

## **WHO'S AFRAID OF POPULATION DECLINE? A CRITICAL EXAMINATION OF ITS CONSEQUENCES**

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**Key words:** Population decline, ageing, depopulation, population stabilization.

### **A b s t r a c t**

Population decline confronts almost all the countries of Central and Eastern Europe. Total world population may be declining before the end of this century. Despite that, is a neglected topic in demography, its analysis and its consequences overshadowed by the problem of population ageing. This paper shows that population decline is a diverse phenomenon. The process of decline, and its end-product of smaller population size, have different consequences. Modest rates of decline may be manageable and scarcely perceptible. Smaller population size may be irrelevant to most aspects of political, social and economic welfare and beneficial for environment and sustainability. In the future, adaptation to it may in any case become unavoidable.

## **KTO SIĘ BOI ZMNIEJSZENIA LICZBY LUDNOŚCI? KRYTYCZNE BADANIE KONSEKWENCJI TEGO ZJAWISKA**

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**Słowa kluczowe:** spadek liczby ludności, starzenie się, wyludnienie, stabilizacja populacji.

### **A b s t r a k t**

Prawie wszystkie kraje Europy Środkowej i Wschodniej stają wobec problemu zmniejszenia się liczby ich ludności. Również całkowita populacja świata może się zmniejszać przed końcem obecnego stulecia. Stanowi to zaniedbany temat w demografii, a jego analizy i konsekwencje są przysłaniane przez problem starzenia się populacji. W artykule pokazano, że zmniejszenie liczby ludności jest zjawiskiem odmiennym. Proces zmniejszania się i jego wynik w formie mniej liczebnej populacji mają różne konsekwencje. Umiarkowane tempo spadku może być możliwe do kontrolowania i odczuwalne w sposób nieznaczny. Mniejsza liczba ludności może być nieistotna dla większości aspektów sytuacji politycznej, społecznej i ekonomicznej, a korzystna pod względem środowiska i zrównoważonego rozwoju. W przyszłości dostosowanie się do tego może okazać się nieuniknione.

## Introduction

Fear of population decline, censuses to warn of it and pro-natalist and other policies to avert it, are almost as old as states themselves (GLASS 1940, TEITELBAUM, WINTER 1985). Rulers and states in the past and present, and stateless tribal societies, found affirmation, strength and protection in population growth and cause for alarm in decline as symptom, and cause, of failure and weakness. Where increases in productivity are difficult or almost unimaginable and where international trade is a zero-sum game, population becomes with land the chief factor of production, its increase to be encouraged by any means including conquest, the prohibition of emigration, and enslavement; its diminution to be avoided at all costs. Mercantilist thinking gave first place to the power and wealth of the state and regarded population as a prime factor, to be increased irrespective of the effect on individual standards of living.

Between the two world Wars, birth rates in many Western European countries, and in the US, fell to below the level of replacement (VAN BAVEL 2001). The prospect of population decline implicit in those rates, formalized into alarming population projections (e.g. CHARLES 1938), prompted several governments to adopt pronatalist policies to avert the 'twilight of parenthood' and 'race suicide'. The recovery of the birth rate, and the 'baby boom' blew away those fears in most Western countries, at least for a while. Instead the world concerned itself with over-population. But since the end of the 20th century, the demographic, political and business worlds have rediscovered population decline. For the latter, at least, this prospect is unappealing (see LONGMAN 2004). However, in some densely populated countries such as the Netherlands, public opinion has for some time been notably relaxed about the prospect of population decline (ROZENDAL, MOORS 1983). And for some years after the Second World War, the governments of the UK and of the Netherlands encouraged emigration, partly in order to ease domestic overcrowding. Many of the numerous Dutch citizens emigrating from the Netherlands in recent years have cited overcrowding among other the factors that have driven them from their homeland (VAN DALEN, HENKENS 2007).

Until the 1980s, demographic transition theory took for granted that populations emerging from the transition would resume the previous pattern of maintenance of numbers sustained by approximately replacement-level fertility. That assumption was convenient, reasonable but evidence-free (*World Urbanization Prospects*. 2002, DEMENY 1997). Fertility in much of the developed world, except for Central and Eastern Europe, remained resolutely below replacement level from the 1970s onwards, emulated by a growing number of developing countries, reviving the concerns of the 1930s (CHESNAIS 1996).

The era of rapid and sustained population increase was a short one in the broad sweep of human history, as REHER (2007) has pointed out. It dates back for little more than two centuries and is now drawing to a close in the West, with profound political and strategic implications. Before that 'great population spike' (ROSTOW 1998), population decline was a constant preoccupation and a not infrequent experience (GLASS 1973, BIRABEN 2004).

### **Population decline – the current reality**

Today, after the unlooked-for irruption of the baby boom, all its birth rates, with the exception of the United States, New Zealand, Iceland and (almost) France, have returned to below the level required to maintain the population. Without migration, the Western world faces population decline in the short or medium term given current levels of fertility. Many developing countries are likely to follow that example within a few decades. Natural increase remains positive in parts of North-West Europe and, thanks to recent increases in fertility, in the Czech Republic, Poland and Slovakia. Elsewhere, deaths exceed births especially where chronic low birth rates have exhausted positive demographic momentum and turned it negative (Japan – OGAWA et al. 2005, Germany – SCHWARTZ 1998, BIRG 2002). The last generations completely to replace themselves in Western Europe were born in the 1950s (SOBOTKA 2008).

