually taken by demographers to be 2.1. This total fertility rate (“TFR”), as it is called, should not be confused with the “crude birth rate” which is another term demographers use and which records the number of births in a given year for every 1,000 persons in the population.

³ The growth rate is simply the year on year increase which results from births, deaths and migration. Even when the TFR falls below replacement level, there is a long time lag before the effect can be seen in the growth rate, especially if there is a high proportion of young people and life expectancy continues to increase.

Life Expectancy

- 2.6 An aspect which has tended to be disregarded is the trend of human life expectancy continuing to increase (presently seen in most areas of the world but with the exception of Africa which is blighted, hopefully only in the short-term, by HIV/AIDs). So even where the TFR falls below the replacement rate of 2.1, increasing life expectancy may contribute significantly to a continuing population growth of numbers.

China and India

- 2.7 The growth rate operates according to the compound interest formula. If we look at China for instance, the growth rate is 0.65% pa despite its fertility having been reduced to 1.7. Although this growth rate is not expected to be maintained (and in fact is estimated to reach zero and then fall to -0.35% by about 2050), its population may reach a peak of 1.44 billion and then slip back to about 1.4 billion by 2050 (and then represent about 15% of the world population). This is an increase over the period of about 78 million people.
- 2.8 Perhaps a more serious outlook prevails in India where the growth rate is 1.55%. Not only is the density more than twice that of China but the growth rate indicates a doubling of the present population (1.1 billion) in just 45 years. Fortunately, the growth rate is estimated to reduce significantly (the UN Population Division estimates to 0.32% by 2050), but that even so the population could still rise to nearly 1.6 billion at 2050 and India would then become the world's most populous country.
- 2.9 However, you may point out that China and India can better sustain their numbers than more-developed countries, because their ecological footprint is so small by comparison. This must be true, at present, and it is useful to note the eco-footprints published (by WWF-World Wide Fund for Nature) for all countries. Its publication "The Living Planet Report 2006" may be found at its web-site (www.panda.org). Here are the estimated total footprints from that report for just four countries:

USA	9.60	(global hectares ⁴ per capita)
UK	5.60	
China	1.60	
India	0.80	

The Living Planet Report 2006 explains:

"The total Ecological Footprint of a nation or of humanity as a whole is a function of the number of people consuming, the average amount of goods and services an average person consumes, and the resource intensity of these goods and services. Since footprint accounting is historical, it does not predict how any of these factors will change in the future. However, if population grows or declines (or any of the other factors change), this will be reflected in future footprint accounts."

⁴ 1 hectare is equivalent to about 2.5 acres. Despite this eco-footprint unit of measure appearing to be based on area, it should be remembered that this is just used for convenience and is really a parallel equivalent. The eco-footprint in fact measures consumption in area units of standard productivity (in worldwide or *global* hectares).

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- 2.10 The technology and exploitation of resources enjoyed by USA/UK and other developed countries no longer remain their monopoly. The farm-worker, the rickshaw-puller, and all of those presently living at virtually subsistence levels in China, India and elsewhere are aspiring to acquire a share of our life-style comforts. It is now well seen that both China and India⁵ are making spectacular strides in industry, assisted by their in-born good intelligence and having an ample cadre of well-educated and astute leaders.
- 2.11 This points to an enormous pressure in these countries as the life-style changes (remember the $I = PAT$ equation). Even were the population growth rate in China and India to be reduced to zero, the impact/eco-footprint will almost certainly increase significantly because of the (A) affluence/consumption and (T) technology factors.⁶ Viewed with the benefit of this information, China's one-child policy does not seem to have been so Draconian after all!
- 2.12 What would the A and T factors provide in the equation? Based on the eco-footprints of USA/UK, it appears that China and India may be able to increase their impact by 5 to 10 times, and so I assume that is just how much $A \times T$ potentially could be.
- 2.12.1 The potential **Impact** of just these two countries on the world's environment is immense and may alone consume the total world's sustainable capacity.
- 2.13 Presently, USA contributes by far the largest amount to the Impact on the environment, and It is shown in the LPR 2006 edition that globally, there is a deficit of about 25%—meaning that we are living beyond our means to that extent. This looks to deteriorate further on present trends.
- Kyoto Protocol*
- 2.14 That brings me to make a reference to the efforts by nations to improve the environment. The lumbering progress to achieve a reduction in CO₂ emissions and the way that the good intentions of the 1997 Kyoto Agreement have been undermined by less than enthusiastic States (famously USA in particular), encompass another topic beyond the scope of what I intend for this Paper.

⁵ As a frequent business visitor to India some 30 years ago, I had been impressed by two major aspects: a) the huge reservoir of talented beings frustrated by lack of fulfilling jobs, and b) the as large numbers of persons living at subsistence level. My conclusion then was that India had the potential to be a leading world economy were it not for the burden of the population millstone. It seems now, with access to capital, technology and a wider spread of education, the country will prove to be the world's power-house despite its population numbers.

⁶ I have highlighted China and India but possibly the most highly-exposed country is Bangladesh. It has a population of 147 million and the density (per sq km) is as much as 1,002, well ahead of the next most densely-packed country (other than city States and islands) which is South Korea at 491. The growth rate is just under 2% but its present eco-footprint is only 0.5 global ha per capita. The potential for increasing the eco-footprint is therefore very great indeed despite any fall in the population growth rate (estimated at 0.62% by 2050) but where is the productive space coming from?

Incidentally, population density is not a very effective guide and a better measure is the population as a ratio to the **productive** land available. Even more useful is the reciprocal of that ratio, i.e. the number of global hectares of productive land per capita of population (= "gha/pc"). This is called the biological capacity or "bio-capacity" for short, and the smaller the figure the less space available to the individual. For instance, that for Bangladesh is 0.3 whilst USA is 4.7 (as given by WWF-World Wide Fund for Nature).

