

The New Global Challenges

Robert W. Fogel

Booth School of Business,
University of Chicago and NBER

During the next generation, OECD nations will be faced with four principal challenges. These are:

1. The emergence of China and India as the dominant global markets and, hence, principal shapers of the global economy.
2. An average increase in life expectancy among OECD nations by over two years per decade.
3. A shift in the structure of consumption that will have a major impact on the economic structure of OECD nations.
4. The rapid aging of the populations of the OECD nations, which will have profound effects on culture.

Changes in the Global Balance of Income and Power

In the year 2000, the global economy was dominated by six groupings of countries: the United States, the European Union (which then consisted of 15 countries [EU15]), India, China, Japan, and a group of six Southeast Asian countries (Singapore, Malaysia, Indonesia, Thailand, South Korea, and Taiwan [SE6]). As measured by gross domestic product (GDP), these six groupings accounted for 73 % of the world's economic output and 57 % of the global population. The balance of the world (including Latin America, Africa, and Eastern Europe) accounted for about 28 % of GDP and 42 % of the global population.

Although political influence is more difficult to define, the United States, with its advanced military technology and its ability to project its military might anywhere, obviously ranks first. However, the EU15 also has great

wealth and advanced military technology. The number of active troops in the armies of the EU15 nations was collectively slightly higher than that of the U.S., and although their annual defense budgets were only a third of that of the U.S., they had nearly as many fighter aircraft and more tanks than the U.S. Perhaps the biggest gap was in hard assets: the EU15 is far behind the U.S. in aircraft carriers, missile cruisers, destroyers, and submarines.

Table 2 presents the forecasts for 2040. The population forecasts are those of the United Nations. The economic forecasts are mine but were influenced by the forecasts of the C.I.A. and *The Economist*. To my mind, the most unsettling of the forecasts in Table 2 is the relative decline of the European Union implied by its stagnation in population and its modest growth in GDP.

Although the EU population in 2000 exceeded that of the U.S. by about a third, by 2040 the EU population will be somewhat smaller than that of the U.S. The projected stagnation of the EU15 population is based primarily on the persistence of extremely low fertility rates.

The total fertility rate (roughly the average number of children a woman is expected to have during the course of her childbearing years) has fallen far below the level required for the reproduction of the population (2.1 children) in most EU15 countries, and has been below reproduction for several decades.

One implication of the low fertility rate is that the population of the EU15 is aging rapidly. In the year 2000, the median age in Italy and Germany, for example, was about 40, which is a decade higher than in China and half a decade higher than in the U.S. By 2040, the median age in Italy and Germany is predicted to be about 50. This rapid aging of many EU15 countries means that their *dependency ratios* (the ratio of economically inactive to economically active persons) will soar. These demographic factors will, by themselves, significantly curtail the capacity for economic growth. However, political and cultural factors appear to be reinforcing the impediments to economic growth. These include limitations on the length of the work-week and increasingly heavy taxes on businesses to support large social welfare programs (that are nevertheless facing bankruptcy) and are threatening to make EU15 firms uncompetitive in the global market.

I do not mean to imply that labor productivity and per capita income in the EU15 will not grow. They will grow at a rate that, by past standards, was not bad (about 1.8% per annum), but they will not be able to match the surge in growth that will prevail in South and East Asia (see Table 3).

The European market will be about 60% larger in 2040 than it was in 2000. But the United States market will be over 300% larger, India's will

1. The Global Distribution of Gross Domestic Product (GDP) in 2000, by Grouping of Nations

Grouping	Population (in millions)	% of total	GDP in billions of \$ (PPP)	% of total
United States	282	5	9,601	22
EU 15	378	6	9,264	21
India	1,003	16	2,375	5
China	1,369	22	4,951	11
Japan	127	2	3,456	8
6 South East Asian Countries (SE6)	381	6	2,552	6
Subtotals	3,540	57	32,199	73
Rest of the World	2,546	42	12,307	28
World	6,086	99*	44,506	101*

Source: Fogel 2007 - *Totals do not equal 100% due to rounding.