Countries with 'natural decline' in 2008 included Italy, Germany and most countries in Eastern Europe and the Russian Federation, and Japan (Tab. 1). Germany's population fell after 1974 (Federal Republic) and then again from 2005 after a period of immigration-fuelled growth. There, official projections gloomily assume a stagnant total fertility of 1.4, and a decline to 68.7 million by 2050 even with 100,000 net immigrants annually (*Berölkerung Deutschlands...* 2006). Japan's population tipped over the edge into decline in 2006. There, official projections, gloomily assuming a future total fertility of a perpetual 1.26, see the population falling from 127.8 million in 2007 to 95.1 million in 2050, by which time natural decline would have reached 1.16% per year (Government of Japan 2009, tables 1.4, 1.6). In China, Hong Kong, Korea, Taiwan and Singapore, despite very low total fertility, demographic momentum still keeps births ahead of deaths.

Ageing and depopulation through emigration can become institutionalised if movement to attractive destinations is easy (e.g. BRETON et al. 2009). In Ireland emigration became embedded in the culture in the 19th and the first half of the 20<sup>th</sup> centuries. (KENNEDY 1993, DALY 2006). East of the Elbe, population decline has been accelerated not only by emigration (HAUG 2005) and by low fertility, but also, in the unreformed former republics of the Soviet

Union, by high levels of mortality (DAVANZO 2001, CHAWLA 2007, *National Demographic Strategy...* 2007). In 2008, deaths exceeded births in 14 countries in Europe, and in thirteen, total population was declining after taking migration into account (Tab. 1).

Table 1  
Natural and total population change in Europe, 2008 (per 1000 population)

States with increasing population 2008 (first 14)				States with declining population 2008 (all)			
natural increase descending order		total increase descending order		natural decline descending order		total decline descending order	
10.51	Ireland	Ireland	14.59	-0.06	Italy	Croatia	-0.30
6.34	Albania	Switzerland	14.05	-0.27	Lithuania	Estonia	-0.39
4.55	France	Norway	13.10	-0.48	Estonia	Lithuania	-0.51
3.97	Norway	Kosovo	12.80	-0.82	Moldova	<b>Russia</b>	-0.74
3.51	UK	Spain	12.03	-1.45	Romania	Romania	-1.39
3.03	Netherlands	Slovenia	10.99	-1.89	Croatia	Hungary	-1.41
2.90	Spain	Czech Republic	8.32	-2.05	Germany	Moldova	-1.45
2.19	Belgium	Belgium	8.22	-2.55	Russian Fed.	Belarus	-1.84
2.00	Switzerland	Sweden	8.00	-2.68	Belarus	Germany	-2.04
1.97	Finland	Italy	7.28	-3.07	Hungary	Latvia	-4.23
1.94	Sweden	United Kingdom	7.21	-3.11	Latvia	Bulgaria	-4.41
1.94	Macedonia	Denmark	7.19	-14.29	Bulgaria	Serbia	-4.57
1.91	Denmark	France	5.75	-4.57	Serbia	Ukraine	-4.96
1.41	Czech Republic	Netherlands	4.95	-5.28	Ukraine		

Note: states below 1 million population excluded. Serbia – total change unknown.

Source: Eurostat Data in Focus 31/2009, Table 1.

The exciting ‘decline’ in Europe’s population, current and projected, of which the media are so fond, arises mostly because of the lumping together of Eastern Europe (including the European former Soviet Union) with all the other regions of Europe (Fig. 1). The most severe decline is projected for Eastern Europe, with more modest declines in the longer term for Western Europe, and growth, not decline, for Northern Europe.

Taking all this together, the expectation for the future of the developed world is a picture of expanding diversity, not a collective descent into oblivion.

These are only projections. Viewed as forecasts, projections are always wrong. What matters is how wrong. For thirty years, birth rates in Western Europe have been relatively stable. According to the Euro-barometer survey of 2006, women in all European countries except Austria want at least two children (TESTA, GRILLI 2006). Postponement or delay in childbearing, universal since the 1970s, deflates annual births and period indices of fertility.

Period birth rates recover when postponement ends. Partly for this reason, birth rates have risen recently in almost all European countries, as in the US

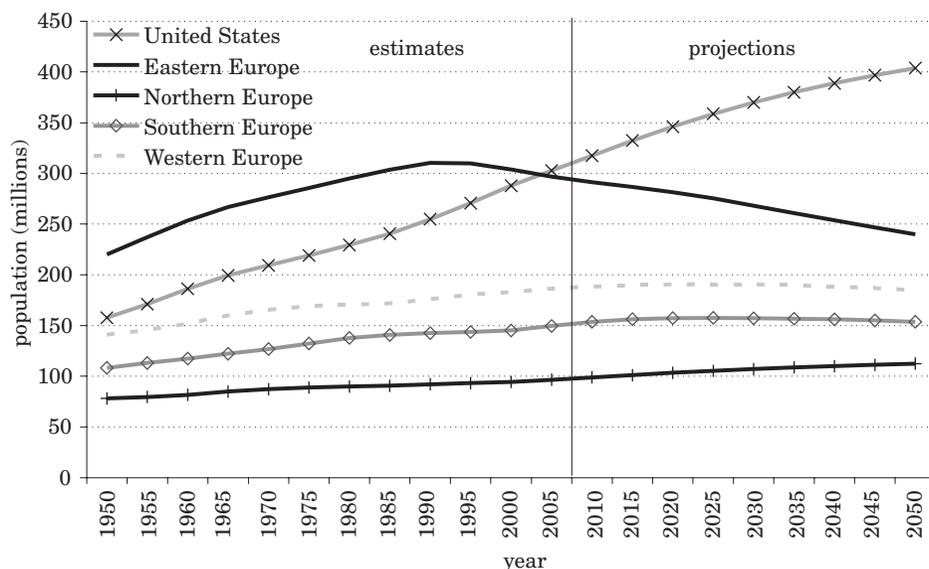


Fig. 1. Population estimates and projections, USA and major European regions, 1950–2050 (millions)  
 Source: UN 2008 – based medium variant projections.