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- 2.14.1 Nevertheless, it is obviously the case that any improvement in the A and T factors will reduce the impact/eco-footprint and reduce the pressure for a sustained reduction in the population of the planet.

Global population

- 2.15 Back to the global picture, we now have 6.6 billion of us inhabiting the earth and the numbers are still growing. It has been estimated that the population will reach around 9 billion⁷ by about the year 2050, at which time or thereabouts the population growth may tail off. I am glad that I shan't then be amongst that number. And of course, at that time, **most countries might hope to be enjoying a level of affluence at least equal to that which most developed countries presently enjoy.**
- 2.16 Even were that size of population sustainable, what happens when the limit of sustainability *is* reached? The growth rate must in some way then be made to tail off to zero or become a minus factor and/or improvements made by way of the A and T factors—but is it wise to bank on these being achieved in an orderly and painless fashion? On present trends, we appear to have a very short time within which to tackle this.
- 2.16.1 The growth rate only subsides very slowly following any reduction in the TFR (which in turn takes many years to alter significantly as the “cohorts” of the female population pass through the fertile range) and can be significantly affected also by increasing human longevity.
- 2.16.2 However, it may be expected that the A factor of affluence and consumption may rise quite quickly in those parts of the world a) where the growth rate presently remains relatively high (e.g. India) or b) of already prodigious population numbers (viz. China).
- 2.17 Although, we should be optimistic that advances in technology may improve the T factor, it seems irresponsible to rely on this as a “*deus ex machina*” to get the world out of this jam. Indeed, some experts say that we have already reached and passed the point of the world's maximum carrying capacity.

OPT

- 2.18 You may care to visit the web-site of an organisation called **Optimum Population Trust**⁸ (www.optimumpopulation.org). This gives far greater authoritative information than I am able to provide. One of its conclusions is that the maximum sustainable population of the world is just **2-3 billion**—yes, less than half our present population. “Sustainable” takes into consideration various factors but perhaps the most important is the level of carbon dioxide emissions. The OPT's estimate of 2-3 billion may be arguable but whatever is sustainable now may well not be in future. The “A” factor in the $I = PAT$ equation may increase the impact immensely, as I have pointed out above, simply due to the increasing affluence in developing countries. Furthermore, what is sustainable is not the same as what is desirable, i.e. what

⁷ This is more precisely given as 9.1 billion as a middle estimate made by the United Nations Population Division in a 2004 Revision of its “World Population Prospects”. A further projection by the UN contemplates the population staying at around 9 billion to 2300, this however subject to huge variant differences by the year 2300, from a low of 2.3 billion and a high of 34.6 billion (when, if that were to come to pass, Earth would then presumably be a satellite of Mars!).

⁸ I am no longer a member of Optimum Population Trust but still support many of its views. Where I differ is in my being opposed to any form of express or implied interference with the choice made within families as to their number of children—in particular I deprecate the words of one of the patrons, Jonathon Porritt when he has declared it as “irresponsible” for a couple to have more than two children.

may be optimal, which I would expect to be something quite a bit less than the sustainable figure.

Effects of over-population

- 2.19 Whatever may happen in the future, it is easy to point to what ill-effects too large a population can have. Natural catastrophes will occur whatever the population but the effect on us will be greater, the larger the concentration of people.⁹ The crowding of populations also often means their being increasingly housed in exposed areas—flood, earthquake etc.
- 2.20 Over-population also makes its own catastrophes and I list some indicators made by Professor David Pimental (Professor of Ecology and Agricultural Sciences at Cornell University) et al. - 1999, of the **chronic** position:
- a) nearly 3,000 million humans malnourished;¹⁰
 - b) 14 million children die each year from malnutrition and other diseases;
 - c) 10-35 million hectares a year of land lost to urbanisation and highways;
 - d) over 10 million hectares of arable land degraded and lost each year;
 - e) 80 nations have water demands which exceed supplies;
 - f) grain production per person declining from 1984.

Whilst we in the developed countries enjoy the comforts we have, what are we doing about the appalling circumstances itemised at a) and b) above? Something certainly, via charities and aid agencies (governmental and private). Nevertheless, much of the aid is **first-aid** tackling emergencies which have already arisen. It is the causes of those emergencies which also need tackling (and the cause of causes), and this means addressing the PAT equation.

Energy Crisis

- 2.21 I have already referred to the hopes of the Earth's nations resting on a "*deus ex machina*" to cope with the existing and rising human population, and most effort at present is being directed towards finding renewable, pollution-free, and cheap power sources. The main possibilities being explored are: wind, wave and tidal power, photo-voltaics, various forms of solar collectors, and biomass. Whilst we would of course hope that technology may improve the situation, on present evidence it is apparent that these alternatives are able to produce but an insignificant fragment of the energy currently being consumed. It looks increasingly that greater reliance will need to be made on the use of nuclear energy, despite the fears and reservations of many people.
- 2.21.1 USA announced in 2003 that it is planning to spend \$1.2 billion to help it lead the world in developing clean hydrogen-powered automobiles. It is unlikely indeed these will be available on a mass scale or universally for many years, probably not before 2050, if then. Despite hopes of proponents of the fuel, the use of hydrogen as a clean power source presently remains a fantasy—it takes as much ("dirty") energy or more to produce hydrogen in a usable

⁹ I write as a one-time reinsurance underwriter of global catastrophes: earthquakes, floods, storms, bush-fires and so on. The effect of PAT has been noticeable particularly on the eastern seaboard of USA where now relatively small hurricanes both cause more financial damage and do it more often, than a few decades ago. Now in 2005, that can be seen the more clearly with the advent of the disastrous hurricanes this year.