2. The Global Distribution of GDP in 2040, by Grouping of Nations

Grouping	Population (in millions)	% of total	GDP in billions of \$ (PPP)	% of total
United States	392	5	41,944	14
EU 15	376	4	15,040	5
India	1,522	17	36,528	12
China	1,455	17	123,675	40
Japan	108	1	5,292	2
6 South East Asian Countries (SE6)	516	6	35,604	12
Subtotals	4,369	50	258,083	85
Rest of the World	4,332	50	49,774	16
World	8,701	100	44,506	101*

Source: Fogel 2007. Note: GDP in US dollars of 2000. *Total equals more than 100% due to rounding.

be over 1,400 % larger, and China's will be 2,400 % larger. Indeed, the Chinese market in 2040 by itself will probably be larger than the combined markets of the U.S., the EU15, India, and Japan. It may well be the case that English will survive as the principal commercial language until 2040, but I suspect that there will be an explosion of business managers in the West who speak Mandarin.

3. Annual Rates of Growth 2000-2040

Grouping	% Population	% GDP	% GDP per capita
United States	0.8	3.8	2.8
EU 15	0.0	1.2	1.2
India	1.0	7.1	6.0
China	0.2	8.4	8.0
Japan	-0.4	1.1	1.5
6 South East Asian Countries (SE6)	0.8	6.8	6.0
Subtotals	0.5	5.3	4.8
Rest of the World	1.3	3.6	2.2
World	0.9	5.0	4.0

Source: Growth rates are computed from Tables 1 and 2.

Note: GDP in U.S. dollars of 2000.

Explaining the Forecast for China

To many, the most provocative aspect of Table 2 is the forecast that, in 2040, the Chinese economy will reach \$123 trillion, or nearly 3 times the output of the entire globe in the year 2000. Moreover, the per capita income of China will reach \$85,000 more than twice the forecast for the European Union (EU15) and also much higher than India and Japan. In other words, China is forecasted to go from a poor country in 2000 to a super-rich country in 2040, although it will not have overtaken the U.S. The basis for so optimistic a view of the course of the Chinese economy needs to be elucidated, with attention paid to both economic and political issues.

Potential Economic Constraints on China

When analyzing the constraints on Chinese economic growth, it is useful to divide the economy into three sectors: agriculture, services and industry. Over the quarter century between 1978 and 2003, the growth of labor productivity has been high in each of these sectors, averaging about 6% per annum. At the national level, output per worker grew by 9%. That is because the level of output per worker was much higher in industry and services than in agriculture. Hence, by shifting workers from agriculture—where the bulk of labor has been concentrated—to industry or services, the economy obtained an additional boost. This inter-industry shift added 3 percentage points to the annual national growth rate. I expect inter-industry shifts to continue to be an important element in China's economic growth over the next generation.

In addition, a more important factor in sustaining China's high growth rate will be the enhancement of the quality of the labor by education. China has invested heavily in rapidly expanding enrollment ratios in both secondary and tertiary education. As I have reported elsewhere, U.S. data indicate that

college-educated workers are 3 times as productive, and a high school graduate is 1.8 times as productive as a worker with less than a ninth grade education. Thus, increasing the enrollment ratio in high school to 100 % and in college to 50 % over the next generation, would by itself add over 6 percentage points to the annual growth rate.

These targets for higher education are not out of reach. It should be remembered that as recently as 1980, the Western European nations had tertiary enrollment ratios of about 25. Only the U.S. was above 50. The movement to enrollment ratios of 50 in Western Europe was a product of the last two decades of the twentieth century. In the case of the U.K., two-thirds of the increase from 19 to 52 % took place between 1990 and 1997.

The significance of investment in human capital as an engine of economic growth has not eluded the State Council. In 1998, Jiang Zemin called for a massive increase in enrollments in higher education. The response was swift: over the next four years enrollment in higher education increased by 165 % (from 3.4 million to 9 million) and the number of students studying abroad also rose by 152 % (China Statistical Yearbook 2003). Since the tertiary enrollment ratio increased by about 50 % between 2000 and 2004 (from 12.5 to 19.0 %), my projection for 2040 is not overly optimistic (China Statistical Yearbook 2005).

Explaining the Forecast for India

In the case of India, it is not only necessary to explain why I am so optimistic about its economic future, but also why I am more optimistic about Chinese economic growth than Indian economic growth. Although India's per capita income has been growing at quite high rates by global standards—about 6 % per annum (7 % since 1996), its growth rate has been a third less than the Chinese rate. Constraints on Indian economic growth are still substantial.