and Australia (SOBOTKA 2008, MYRSKYLÄ et al. 2009). While in some it is now close to replacement (France 2.02, UK 1.96 in 2008), few demographers believe that fertility will generally return to replacement level (e.g. LESTHAEGHE 1999, FREJKA et al. 2004). Persistence of very low fertility over a long period may socialise new generations into very low expectations for family size; a ‘low fertility trap’ (Lutz et al. 2006), to be reversed only with the greatest difficulty (*Strong Family and low Fertility...* 2004). UN projections assume that all countries will eventually converge to a TFR of 1.85 (UN, 2009). With constant mortality and no migration, such a fertility rate implies an eventual decline in population of around 0.35% p.a.

Migration, the most important factor now in Western population dynamics, is the most volatile and the most difficult to project (TEITELBAUM 2001). The potential importance of future migration in Western Europe, assuming the continuation of current trends, can be gleaned from Figure 2. The latest projections expect all the countries of Central and Eastern Europe to have smaller populations in 2025 compared with 2010 except the Czech Republic and Slovakia, although the projected decline is less than in earlier projections.

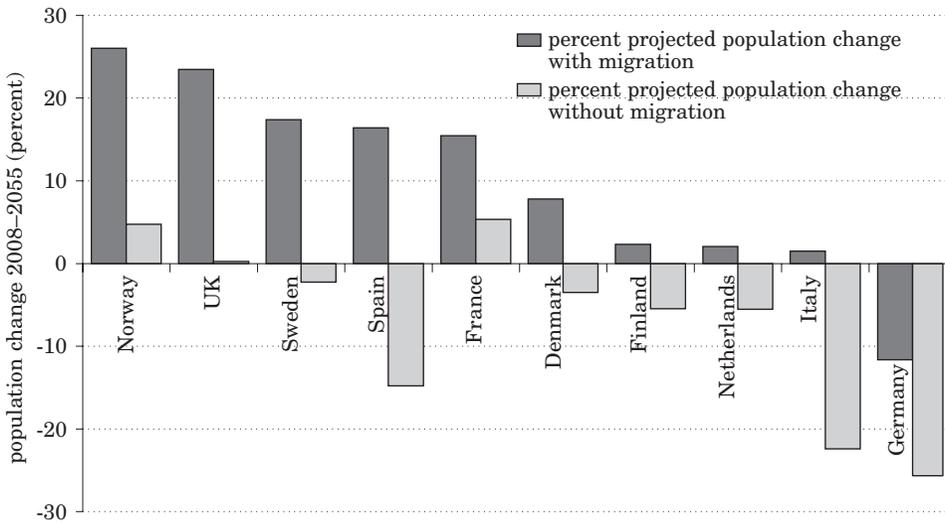


Fig. 2. Population change in selected European countries 2000–2055, percent, with and without migration

Source: Eurostat 2007.

## Population decline and population ageing – divergent sisters

Population decline is often treated as a sub-text of population ageing, which has received the greater attention. In some aspects those processes proceed in parallel, in others they diverge. Decline and ageing may share a common cause in low birth rates, but one does not cause the other. Any reduction in birth rates promotes population ageing, even in youthful societies. Decline only follows (excepting the effects of migration) when the birth rate falls below the death rate. Inward migration (in the youthful pattern usually experienced to developed countries) acts similarly upon both, tending to reduce population ageing and decline, and preventing or reversing decline altogether if it is on a large enough scale. A reduction in mortality has opposite effects – tending to increase population, or at least to moderate decline, while (in modern societies) also exacerbating population ageing.

Sub-replacement fertility, continued for many years in the absence of migration, has divergent effects on age structure and on population size. Ignoring migration and mortality, it makes the population older for about two generations before the age-structure comes to rest upon a new, older but stable distribution. Population size follows a different path. That continues downwards at an eventually constant rate. In the medium to long run the effects on age-structure are modest; on population size eventually highly significant, tending towards extinction.

## Reasons for fearing population decline

When considering the objections to population decline, and its possible benefits, it is important to make a distinction between the prospect and process of decline, and the fact of having a small population, or a smaller one than hitherto. A distinction must also be made between absolute and relative decline. A relative decline in population may still be a cause of concern if population growth falls behind that of political or economic rivals. Finally, the pace of decline matters. A given reduction in population will have different implications depending on whether it occurs gradually through the course of centuries or is compressed into a few decades.

## Economic growth

As labour (equivalent to population) is one of the key inputs to production it is axiomatic that population growth increases total output (GDP) as long as additional workers can be employed. This is illustrated by the American experience. During the twentieth century GDP per capita grew at virtually the same rate in the USA as in Western Europe (2.0% p.a. and 1.9% p.a. respectively)<sup>1</sup>. However, the USA experienced much faster population growth (1.3% as compared to 0.5%) with the result that total GDP also increased much faster. In 1900, the total output of the US economy was 46% of that of Western Europe as a whole. By 2000 the figure was 106%. Conversely, declining population implies slower output growth, unless it is compensated by acceleration in productivity. Confidence in growth in numbers may underpin confidence among investors and inventors that their products and services will be launched onto a growing market that will sustain demand, and that a growing labour force can match demand with the required output. In theory, a larger population size permits greater economies of scale and division of labour, thus improving productivity. Manufactured products with high development costs come within the reach of growing capital markets.