¹⁰ This may be over-stated and more recent estimates suggest up to about 1 billion persons suffer malnourishment.

form, as the energy which hydrogen itself can potentially provide.¹¹ Hydrogen is still available only as an alternative by which energy may be carried. Much the same may be said of electric vehicles, still not far beyond the experimental stage, despite one always hoping for a breakthrough in being able to produce a clean energy source.

- 2.22 There is an impending energy crisis, as scientists warn us, and meeting that crisis should involve our addressing *all* constituent elements, i.e. each of the three factors in the PAT equation.

United Kingdom

- 2.23 The United Kingdom itself has one of the world's highest population densities of 243 persons/sq km, which may be contrasted to that of USA (30) and Australia (2).¹² Much of this density is packed into the main cities of England but there is not much room in which to move even away from urban areas. The nation has a smallish growth rate of just 0.34% and so a sort of equilibrium prevails. Behind that figure however, lies several factors:

- a) the TFR is presently between 1.6 and 1.7, well below the replacement level;
- b) life expectancy is increasing (presently life expectancy at birth is about 77 (men) and 81 (women), this having risen for men by about 6 years in the last 24 years, and for women by over 4 years during the same period);
- c) **net** immigration shows a latest increase of at least 223,000 per annum (but possibly more).

- 2.24 Increasing life expectancy is gradual but significant, and its effect is sufficient, on projections, to add 6.6 million to the population within the next 70 years - this is discussed in a short appendix to this paper. Nevertheless, if we leave that and migration aside, Britain should have a negative growth rate. If that were so, the pressures which it now feels—such as in transport, housing, water consumption, health and other services etc—and the drain it exerts on the world's resources (its large eco-footprint) might even reduce also, since the A and T factors might presently be presumed to be increasing very little.

- 2.25 The OPT suggests that a population of **30 million** may be the largest that the United Kingdom can sustain throughout the next century. This opinion by the OPT's researchers may be arguable but I am inclined to accept it, subject to my hearing of and weighing up any contrary opinions. But note that this is the *sustainable* figure and that does not mean to me that it is the optimum. Nevertheless, let's just stick with this sustainable estimate.

¹¹ This awkward fact may be circumvented in Iceland where there is an abundance of both thermal and geothermal energy to convert hydrogen into a "clean" energy source. It is not that it is impossible to create hydrogen cleanly but that it will take much time and expertise to develop the technology for this to be a major energy provider.

¹² The respective bio-capacities are UK: 1.6 gha/pc, USA: 4.7 gha/pc and Australia: a luxurious 12.4 gha/pc (but subject to lowered water-table and soil salination problems).

- 2.26 The UK population is advised at now reaching 60 million and the Government Actuary's Department predicts (2004-based) this increasing to nearly 69 million by the year 2044.¹³ However, were there no migration factor, ie immigration balancing out emigration to arrive at **zero** net immigration, then the natural increase estimate would give a projected number at the year 2044 of just 59.8 million (having peaked during the period to and fallen back from 61.3 million).¹⁴
- 2.27 To demonstrate the effect of migration, here is (on the next page) a chart of the population growth projected made by the Government Actuary's Department using 2004-based data. The source data may be found in files which can be downloaded from the GAD's web-site at www.gad.gov.uk.
- 2.28 Without a net immigration factor, the population would start to reduce within about 40 years, but with net immigration at presently-projected levels, such net immigration will increase the country's numbers by around 9 million = about 15% more of the present population numbers. Not shown on the chart, the GAD estimate the "natural change" population would continue to fall gradually after 2044. On that basis, OPT's suggested target (30 million) could be reached by about the middle of next century.
- 2.29 In addition to the indistinct picture of the level of net legal inwards migration, there is an unquantifiable number of illegal immigrants arriving all of the time, including a number (possibly large) of rejected would-be asylum seekers who have eluded removal. After much public consternation having been expressed, this peculiarity is at last being addressed (but only tentatively so far) by a government which in my view has failed its citizens by allowing a disastrous situation to develop (I refer to the increasing density, but there are accompanying problems such as health dangers and assimilation). For anyone interested in that topic and for an exposition of a sorry story of misconceptions and botched performance, please turn to the web site www.migrationwatch.co.uk. Nevertheless, my concern insofar as population pressures are concerned, is not whence the immigrants arrive, their political or economic status or their assimilation into the community, but simply the additional numbers.

¹³ Projections by the GAD also give the following estimates:

year 2031	67,013,000
year 2051	69,252,000
year 2074	70,691,000

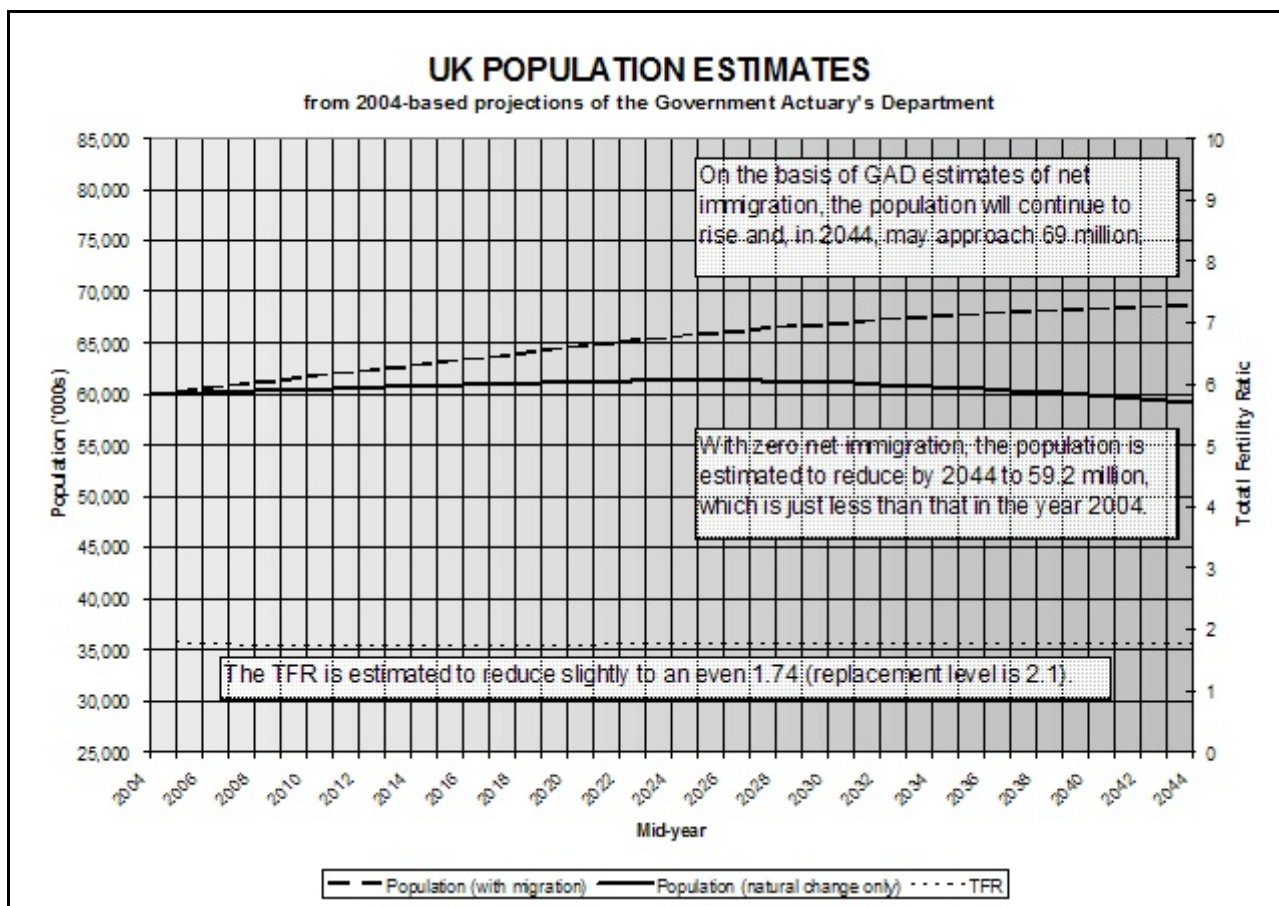
but the GAD does also remind us that the further into the future the projections are made, the less reliance we might properly place upon the estimates given.

¹⁴ Official migration figures for the UK are subject to doubt and some scepticism. This partly arises from what appears as not very effective record-keeping and monitoring by the UK authorities. Net immigration comprises the total of legal immigrants less any emigrants, and the Office for National Statistics has published the figures for the year 2004 (which are a considerable rise on those estimated in previous years):

Immigrants:	582,000
Emigrants:	<u>360,000</u>
Net immigration:	223,000 (rounded)

but the Government Actuary's Department (one of its last annual estimates before responsibility for all population projections was handed over to ONS) gave a figure for net immigration in 2004-5 of 255,000. It is presently unclear to me to what extent illegal entry has been included in the inflow estimate—my impression is nil.

Most recently (2006), these figures have been overshadowed by the numbers entering UK from Baltic and other East European States—reportedly about 600,000 over two years.



- 2.30 Confusion has prevailed over the real numbers of the UK's total annual net inflow. It is possibly largely due to the concerns expressed by MigrationWatch UK that a seemingly more realistic estimate is now given by relevant government organisations (the GAD/ONS in particular) of the inflow. Whereas the Government Actuary's Department (GAD) had previously estimated an annual net inflow of 130,000, it now suggests net migration will fall to about 145 million per annum (after a peak figure of 255,000 for 2004-5), but this must be subject to many outside influences which could change the projections considerably. One such influence is the possibility of the UK government introducing an effective policy for limiting net immigration, but so far, the impression is one of disorder and futility. And this is illustrated also by the recent sudden influx of people from inhabitants of the newer entrants to the European Union.
- 2.31 Although these estimates may be seen as only conjectural (albeit by statisticians/actuaries), they do point to a useful way how the UK population might be regulated without any imposition being made or restrictions inflicted upon the existing population.
- 2.32 However at present, despite a relatively low birthrate, the UK finds itself still increasing its population and this to a large extent derived from a stream of uninvited persons into the country. It is more than time the UK government not only checked the illegal immigrants, quite obviously, but also restricted legal immigration to just those persons the nation really wishes

to allow in the country—whether for economic, political or social reasons, or indeed from compassion (asylum seekers). If the controls or lack of them are left as they are, this flood may create many difficulties, of which circumstance the public is increasingly becoming aware.