Although India has an excellent system of higher education, which is capable of supplying the engineers, chemists, statisticians, and other professionals needed to run a modern economy, India lags substantially behind China, South Korea, and other ASEAN countries in current educational achievement. Over 40 % of the population is still illiterate (CIA 2007), and gross secondary school enrollment rates in 2002 were less than half of those of China. Enrollment in institutions of higher education has grown by 5 % per year between 1980 and 2002. But this expansion rate is only half of that experienced by China over the same period.

Another problem for India is the low rate of growth of labor productivity in agriculture, which is about half that of China. Since about two-thirds of

India's labor force is in agriculture, this problem hinders the growth of the overall economy in two ways. It slows down the rate of transfer of labor from agriculture to industry and services where output per worker is much higher. Moreover, the culture of rural areas is less conducive to education than the urban areas. Hence, the high school dropout rate in rural areas is quite high, especially when compared with China.

Threats to Political Stability in India

Political threats stem from three sources: unresolved religious tensions, especially between Hindus and Muslims; unresolved ethnic disputes and unresolved pressures created by the caste system.

Sharp religious tensions prevail between the Hindu majority and the large minority of Muslims. These tensions periodically erupt into violent clashes, such as the 2002 riots in the state of Gujarat that produced some 2,000 deaths. Terrorist attacks are also related to disputes over Kashmir. In 2001, Kashmiri terrorists attacked the Indian parliament in New Delhi, killing a dozen people. In 2006, terrorists planted explosives on a train in West Bengal, killing five and injuring scores more.

The Indian caste system, which divides the population into a hereditary hierarchy that determines economic and social opportunities, has relaxed somewhat as a result of government policies. The government has sought to offset the discrimination against lower castes with educational subsidies. However, the caste system remains rigid in rural areas and is propped up by parties that seek to represent themselves as the champions of the lower castes.

The social, religious, and ethnic clashes, which are sources of instability that threaten to undermine the conditions for economic growth, have so far been contained. Moreover, the commitment of the leaders of both major parties to ease these divisions suggests that conditions for rapid economic growth will continue during the next generation.

Trends in Life Expectancy

Will the twenty-first century witness as large an increase in the average life expectancy of the rich countries —thirty to forty years— as occurred during the twentieth century? Most experts believe it will not. The middle estimate of the U.S. Census Bureau, for example, is that the increase in life expectancy between 2000 and 2050 will be only about 7 years, and the estimated increase for the entire twenty-first century is just 13 years. This is less than half the increase that occurred during the twentieth century. The same conservatism is evident in the projections of the UN, OECD, and other national and international agencies.

These pessimistic projections rest on several propositions. Perhaps the most widely accepted is the proposition that opportunities for large reductions in mortality rates are possible only when death rates under age 5 are very high. Proponents of this view argue, for example, that the sharp decline in U.S. mortality rates during the twentieth century was the result of a unique opportunity that cannot be replicated by those nations that have already experienced it: the opportunity to wipe out the majority of deaths due to acute infectious diseases, which were concentrated in infancy and early childhood. Whereas more than a third of all deaths at the turn of the twentieth century were of children under 5, today infant and childhood deaths are less than 2% of the annual total. By contrast, deaths among persons age 65 and over, which accounted for just 18% of the total in 1900, have grown to three quarters of all deaths today. Thus, at the start of the twenty-first century, the argument goes, the more than 90% of birth cohorts who live to age 50 begin to suffer from an increasing number of chronic diseases because their vital organ systems naturally lose their effectiveness with aging, and this deterioration eventually increases to a point where life can no longer be sustained.