In a closed economy, population decline, or even the end of population growth, pulls the rug from under these advantages and reverses them. It is accompanied by a greater degree of population ageing with all its costs. With given productivity, GDP declines *pro rata* with numbers of people. Economies of scale may diminish. Shrinking markets and a diminished workforce could squeeze profitability – declining domestic demand accompanied later, as the

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<sup>1</sup> These data were compiled by Angus Maddison and are available at [www.ggd.net/maddison/Historical.../horizontal-file 03-2007.xls](http://www.ggd.net/maddison/Historical.../horizontal-file 03-2007.xls).

workforce contracts, by rising wage pressures from an increasingly scarce labour supply. Weaker investment – discouraged by the prospect of declining markets – would mean that plant ages and is less competitive. If cheaper imports replace domestic supply, domestic manufacturing capacity gets hollowed out. The psychology of the market becomes defensive, pessimistic and risk-averse when the cushion of population growth is no longer there, according to JACKSON and HOWE (2008, p. 113).

A falling population base implies higher taxes to maintain existing infrastructure or to fund indivisible new projects. Eventually, the State may have to abandon some of the infrastructure – amalgamating schools and hospitals and restricting repairs. A contracting housing market, and falling public investment in infrastructure, reduces demand for building materials and construction work. If decline were across the board, smaller communities could become unviable.

In a closed economy, declining population thus puts the spotlight on increasing standards of individual productivity and consumption to maintain the level of investment and confidence. Vulnerability to slumps may be higher without the prospect of long-term growth in demand to buoy up confidence. Products with high research and development costs can no longer be contemplated solely from the resources of the national economy. Ireland was a unique example of population decline in Europe from the 1840s to the 1950s, although only a nation-state from 1922. Official reports drew attention to high overhead costs in provision of services, the limited domestic market, the discouragement of risk-taking, the lack of optimism about prospects. (WALSH 1974).

### **Military security**

Other things being equal, big counties have more political and military power than small ones (MCNICOLL 1999, KENNEDY 1988, KAGAN 2003). Population decline *ipso facto* reduces the potential size of armed forces. GDP, smaller than hitherto, can no longer support the domestic development of expensive equipment, which must then be imported at a cost to the balance of payments or foregone. The mechanisation of warfare and the advent of nuclear weapons have not eliminated the importance of the balance of numbers between powers at similar levels of development. A classic example is the failure of French population to grow in the 19<sup>th</sup> century, following its very early fertility transition. France began the 19<sup>th</sup> century as Europe's demographic, military and economic superpower. It ended it on a par with the United Kingdom and Germany, to which it lost two provinces in 1871. Near-defeat in the First World War reinforced fears of population decline (see TEITELBAUM, WINTER 1985),

confirmed by the final catastrophe of 1940 among other reverses (SAUVY 1987, Ch. 8). More recently, the power residing in the Kremlin has diminished with the diminution of population, space and economy under its control. After the loss of its satellites in 1989 (total population with the Soviet Union 385 million) and the break-up of the Soviet Union itself in 1991, Russia will face an even further loss of capacity if its population declines as projected from 148 million in 1990 to 116 million by mid-century (BALZER 2005, *World Population Prospects*. 2009). The relative decline of the Western powers projected for the 21<sup>st</sup> century, compared with the population increases of third world countries, magnified by their economic growth, promises a radical shift in the strategic balance (e.g. JACKSON, HOWE 2008).

### **Civil political power**

Numbers also matter in the peaceful exercise of power. Population determines representation in many international bodies (although not the United Nations), and is correlated with economic power. Representation in the European Commission and the European Parliament is directly related to population, although with a favourable weighting for small countries. G8 membership depends on GDP, closely related to population within today's developed realm. Over a few decades relative rank-orders of population will change, with consequences for economic and political weight in the international order (MCNICOLL 1999), including the rank-order of size in the EU. The UN 2008 – based projections suggest that Germany's population will be eclipsed by that of the UK by 2050, with France not far behind – a development of considerable symbolic power, if nothing else. Smaller countries such as Bulgaria (SUGAREVA et al. 2004) and Hungary fear damaging depopulation. More broadly, the relative and eventual absolute decline of the population of Europe invites an unfavourable strategic outlook compared with the continued rapid growth of the USA (KAGAN 2003), diminishing Europe's importance to the USA as an ally in competition with other, growing global centres of power and wealth.

### **Is population decline really such a problem?**

Population decline, therefore, is seen as bringing some disadvantages to any society.

Rapid decline in countries such as Bulgaria has pathological social and economic causes provoking emigration and low rates of birth and survival

exacerbated by the process of decline itself in a vicious circle. The population declines currently in progress and projected for other countries in Europe are more gentle, buffered by immigration and greater longevity and, recently, some recovery in birth-rates. Germany's decline, projected to mid-century, would take population size back to the level of 1955, in Poland to the level of 1967, in Italy to 1977. None of the dire effects foreseen above were apparent in those populations in their earlier, smaller size.

The rapid decline and ageing in the rural areas of South-Eastern Europe is an extreme acceleration of a normal process. Over more than a century in all developed societies, efficient agriculture has produced more and cheaper food and occupied a much smaller proportion of the workforce (SAVILLE 1957, FESER et al. 2003). As rural populations decline, their numbers may sometimes fall below the critical minimum threshold for maintaining local services (SUTTER, TABAH 1951). But this out-migration liberates a workforce for urban industry, services and specialisation. Not all grieved to leave the often impoverished countryside, or the 'idiocy of rural life'. And in some countries, counter-urbanisation has partly reversed the trend, although not to the agricultural sector (CHAMPION 1989, 2000).