- 2.33 Dispiritingly however, the present UK government has shown that it considers population growth by immigration should be encouraged, on the grounds that this assists with the economic health of the nation—would that someone could disabuse them of this and point to the long-term consequences.¹⁵

Simple remedy in theory, but testing in practice

- 2.34 Although the United Kingdom seems to have a population problem greater than that of many other countries, it is surprising that the remedy can be both simple and fast-acting. As already mentioned and *with the important proviso that net immigration is reduced to zero, the existing growth rate might be immediately cut, eventually to reduce below zero, contracting the population to around 30 million within about 150 years.*
- 2.35 Whether in practice that were feasible, may be another matter, but my message is that whatever can be done should be done. The problem should be addressed and not just waved away as unimportant or not immediately urgent. It would be hoped also of course that other developed countries would adopt a concerted policy to achieve a proportionate result, so that the eco-footprint could be reduced to something closer to that of the biological capacity.
- 2.36 I appreciate of course that the period of change could place strains on the economy (reduced markets, ageing population et al) and doubtless have many other transient inconvenient or uncomfortable effects.¹⁶ Just as an example, the country would have an enormous stock of housing, hospitals, schools, factories, offices and other buildings becoming redundant, albeit this becoming noticeably so only after many decades. On the other hand, just think how the country may be more secure from being less self-insufficient, and of the increased physical space and elbow-room which would be available. Nevertheless, there is no gain-saying that a massive project would need to be implemented to reach the UK goal which the OPT recommends. Managing the task would doubtless need much courage, good leadership, perseverance and expertise.

¹⁵ The British government is not the only one to hold such a view. The density of Japan is about 333 persons/sq km (bio-capacity: 0.71 gha/pc) and the annual growth rate a modest 0.15%, this after a spectacular decline in the TFR to just 1.42 as estimated for 2002. A significant reduction in the population looms, placing further strains on a stumbling economy and increasing the ageing profile and thus reducing the potential support ratio ("PSR"). The situation has been exacerbated also by significantly increased life expectancy. Despite a traditional conservative resistance by the indigenous population to migrants, a Prime Ministerial commission in 2000 concluded that: "*Japan should set up an explicit immigration system immediately to encourage foreigners to move in and take up permanent residence here.*" The average annual increase in registered foreigners is only 75,000 presently and there are up to about the same number of illegals = 150,000. The proportion of foreigners is now only around 1% of the population, but to maintain the PSR a UN Report in 2000 on "Replacement Migration" suggested net immigration numbers would be needed far exceeding that of the present population itself (about 127 million)—an impossible scenario. The Japanese face a continued decline in the PSR and need to find other means to cope with the strain.

¹⁶ Opposition from various religious organisations might also be encountered but this does not presently seem to be the case as for instance in Indonesia (Muslim) where a concerted Family Planning scheme has already cut the TFR from 5.6 to 2.35 and with 55% of women using contraceptives. Similarly, (Roman Catholic) Italy appears to disregard the Pope's directives on contraception, the country having reached an estimated TFR of just 1.28—one of the lowest.

Ageing population

- 2.37 It is plain that if the fertility rate reduces, the age spectrum of the population will shift so that the potential support ratio (PSR) will reduce, with a smaller work-force supporting a larger ratio of pensioners.¹⁷ There may well be means by which this transient effect may be overcome. For example, since life expectancy is increasing (see the Appendix), it may be anticipated that more people will wish to or find it necessary or convenient to work to a greater age than hitherto. Already the UK National Insurance pensionable age for women is to be increased from age 60 to 65 in about 2010, and the government has made noises of this being further increased for both sexes to 70 (although in the just published—November 2005—Pensions Commission (Lord Turner) Report an increase, eventually, to only age 68 is mooted).
- 2.38 Furthermore, with greater efficiency which may follow from not just better management but also from technological advances and possibly also better health, productivity per capita of the work-force may well increase and contribute to the carrying of the ageing burden (if that is what it were to become).¹⁸
- 2.39 Presently, for the purpose of calculation of the potential support ratio (“PSR”), the average working age range is taken as from 16 to 64 inclusive = 49 years, but this may in future years be found to be less appropriate and unreal. More properly it may be found to be, say, 18 to 69 = 52 years. The extension of the upper age range, not only provides more working years but encroaches on and reduces the pensionable years. It could be that the *real* PSR would provide a more acceptable figure.
- 2.39.1 Using the 2004-based principal projections of the GAD, I have found the “official” PSR in 2004 was about 4.0 and that this would reduce to about 2.4 by the year 2044. On the basis of the population projections from natural change only (ie zero net immigration), the PSR in 2044 would be just under 2.0, not a great deal less than that for the principal projection. More importantly, if we saw that the working-age range at that time to be more properly from 18 to 69, the PSR would be 2.6 which is even more than the “official” PSR for the principal projection.
- 2.40 The PSR is, in any case, a clumsy tool on its own and for a proper assessment, other factors would need to be considered, such as the likelihood of greater productivity per capita via expected technological improvements.
- 2.41 The immediate problem (but a problem of which successive governments should have been aware for many years—possibly decades) is how to persuade persons to accept a higher age before receiving benefit under the National Insurance pension scheme. For those of the public who have (had) the means and the foresight to make provisions for old age through private pension and/or other investment plans, this is not of such consequence perhaps, but for low income earners and those who have otherwise remained mainly dependent on the NI

¹⁷ By the same token of course, the work-force will need to support only a smaller ratio of those at the other end of the age spectrum, i.e. babies, children and those still in full-time education.