Empirical observations are buttressed by a variety of theories, some of them drawn from evolutionary biology, as to why the cells of vital organ systems decay. One prominent theory holds that because reproduction ceases at age 50, there is a sharp rise in deaths at post-reproductive ages because the forces of natural selection have not eliminated the genes that hasten rapid physiological decline past age 50. There are, however, persuasive arguments that spell out a more optimistic view of the course of changes in health and longevity during the twenty-first century. One of these arguments is based on the projection not of past changes in average life expectancy but of record life expectancy since 1840. Record life expectancy is defined as the highest life expectancy experienced by any country at each point in time. For example, the record life expectancy at birth in 1840 was found among Swedish women, who lived on average a bit over 45 years. In the year 2000, Japanese women achieved a record life expectancy of nearly 85 years. Fitting a curve to such best practice observations over a period of 160 years yields a linear curve, which suggests that for the foreseeable future, female life expectancy will increase at 2.4 years per decade and male life expectancy will increase at 2.2 years per decade. These equations lead to the prediction that by 2070 female life expectancy in the United States will be between 92.5 and 101.5 years, which substantially exceeds the forecast of 83.9 years made by the Social Security Administration in 1999.

The fact is that demographers' past predictions of maximum life expectancy have been notoriously conservative when these forecasts were based on average experience. In the late 1920s, L. I. Dublin, the chief actuary of the Metropolitan Life Insurance Company, put a cap of 64.75 years on life expectancy for both men and women. In 1936, he collaborated with the leading mathematical demographer of the first half of the twentieth century to publish a revised upper limit of 69.93 years. More recently, a leading gerontologist set an upper limit on life (excluding some major breakthrough in molecular biology) of 85 plus or minus 7 years.

Generally speaking, these caps tend to be in the range of 5 to 10 years beyond the observed life expectancy at the time the forecasts were published. The accelerating decline in the prevalence of chronic diseases during the course of the twentieth century supports the proposition that increases in life expectancy during the twenty-first century will be fairly large. At the beginning of the twentieth century, the burden of chronic diseases among elderly Americans was not only more severe but began more than 10 years earlier in the life cycle than it does today. Moreover, the number of comorbidities at each age between 50 and 70 is well below levels that prevailed a century ago. This is, according to one study, equivalent to pushing back old age, since an increase of one unit in a comorbidity index is the equivalent of being a decade older. Studies of changes in functional limitations among persons who have reached age 65 since the early 1980s indicate that such limitations declined at an accelerating rate during the balance of the 1980s and the 1990s.

Dora Costa has found that favorable changes in body size, particularly the decline in the waist-to-hip ratio (a measure of abdominal fat), explained close to half of the decline in mortality rates above age 65 during the course of the twentieth century. Taking account of the characteristics of men of military age in 1988, she predicts that the annual decline in male mortality rates after age 65 will be nearly twice as high between 1988 and 2022 as it was between 1914 and 1988. Overall, the work on trends in chronic diseases and on frame sizes tends to support forecasts of continued linear trends in the extension of longevity during the twenty-first century.

Shifts in the Structure of Consumption

The increase in life expectancy coupled with stability in the fertility rate will lead to an increase in the share of the population over age 65. The dimension of changes in age structure on the future cost of health care can be illustrated by considering the U.S. case. Since the per capita consumption

of health care services rises with age, the aging of the U.S. population would by itself lead to an increase in the burden of health care. However, as Table 4 shows, the effect will be modest. The change in the age structure of the population will raise annual per capita consumption from \$3,819 in 1999 to \$4,443 in 2040, is a rise of just 16 % in 41 years, or an annual rate of growth of 0.4 %. However, the demand for health care will grow much more rapidly than indicated by Table 4.

4. The Effect of Changes in the Age Structure of the Population on the Per Capita Cost of Health Services, 1999–2040

	Per capita consumption of health services	Age distribution in 1999	Col 1 x Col 2	Age distribution in 2040	Col 1 x Col 4
	(1)	(2)	(3)	(4)	(5)
Ages 0-18	1,872	.2865	536	.2408	1,814
Ages 19-64	3,230	.5878	1,899	.5615	1,814
Ages 65+	11,018	.1256	1,374	.1977	2,178
Per capita over all ages			3,819		4,443

Source: Fogel 2008

Hence, in the U.S. case, changes in the age structure are a minor factor in the expected rise in the burden of health services over the next several decades. Nevertheless, sharp increases in health costs are likely, for reasons other than changes in age structure.

Explaining the Growth in the Demand for Health Care

The principal factor driving the growth in expenditures on health care is demand. As people get richer, they want to spend a larger share of their income on improving their health. The fact is that the structure of consumption has changed drastically in the U.S. since the late nineteenth century and the growth in demand for health care has to be evaluated in that context.