So far we lack much empirical evidence that modern population decline will depress innovation, investment or individual wealth – the process has scarcely begun. Population in all the major West European countries, including the UK, had almost ceased to grow from the 1970s until the 1980s, until the revival of immigration from the mid 1980s. In Germany (Federal Republic) numbers fell slightly from 1973 to 1985. Despite that, German GDP continued to grow substantially, by 26% over the period compared with 29% for 13 countries of Western Europe (UNECE Economic Survey of Europe 1989–90 table A.1). No crisis of business confidence ensued, or was even discussed, or is now. However the mood in Japan is more despondent (CHAPPLE 2004, AKIHIKO 2006, COULMAS 2007). However, economic pessimism about Japanese prospects is not universal. Over the decade 1995–2005 Japanese GDP rose by 11.9% and population by 1.8%. The IMF forecasts that in the following decade, 2005–2015, population will fall slightly by 1.2%, but GDP will rise by a further 10.6% (IMF WEO database).

On closer scrutiny, some of the problems listed above lack substance, or may be advantages. Current recession apart, the practical concern most often voiced is not unemployed resources and unemployment, as feared by KEYNES (1936), but a shortage of labour hampering output, and inflationary wage pressures. Concern about GDP can only be justified if national power, defence and international influence are given a greater weight than individual welfare. Naturally, total GDP tends to expand with total population size, but this has no necessary bearing upon individual welfare. As SAUVY (1969, Ch. 6) pointed out, the 'power optimum' that gives greatest comfort to strategists and to

rulers may be quite different from (usually bigger than) the population size that optimises individual welfare. The interest of the poor might be quite other. Those who sell their labour do better by making themselves scarce, not abundant.

On a global scale, there is no evidence of a positive relationship between population size and GDP per head, or between the growth rates of these variables (Fig. 3, 4). The same is true amongst the industrial countries (not

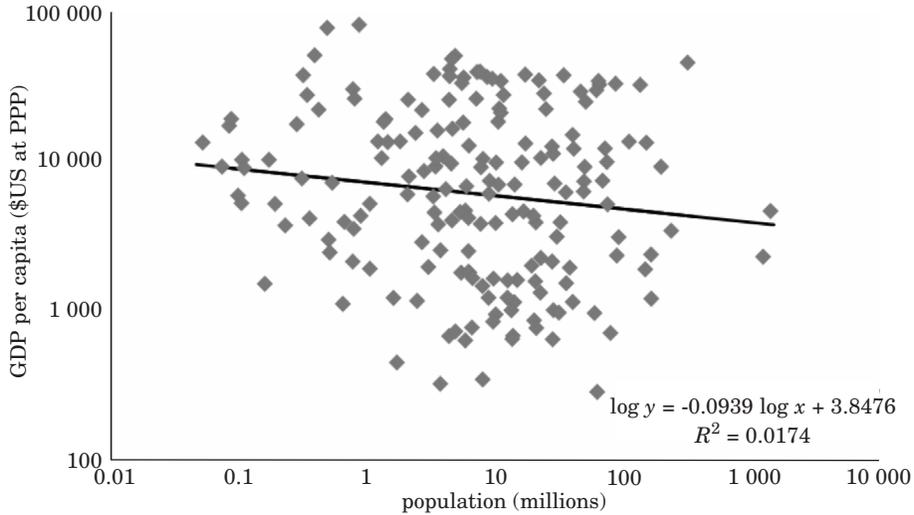


Fig. 3. GDP per capita and population, 180 countries, 2006

Source: IMF, WEO data bases. All countries for which data are available are shown.

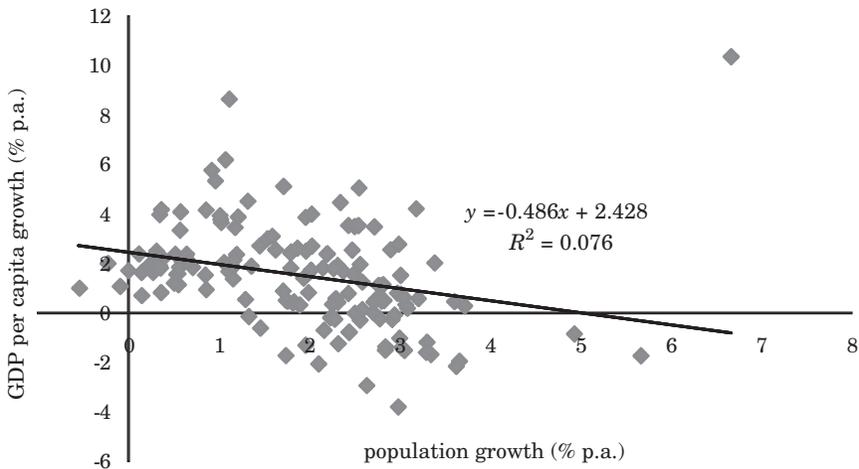


Fig. 4. Growth rates of GDP per capita and population: 147 countries, 1980–2006

Source: IMF, WEO data bases. All countries for which data are available are shown.