¹⁸ This subject has been touched upon in a report by the United Nations in March 2000 on “*Replacement Migration*”. It was suggested that a declining PSR should be addressed with reassessment not only of policies and programmes relating to international migration, but also of: “(a) the appropriate ages for retirement; (b) the levels, types and nature of retirement and health-care benefits for the elderly; (c) the labour-force participation; (d) the assessed amounts of contributions from workers and employers to support retirement and health-care benefits for the increasing elderly population ...”.

pension, it is only fair to expect that any lengthening of the period of contribution and raising of the age before a pension may be drawn, should be introduced with adequate warning—with 20 years notice or some such. Nevertheless, this (with the raising also of the respective pensionable-age horizon under staff schemes within the public sector) is an issue for government resolve and needs to be tackled regardless of PSR considerations.¹⁹

Reducing markets

- 2.42 The real inhibitor, in my view, to being able to implement a policy of a reducing population is that of the potential effect on the economy. A smaller population means a smaller market for consumption of goods and services and this could have a serious effect on industry and commerce generally. In the last century and before, the commercial world has been greatly assisted by and possibly has relied upon the fact that its markets were ever increasing by way of the growing population numbers and the growing affluence of those populations. It is not just capitalist systems which rely on growth but historically, capitalism has certainly needed to do so. It follows that business leaders and politicians are unlikely to support a regime which could lead to a reduction in commercial activity, with the prospect of failing businesses and of unemployment = less profits from commerce and fewer votes for the politicians.
- 2.43 But just because it may be difficult is not a reason for failing to address the problem. In any case, what I have outlined in the previous paragraph could well overstate the measure of the economic implications. For one thing, the level of unemployment may be reduced simply because of the smaller population. Similarly, despite any world-wide population reduction, the erupting affluence which may be expected in the developing nations will *create* markets. Nevertheless, such a large subject requires expert study to identify and cope with all the possible circumstances—it is not something which can be glibly waved away and surely no responsible pherologist²⁰ would attempt to do so.
- 2.44 The great difficulty is that there is little obvious incentive to leaders—political and other—to study problems of over-population; at first sight and in the short-term, a policy of population reduction could inhibit profits and be expected, if poorly managed, to be sufficiently unpopular as even to force a government from power. Few are brave enough to risk that.

To whom this Paper is mainly addressed

- 2.45 Be that as it may, it is those in the public eye and recognised as opinion-formers capable of perceiving and willing to address the issue in the long-term, who may have more effect. **I should like to convince them of the desirability, if not urgent need, to take up the responsibility for their lobbying governments and other relevant authorities to investigate and implement appropriate action.** This Paper is therefore mainly addressed to those persons.
- 2.46 The solution involves coming to terms with the need to create a balance in our environment, and that in turn means we need to address the truth that our economic well-being must be

¹⁹ Although outside the subject of this paper, I would suggest that the terms of national pensions provisions should be fashioned uniquely for each annual age-group cohort. For instance and as may be seen from my comments in the Appendix, the terms of a 20 year-old **now** may be seen as inappropriate to those of a 50 year-old **now**, simply from their having differing life expectancy at birth and subsequently.

²⁰ Pherologist = a student of carrying capacity.

self-supporting and not reliant on a perpetual increase in production and consumption. I can also point out, as comforting and self-evident, that if a country's population is falling but its GDP declines at a lesser pace, then the per capita economic growth increases.

United States of America

- 2.47 The United States of America presents a unique circumstance: a developed country (with an eco-footprint far outstripping all others, with the exception of only tiny UAE), plus a high growth rate, presently at just under 1% per year. It is acknowledged in the UN's 2002 Revision of World Population Prospects, that on present policy the growth in USA, although slowing, will continue (including a projected increase per year of 1.1 million just from net inwards migration) so that by 2050 it may have a population of over 400 million.²¹ This would be an increase of around a third from the present 300 million.
- 2.48 Even were just the present-day level of affluence to be maintained, USA should be looking to reduce its numbers meaningfully. However, that message may be rebutted, if not ignored, by those in the US concerned with economic well-being and preservation of the country's political might,²² since both of these may be helped (albeit only in the short-term) by increased population numbers. That is an understandable human reaction but in the long-term it is as unsustainable as will be the planet's carrying capacity if USA, and the rest of us, fail to get to grips with our people plague.
- 2.49 USA gives us an outstanding example of how potentially disastrous effects may arise even in a country with surplus food and surplus buying power. In 2003, its ecological footprint was assessed at 9.6 gha/pc whilst its bio-capacity was just half that, standing at 4.7 gha/pc. Very belatedly, moves are being undertaken federally and by certain States to combat the environmental pressures. Included is a debate over immigration, particularly from Mexico, but even now that argument does not seem to encompass consideration of the present serious overshoot and how added net immigration will exacerbate an already unsustainable pressure.
- 2.50 Despite any individual's willingness to adopt more efficient means of consumption and even to ration oneself to a certain extent, this will surely always be tempered by a reluctance to cramp one's lifestyle significantly or forego one's ambition to an ever-better lifestyle. Facing such a reality, a brake on population size seems an inevitable necessity and, in the case of USA, this means close attention to its net immigration.

Effect of migration on United Kingdom and USA

- 2.51 The difficulties which the United Kingdom is facing over migration must be mirrored in a number of other developed countries, none more so than in USA. The effect is that the less developed countries can manage to reduce their annual population growth by the fact that so many of their (mainly young) people are voting with their feet and decamping for a potentially more acceptable life in one or other developed country of their choosing. If this did not occur, there could remain more of a pressure of population in the would-be migrants' native country, to the benefit and relief of the prospective new host country, but in total, migration makes not one iota of difference to the size of the world's population. The difficulty arises from the

²¹ This is shaded to 395 million in the UN's 2004 Revision.

²² The fear of less political influence internationally may well be a potent, if unspoken, reason for some countries viewing a continued increase in population numbers as a key to avoidance of this eventuality. USA may well view the growth of China and India in particular as a justification to bolster its own population numbers as much as possible, regardless of the deleterious effect on the planet's environment.

inevitable increase in the **impact** of such immigrants as they attain the higher living-standards to which they understandably aspire.²³

- 2.52 There are other aspects to this flow of migrants (so-called “economic” migrants) from the less developed countries. These relate to a possible financial burden of coping with the flow, the possible economic gain from a new work-force, fertility rates, and the assimilation rate of persons of different cultures and life-styles. Similarly, any outflow of persons from their countries of origin, may denude those countries of valued talents and drain resources. Nevertheless, those matters are all really beyond the intended scope of this Paper and may not in the long-term impinge on population pressures but migration really is a far-reaching subject which should be addressed as part of the overall question in the UK, USA and elsewhere.