Table 5 presents the change in the structure of expanded consumption in the United States between 1875 and 1995. The trend in the structure of consumption in other OECD nations has been quite similar. The term “expanded consumption” takes account of the fact that as income has increased, consumers have preferred to take an increasing share of their real income in the form of leisure rather than in purchasing more commodities, as would be possible if they did not reduce their hours of work. Hence, the cost of leisure includes not only out-of-pocket expenditures but also the imputed value of the increased hours of leisure.

**5. The Long-Term Trend in the Structure of Expanded Consumption
and the Implied Income Elasticities of Several Consumption Categories**

Consumption class	Distribution of consumption (%)		Long-term income elasticities
	1875	1995	
Food	49	5	0.2
Clothing	12	2	0.3
Shelter	13	6	0.7
Health care	1	9	1.6
Education	1	5	1.5
Other	6	7	1.1
Leisure	18	68	1.5

Source: Fogel 2008

One notable feature of Table 5 is the change in the share of income spent on food, clothing, and shelter, which has declined from 74 % of expanded consumption to just 13 % over the 120-year period. Another striking change is the share of income spent on health care, which has increased nine fold, from 1 % of expenditures to 9 %.

For purposes of forecasting, the most important feature of Table 5 is the last column, which presents the long-term income elasticities for each category of expenditures. The “income elasticity” is defined as the percentage increase in expenditures on a given commodity that will occur with a 1 % increase in income. Notice that the income elasticities for food and clothing are quite low, which means that the share of these items in total consumption will continue to decline. An income elasticity of 1 means that the share of a given item in total consumption will remain constant. Notice that shelter, which includes most consumer durables, is closer to but still below 1. On the other hand, the income elasticities for health care, education, and leisure are all well above 1. The income elasticity of 1.6 means that income expenditures on health care in the United States are likely to rise from a current level of about 16 % of GDP to about 29 % of GDP in 2040.

Is that bad? Should such a development be avoided? Should governments seek to thwart consumer demand for health care services? Such a policy would be necessary only if OECD nations lacked the resources to provide that much health care. However, the growth in productivity of traditional commodities, including food, clothing, shelter, and consumer durables will release the resources required to provide expanded health care. In the United States a century ago, it took about 1,700 hours of work to purchase the annual food supply for a family. Today it requires just 260 hours. If agricultural productivity grows at just two-thirds of its recent rates, then by 2040 a family’s annual food supply may be purchased with about 160 hours of labor.

A recent study of the role of the change in the benefits and costs of health care conducted by investigators at the National Bureau of Economic Research (NBER) concluded that the benefits of health care services over the past 40 years have more than justified their costs. This analysis suggests a fundamental repositioning of the public debate about medical care from how governments can limit spending to how to get the most out of the spending that is undertaken. Other NBER investigators have also suggested changing the methods of health care financing so that the consumer demand for increasingly effective services is not unnecessarily thwarted.

Public policy should not be aimed at suppressing the demand for health care. Expenditures on health care are driven by demand, which is spurred by income and by advances in biotechnology that make health interventions increasingly effective. Just as electricity and manufacturing were the industries that stimulated the growth of the rest of the economy at the beginning of the twentieth century, health care is the growth industry of the twenty first century. It is a leading sector, which means that expenditures on health care will pull forward a wide array of other industries including manufacturing, education, financial services, communications, and construction. The pressure to suppress health care expenditures arises from the way that governments and businesses currently provide insurance in OECD countries. These institutions need to provide a basic and affordable package of health services. Beyond that, they should offer additional policies at higher costs that provide upscale services (such as private rooms, the most expensive alternative procedures and medicines, the shortest waiting time, the fullest coverage of optional services, and access to physicians anywhere in the country, not just in local clinics). Health care is not a homogeneous good, all of which is essential. There are large luxury components in health services that may appeal to some tastes but that are not necessary for sound basic health care. It is, of course, necessary to provide medical care for those who are too poor to purchase it from their own resources, but for those with more resources, shifting to private savings accounts for health services is an effective way to relieve pressure on the finances of both businesses and government.