shown separately) and also over a much longer time period.. Using data from MADDISON (2007) we computed growth rates over the twentieth century as a whole for a sample of 12 major West European economies, together with Canada, the USA, Australia, New Zealand and Japan. A regression of growth GDP per head on population growth yielded a correlation coefficient equal to -0.12. With Japan excluded the correlation was -0.25. Moreover, small industrial countries are just as rich as large ones. (BARLOW 1994, KELLEY et al. 1995, SHEEHEY 1996, BARRO, SALA-I-MARTIN 2003). Economic growth measured simply as GDP growth, as opposed to increase in GDP per head, has no bearing on individual welfare, as the UK House of Lords (2008) has emphasised in its recent report. A number of European countries have lost territory and (in most cases) the corresponding population over the last century (Austria, the United Kingdom, Germany, Sweden), without adverse consequences for the individual standard of living. While a large domestic market is obviously an advantage, as the US example shows, equivalent advantage may also arise from the adoption of free trade or membership of a trading block such as the European single market. The same principle applies to military and political affairs, where countries too small to have much influence on their own can increase their leverage by joining alliances. However, as the EU and NATO illustrate, alliances can be fraught with problems and can rarely mobilize their combined diplomatic or military resources as effectively as a large centralized state.

Small countries within a peaceful international order can have influence out of proportion to their size, such as the Irish Republic and Iceland (KREBS, LEVY 2001, WEINER, TEITELBAUM 2001, Ch. 3). Their impotence makes them convenient as neutrals. Some smaller states earn part of their living as uncontroversial hosts to international bodies. Small nations, with the same vote as the biggest, are thereby disproportionately influential in the UN General Assembly and are over-represented among EU institutions. For the most part, it would be vain for countries locked into modern low-fertility demographic regimes to seek radically to change their position in the international league table of population size. And to try to do so through mass immigration would risk a serious breakdown of cohesion.

On the question of economies of scale, the significance of this factor depends on the extent to which overseas markets can compensate for the diminution of domestic ones. Free trade makes national-level population decline less important because it increases the proportion of output that is exported. Countries with a small population typically export far more than large countries at the same stage of development. For example, in 2008, total US exports of goods and services were equal to 5.9 thousand dollars per capita. The corresponding figures for Finland and the Netherlands were 24.1 and 44.3

respectively (WTO database). Smaller economies, however, may lack the resources to invest in new highly competitive products requiring expensive research and development. But that can also apply to very large countries – there may only room in the world for two major manufacturers of civil aircraft, and two or three of aero-engines, and a diminishing number of volume car manufacturers, for example.

As regards demand, some earlier worries have lost impact. Consumer demand for ever-cheaper goods appears to be insatiable – contrary to what KEYNES (1936) and REDDAWAY (1939, 1977) – and before them Malthus – had feared. Reddaway's concerns were primarily directed to the economy of a manufacturing nation, not one where services predominated, and seem to have been wrong even then. Superior macro and micro-economic policies have developed in the post-war years, with floating exchange rates, more open international trade, better management of inflation and (in many countries) a less regulated labour market and price mechanism. Consumer demand has been fuelled by the accelerating inventiveness of (ever-cheaper) consumer products promoted by advertising in ways unheard of in earlier times, the outsourcing of manufacturing, and borrowing. The recent economic crisis had nothing to do with population decline but was provoked by high consumption fuelled by excessive debt and failings in the financial sector..

Some claim that declining numbers, or small size, deprive countries of critical mass for research and development, driving specialists abroad. But between the prosperous countries of Western Europe there is no brain-drain from small to larger populations. Scholarship has always been mobile and international, and technical innovations in small countries (e.g. Nokia, and nuclear power, in Finland; advanced jet fighters and other weapons in Sweden) do not support such fears. The related notion advanced by SIMON (1981), that population size and growth is essential because it produces more geniuses, to the general good, seems a priori absurd. The briefest reflection upon the intellectual output of 5<sup>th</sup> century Greece, and of renaissance Florence, with the stagnation that followed, or the relative intellectual sterility of much larger populations then and today, allow us to dismiss it. There is no significant association between population size and the number of Nobel Prizes awarded per million of population (Fig. 5). The smaller populations do better – first in rank is Iceland, the first eight (mostly Nordic) all have populations under ten million except for the United Kingdom.

Downturns in house-building are often regarded as heralds of economic decline, depressing demand for other products and leading to layoffs among building workers (although that could be mitigated if many are immigrants). Falling house-prices erode the asset value for the aged population, on which some in property-owning countries rely for their pensions through equity

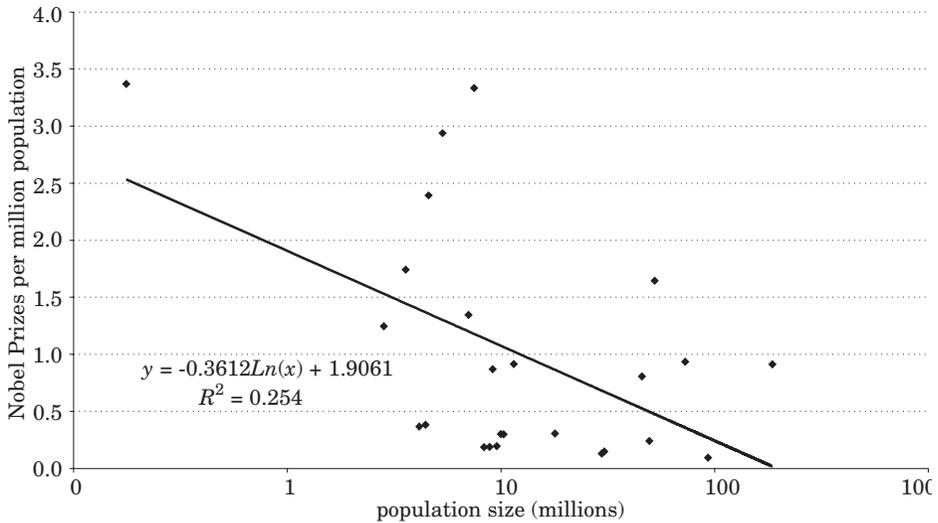


Fig. 5. Distribution of Nobel prizes per head of population, in relation to population size 1900–2002  
 Note: 25 countries are included, most of which were economically developed by 1900; mostly European plus United States and Japan. All other countries had negligible or zero Nobel Prizes.  
 Sources: The Nobel Foundation; population data from the United Nations.