²³ A questionable aspect is where countries actively *encourage* immigration or turn a blind eye to illegal immigrants to fill some gap in the labour market. It may be seen that in this way a community may be robbed of the more active, aspiring and talented elements within that community, by others abroad competing for their services.

3 WHAT SHOULD WE AIM FOR?

3.1 The general aim for the planet should be to ensure the population as exists at any one time may live within its own resources and not make demands upon the resources which should otherwise be available to future generations. It is estimated by WWF that the world's population has an eco-footprint which exceeds the Earth's biological capacity by about 25%. That 25% deficit represents an excessive use of the Earth's resources, yet it is still a pale reflection of its full extent, as it fails to take account of:

- a) the exhaustion of mineral deposits,
- b) the erosion of topsoil and its incipient loss through salination,
- c) overuse of water supplies,
- d) most forms of pollution (with the possible exception of carbon dioxide), and
- e) the loss of animal and plant species and of our wildernesses.

Furthermore, uncontrolled population pressures are more likely to result in conflicts, which not only could result in large losses of life but also make further large demands on the Earth's resources.

3.2 The moral exhortation is straight-forward: ***during one's span on Earth, do not leave a mess for future inhabitants to cope with.***

Wild-life

3.3 All of the foregoing has focussed on the human population of the world, but I suggest that there is a responsibility owed as well towards other living things generally. In considering the world's maximum sustainable capacity of humans, it would be wrong to ignore the balance of nature, not just in terms of how it affects humans but also of how it affects other living occupiers of the planet, particularly the higher forms within the animal kingdom. Nor must plant-life be forgotten.

3.4 So, our wildernesses—literally the homes of animal and plant wild-life—need protection from our human hordes also.

4 REMEDIES

- 4.1 The main remedy as given by those who appear to know, is **education**.
- 4.1.1 First, the education of everyone to understand the logic of the PAT equation and of the dangers and circumstances which I have very briefly outlined in this paper. This specifically includes impressing on all those who influence policy: government, parliament, local authorities, judiciary, religious leaders, scientists, teachers, journalists, business leaders and so on, that a change of attitude is urgently needed—in this country and everywhere else.
- 4.1.2 Secondly, the general education of the populations in developing countries, i.e. those persons who are presently deprived from receiving a good education. It has been found that the better educated (and/or affluent) individuals or groups become, the birthrate tends to subside in tandem.
- 4.1.3 Lastly, specific education on birth-control techniques and the advantages of family planning—far more intensively than as at present.
- 4.2 Nobody should suggest that any coercive measures should be adopted by governments or others, such as those which were introduced by China. Rather should any State-led intervention be restricted to stick and carrot encouragement via **fiscal measures** (taxation, subsidies, grants etc).
- 4.3 Another step (vital in my view) is to **check immigration** efficiently and more selectively.²⁴
- 4.4 “Developing” countries by definition have an increasing affluence (“A”) factor, as indeed may be hoped for, and therefore the ecological impact should be anticipated to expand greatly, despite any slowing in population growth. This indicates the desirability of an even lower fertility rate than that of the developed countries, for a considerable period, and **international aid** should focus on assisting in and managing this process.
- 4.5 *All* countries need to pay more than lip-service to the **protection of the environment** and continue to tackle the A and T factors.

Hugh Thompson
April 2009

For the record, I am just a member of the public and have no expert skills in demography—my interest in population issues simply stems from being informed of difficulties as have been outlined in this Paper. An Australian, I have been temporarily resident in England for some 50 years. I suppose it could be said that I am an immigrant but I entered the UK at a time when I was still counted as a British subject. For a little more of my background, some mention is made in my web site at www.doot.co.uk, this being mainly a vanity site of photographic images but with a small section also on population matters.

²⁴ Immigration controls are regarded by many of my libertarian-minded kith and kin as wretched. However, I consider the idea of the Earth being “one world” over which all of us should be able to roam freely, is just not practicable even if desirable or a moral right. The present human plague needs our prior attention before giving consideration to the merits or demerits of such other ideals, however well-meaning or seeming-attractive.

APPENDIX - Some notes on greater longevity (UK)

1. Presently, according to statistics and projections provided by the Government Actuary's Department, and the Office for National Statistics, the average life expectancy in the United Kingdom is:²⁵

<u>NOW:</u>	At birth	at 50	at 65
Males	76.9	29.3 (= 79.3 total)	16.9 (= 81.9 total)
Females:	81.1	32.7 (= 82.7 total)	19.6 (= 84.6 total)

2. In the UK, the pensionable age (National Insurance scheme = "NI") contemplates retirement by males at age 65 and by females at 60. So eventually and in theory for those born in 2005, the average man will be drawing a pension on average for 11.9 years and the average woman for 21.1 years (this actually somewhat less than will be the case for those who actually manage to survive to pensionable age - see below). Within the next decade, however, the female NI retirement age will be increased to 65 also.
3. Putting aside the present disparity vis-a-vis the two sexes, it may be seen that the cost of paying NI pensions has risen significantly from that which applied in previous decades, and not just from increasing numbers of people reaching pensionable age. For instance, the relevant figures in 1981 were:

<u>IN 1981:</u>	At birth	at 50	at 65
Males	70.9	24.2 (= 74.2 total)	13.0 (= 78.0 total)
Females:	76.9	29.3 (= 79.3 total)	16.9 (= 81.9 total)

4. No wonder that pension schemes, whether funded or not funded (such as is National Insurance), are presently feeling the pinch. Unfortunately, the perceived solution by many of those in authority is to find means by which the working-population may be increased in order to pay for the pinch, and achieving this by encouraging immigration. To me this seems less than logical and it fails to consider the long-term effects.
5. In the long-term, we may expect that human longevity will continue to increase and the year-of-birth cohorts of the present working-population will in due course become pensioners. What then? Double up the increase of the then working-population? That path leads to an inexorable progression: 2, 4, 8, 16, etc and is clearly impracticable.
6. In 2005, the average man surviving to age 65 has about an extra 4 years of retirement beyond that which was the case in 1981, the average woman nearly 3 years, yet the funding of pensions for persons retiring now has been based on circumstances applicable in earlier years, and in many cases much earlier than even 1981.