The Implications of the Rapid Aging of OECD Populations

The population of OECD nations has been aging rapidly, and that trend is likely to continue over the next several decades.

Columns 1 and 2 of Table 6 present the forecast of the Population Division of the United Nations (UNPP) on the change in the median age of the five largest West European nations and Japan. In Germany, Italy, Spain, and Japan, the predicted increases range between 11 and 14 years. In France and the United Kingdom, the median age increases by six and five years, respectively.

**6. Median Age and % of Population Age 65 and Over
in Five European Nations and Japan in 2000 and 2040**

Country	Median Age		Percentage Age 65 and over	
	2000 (1)	2040 (2)	2000 (3)	2040 (4)
France	37.7	44.2	16.1	26.5
Germany	40.0	51.2	16.4	31.8
Italy	40.3	50.9	18.4	31.8
Spain	37.6	49.1	16.8	28.1
United Kingdom	37.7	42.3	15.9	22.6
Japan	41.4	54.4	17.2	35.1

Source: <http://esa.un.org/unpp>

Columns 3 and 4 forecast the change in percentage of the population that will be over 65. In the case of Japan, the proportion of the population that is elderly will double, reaching 35 % by 2040. For Germany and Italy, the elderly will increase to nearly a third of the population. Only in the United Kingdom will the elderly be less than a quarter of the population.

The basic reason for the rapid aging of the population has been the low level of fertility. In all of these countries, the total fertility rate has been below the level needed to replace their populations for several decades. As a result, the percentage of women in the childbearing ages has declined from about 50 % in 2000 (it was also about 50 % in 1950) and is projected to be about 35 % in 2040. So we have a double whammy (to use American slang): not only will women in the reproductive ages have sharply reduced fertility rates, but the proportion of women who are in the childbearing ages will also have declined sharply (see Table 7).

Attitudes toward sex have evolved sharply. One hundred fifty years ago, it was considered a sin to enjoy sex, the only legitimate purpose for which was procreation. But today, even in Rome, young women respond that sex is mainly a recreational activity. Behind the statistics on trends in fertility is a vast change in ethics embodied in a culture that is much different from that embraced by the generation that fought in World War II, which married early and produced the great baby-boom of 1945–1965.

7. Percentage of Women Aged 15-49 in 2000 and 2040

Country	2000	2040	Percentage Decline
France	47.5	38.3	19
Germany	46.8	34.6	26
Italy	47.0	34.4	27
Spain	50.8	35.8	30
United Kingdom	46.8	41.5	11
Japan	45.4	31.7	30

Source: <http://esa.un.org/unpp>

The widespread embrace of the ethic that celebrates sex as recreation means that the rate of natural increase (births minus deaths) is likely to decline in the principal OECD nations. Indeed, even in 2000, the natural rate of increase was negative in Germany and Italy. By 2040, it is likely that natural increase will be negative in all of the designated nations except the United Kingdom.

8. Predicted Changes in the Natural Rate of Increase (per thousand)

Country	2000	2040
France	3.8	-0.3
Germany	-1.5	-6.2
Italy	-0.7	-4.3
Spain	1.4	-0.9
United Kingdom	1.3	0.7
Japan	1.0	-7.5

Source: <http://esa.un.org/unpp>

Although the twentieth century increase in the share of the population that is elderly is a tribute to the great advances in economic performance, biomedical sciences, and environmental improvements, there is no automatic guarantee of equitable balance between the generations in the future. Indeed, there are new problems that will have to be solved if a third of population in 2040 is over age 65.

If the elderly cling to the best jobs well past current ages of retirement, younger workers will have to wait an extra decade, perhaps longer, to get their turn. Moreover, since younger workers are a major source of new ideas, slowing down the ascendancy of the next generation may retard the pace of technological change. The solution to such problems will not be easy. The elderly should not be shunted aside as if they were rotten tomatoes. At age 65, they will be vital, experienced, and can expect to be in good health for another 20 to 30 years. To force their premature retirement will undermine not only their morale, but also the morale of those who expect to replace them.

I do not mean to set forth a full catalog of the issues that will face policy makers as a result of the aging of the population. I merely wish to reassure the younger generation that there will be plenty of problems for them to grapple with when they are the principal policymakers.