release. Would population decline thereby trigger a perpetual slump? In fact, large and damaging fluctuations in house prices and demand have so far had little to do with demographic change, at least in the UK. Their recent instability has been provoked by the growth of highly-g geared mortgages and by the use of property as an inflationary hedge in which a huge proportion of private asset value – £3 trillion in the UK, twice GDP – has been buried in unproductive brickwork.

Furthermore, in most countries household growth is far ahead of population growth and will continue after the latter ends, being driven by independent trends which have substantially reduced household size over the last century: divorce, longer survival, a more independent youth. The trend towards smaller household size, however, has already slowed in the US and UK. In the UK, the land element in house prices is very high (40% of the price or more). Those constraints, in turn, follow in part from the pressures on land in a densely-populated island, especially one long addicted to houses rather than to flats. In the UK and elsewhere there has been an irrational tendency to run two inflation systems (national inflation bad, house-price inflation good) leading to inflationary bouts of equity withdrawal. A smaller emphasis on construction in the overall GDP, arising from population stabilisation and

decline might eventually benefit national economies, once household growth had run its course. Economic stimulus cannot depend upon continued population growth that cannot in the end be sustained.

### **The other side of the argument: the merits of population stabilization and decline**

On the economy as a whole, long ago the end of population growth was seen by the Royal Commission on Population (1949) as a relief from the balance of payments problems that have plagued the UK and other countries for most of the 20<sup>th</sup> century, as competitive advantage in manufacturing was lost. Some imports of food, fuel and raw materials, (in Japan all fossil fuel and most raw materials) are unavoidable. With fixed land area there are limits to sustainable food output; with fewer people self-sufficiency is easier and with it some relief from balance of payment costs. With food cheap on the international market, and wartime threats long forgotten, concern about food security has waned. But this concern is re-emerging as the era of abundant global food surpluses appears to be drawing to an end (ROBERTS 2008), a crisis hastened by global climate change and population increase.

As population diminishes and the stock of capital goods does not, the ratio of capital to population improves and average person should be wealthier. Resources can be directed to improve standards, not to make wider provision for a growing population (REDDAWAY 1939). However the capital stock needs eventually to be renewed and the annual cost of maintaining the complete transport network and other infrastructure may be unchanged, so that with a much smaller population the cost per head would be greater. Once these factors are taken into account, it is less obvious that, over the long run, a much smaller population benefits from inheriting a capital stock designed for its more numerous ancestors. Lower levels of usage in fixed distribution systems of drinking water and sewage disposal, for example arising from population decline and other factors in Eastern Germany, can cause serious technical problems potentially affecting health (HUMMEL, LUX 2007). But in the shorter term, a modest reduction in size would take population back to a more comfortable stage when congestion on the same transport networks was less. In many countries, certainly the UK, infrastructure provision – notably in transport – has lagged badly behind population growth and other factors of demand. London is already under serious water stress as a consequence of rapid population growth, among other factors (*London State...* 2010). To avert temporary crises, a large desalination plant will operate in London from 2010 – an extraordinary expedient seemingly more appropriate to the Gulf States or to Australia

The scarcity of labour in a declining population will inconvenience employers. But there are two important compensations. Employers will be obliged to review the efficiency of their operations and introduce equipment and techniques to increase productivity, substituting capital for labour and creating demand for higher technology products in a more 'knowledge-based' economy (*Incredible shrinking countries* 2006, LIND 2006). Governments would be obliged to accelerate overdue reforms of retirement age. Much greater efforts would have to be made to mobilise the substantial population of unemployed youth, and the 'underclass', into the workforce. With abundant labour, immigrant or otherwise, this part of the population; unattractive to employers, can be ignored, remaining in its marginalised and often criminalized state. Mobilising this population would improve average income, cut crime and reduce inequality.

Costs of congestion and crowding should decline with smaller population, and journey to work times fall. Traffic could decline *pro rata* with population. With a much smaller population, lower density could increase some journey times, but lower density might have the paradoxical effect of making population more geographically concentrated, as some areas became effectively depopulated and it becomes more efficient to move to inner urban areas (MÜLLER, SIEDENTOP 2004). With fewer people, fewer resources need to be devoted to new dwellings and their associated infrastructure once household formation had also ceased to grow. Housing, much criticised recently in the UK for its cramped plots, could be built at a somewhat lower density as in the earlier 20<sup>th</sup> century, with gardens free from the threat, or the temptation, of infill. Unsatisfactory housing, especially in peripheral social housing estates requiring apparently perpetual refurbishment, would be demolished and returned to open land. Costs of housing and of land would eventually fall with a stable or declining population. That might encourage family formation, as discussed later.