²⁵ The life expectancy rates which are quoted are at current rates for the year concerned. This is unlike figures which would apply for "cohorts" of people of the same age as they grow older. A person born now may expect a somewhat different average figure to apply when he/she reaches 50 or 65 than as shown here.

7. The real solution is not one of increasing today's funds for today's pensions, but to examine the necessity for a pension. With increased longevity also has come better health, so more people are surviving to the present NI pensionable age. Those who are of working-age may arguably be presumed to be capable of providing greater productivity per capita simply from better health and education, but probably it will be through the steady improvements in technology which will allow the nation's GDP per capita to be maintained and indeed be increased. So if the work-force of a given size or proportion is providing ever-increasing production, this should allow lee-way in financing pensions.
8. Little wonder that the UK government is also introducing schemes by which the population is to be encouraged to defer the NI pension for several years. What this may do is not reduce the cost to the government (in theory the pensioner will receive a proportionately increased pension from that which would be paid at 65/60) but allow the individual to earn an income during the deferral period, which would be taxable and in turn contributing to the nation's wealth. In due course, however, one may expect that once deferrals become a common occurrence, the government will raise the standard retirement dates and re-jig pension amounts so that the cost to the government **is** lessened. Indeed the just-published Report by the Pensions Commission led by Lord Turner contemplates the retirement age for NI being extended to age 68.
9. In fact, whether drawing from National Insurance, a private pension scheme, or from other savings, it would be reasonable to expect any individual to continue to work for as long a period as he or she may consider to be necessary for a comfortable life-style. Maturity dates under insurance policies for instance may be considered as only the earliest date before which benefits may be drawn, and many may wish to consider deferral. Others may both take the benefits and continue working. As annuity rates continue to fall due to increased likely longevity, so will this surely become more common—this regardless of any government legislation or intervention; it should be a natural development.
10. Still with current period figures (by contrast to year-of-birth cohorts), the GAD have projected future life expectancies. In the year 2054, the estimates are:

<u>IN 2054:</u>	At birth	at 50	at 65
Males	83.9	35.5 (= 85.5 total)	22.4 (= 87.4 total)
Females:	87.3	38.3 (= 88.3 total)	24.7 (= 89.7 total)

11. As shown above, a male born about now has a life expectancy of 76.9 years and a male this year aged 50, may expect a total life of 79.3 years (all of these figures are of course averages only), but today's male baby may look forward if and when he arrives at age 50, to a total life expectancy not of 79.3 years but of about 85.5 years.²⁶
12. To put it in bald terms, the expectation of life on birth (ELOB) increases from 71 (males) and 77 (females) in 1981 to 84 and 87 in 2054, **an increase of 13 years and 10 years**

²⁶ This should incidentally demonstrate that the older we get, the older we are likely to get, and that in contemplating any pensions or savings plans we need to consider life expectancy at the time of approaching retirement and not just life expectancy at birth.

respectively over a period of about 73 years. If we were to say that the retirement age was 65 in all cases, this represents—based on ELOB figures—an increase in retirement years:

YEAR	MALES	FEMALES
1981	7	13
2054	20	23

Does not that clearly show the extent of the problem? But it is only a problem if individuals within the population fail to accept the need to provide for themselves adequately and adjust the point of retirement accordingly.

13. Whichever way one looks at it, our lives in total are lengthening significantly and we have more years during which we need to look after ourselves for a comfortable life-style, a circumstance likely to continue if not intensify with the passage of time. Either we provide for ourselves for this extra time on earth by greater productivity during our working days or we work for a longer time. Or do both.

Increased size of population

14. Apart from the perceived problems of an ageing population through greater life expectancy, there is the concomitant effect of the continuing greater longevity increasing the nation's population numbers—quite significantly.
15. The effect on the size of the population may be measured from GAD projections. The principal projection (on present trends) shows a total population in 2074 of 70,691,000 but this would reduce to just 64,108,000 were there no improvement in mortality. **In just 70 years, there would be an increase of over 10% or about an extra 6.6 million people living because of the expected rise in life expectancy.**²⁷
16. So we can expect there to be significantly more people, all on average living much longer.
17. The circumstance of increasing life expectancy has attracted public attention because of the perceived pensions crisis, but few appear to be aware that it is also a significant factor in the increasing population in UK (and doubtlessly elsewhere also). Obviously, we all would like to live (healthily) longer, but the cost of this must be appreciated - both in economic terms and in the pressures provided by greater population density.

²⁷ If that were not enough, the United Nations Population Division has now drafted a report (December 2003) with projections up to the year 2300. However one may view the credibility, the estimates for UK of expectation of life on birth (ELOB) are:

	1995 - 2000	2045 - 2050	2095 - 2100	2195 - 2200	2295 - 2300
Males	75	81	86	94	100
Females	80	86	90	98	103

Perhaps we should allow future centuries to look after themselves!