### **Environmental aspects of decline**

The environmental consequences of lower population density could be considerable, and mostly favourable. Human population growth has been the biggest threat to wildlife (HAMBLER 2004, Ch. 2). Most encroachment on countryside would cease. With a relaxation of pressures, the intensification of agriculture, that makes much of the countryside a wildlife desert, would be relaxed. Some marginal land could revert to wilderness, as in previous eras of population decline (e.g. 6<sup>th</sup> century and late 14<sup>th</sup> century Europe). Expensive sea defences protecting low-lying coastal land no longer needed for agriculture

could be abandoned, enabling land to be reclaimed by sea and saltmarsh. In Western Europe, especially the UK, most 'nature' is man-made. The climatic climax vegetation (the stable natural state without human interference) over most of Europe is forest, to which untended land would revert within a century or so, after an unaesthetic interval of scrub. Succession from agriculture back to forest brings a greater richness of species (HAMBLER 2004, Ch. 7), and trees are effective carbon sinks.

Emissions and pollution of all kinds would fall, but only roughly *pro rata* with population size with benefits for human health (COSTELLO et al. 2009). Households are a most important source of emissions, resource consumption and damage to biodiversity (LIU et al. 2003). Household numbers typically increase faster than population and could continue to grow even when population had started to decline. In the UK, for example, in 2007 the domestic sector consumed 28% of all energy generated and was responsible for 26% of UK CO<sub>2</sub> emissions; the single most important source except for transport. Energy consumption in the sector grew 20% from 1970 to 2007, mostly due to growth in the number of households. Projected population growth will prevent the UK from meeting its self-imposed target to reduce emissions by 20% from 1990 levels by 2010 (BOARDMAN 2005), even if nothing else does. The environmental effects of the faster population growth in the US, Canada and Australia (O'CONNOR et al. 2008) are correspondingly more potent, with US oil use projected to increase by 43% by 2025 (MARKHAM, STEINZOR 2006). The projected diminution of Japanese, Russian and eventually Chinese populations must be accounted a blessing as regards emissions, the consumption of hardwood forest products, the protection of whales and other marine species, and mammals used for traditional medicine.

### **The inevitable end of growth**

The final argument is that population growth, and economic growth measured as GDP, must come to an end. Evidence for unavoidable shortage of fresh water in many parts of the world, even more than projections of food shortage, is mounting. Growth in population and economy together are bringing about their own limitation, if forecasts of the climate change that they provoke have any validity. The demographic consequences of climate change are even more difficult to project than climate change itself; uncertainty piled upon uncertainty. The higher latitudes of the Northern hemisphere may be able to support more population than at present. The lookout for some other areas is severe, including many with high population growth in fragile arid lands in the tropics (e.g. BOKO et al. 2007). Projections of climate change,

although controversial and uncertain, have now crept within the range of conventional population projections, although for the most part not incorporated into them. If the populations of the world do not reverse their growth, then negative feedback from our previous activities may force us to do so, in disagreeable ways. But prognoses must be cautious. The sharp declines in population forecast in 'Limits to Growth' (MEADOWS et al. 1972, 1992) devalued later warnings based on better evidence.

## Conclusions

Widespread sub-replacement fertility has focused attention on population decline. That is already underway in a number of countries: in Germany, in Poland and many other countries in Central and Eastern Europe, and in Japan. Some think it will become universal. Population decline and population ageing in modern societies share a common cause in low fertility. But one does not cause the other. In recent writing, much more attention has been given to ageing than to decline, unlike the position in the 1930s (GLASS 1936, CHARLES 1938).

The process of population decline inevitably brings problems, although rates of decline might hardly be perceptible to contemporary observers. A smaller stable population, once achieved, could have advantages. Smaller population size might of itself arrest further decline and permit the resumption of growth. The notion of homeostatic feedback between population size and family building was the foundation of Malthusian population theory (MALTHUS 1802) and its existence is well documented for earlier centuries (e.g. WRIGLEY, SCHOFIELD 1981, LEE 1985, WILSON, AIREY 1999, CLARK 2007). Those processes have been neglected in much recent population thinking. LEE (1987) The advent of population decline suggests that a reconsideration is overdue.

Negative feedback in modern societies may have been underestimated. Populations may have 'overshot' their sustainable or comfortable limits. Inevitably there are lags, protracted by the inertia of culture and tradition, between the beginning of negative effects upon family welfare of larger surviving family size and larger population, and the responses of individuals to it (EHRlich, KIM 2005). Demographic momentum exacerbates the delay. Fertility at or below replacement level was reached in most Western European countries by the 1930s. But their populations have since increased by between 20% and 80%, partly thanks to the transient baby-boom and to migration but mostly as a consequence of demographic momentum. Density-dependent responses may still be discernible in modern human populations, at provincial level. Recent studies in European countries have shown a negative relationship

between population density and fertility, controlling for the effects of other variables (LUTZ et al. 2002, 2005, KULU et al. 2009). Negative feedback can be important at the national policy level as well, in attempts to manipulate demographic behaviour to avert the dire consequences implicit in the persistence of current demographic behaviour, and thereby to falsify the population projections that herald the bad news. In some countries of the rich world political pressure is growing for an explicit recognition of the need for measures to increase the birth rate, however ideologically unacceptable pronatalist policies may have been regarded in even the recent past. (MCDONALD 2006).

Defining optimum population for modern societies is difficult if not impossible. While it is clear that the process of decline has numerous drawbacks, these are only important if the decline is fast and protracted. Smaller population size, however, has social, economic and environmental advantages. And it may be forced on us, as a requirement for our survival, if the ultimate feedbacks from our growth arising from climate change come to pass (DYSON 2005).

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