

Chapter 15

Macroeconomic Challenges for the 21st Century

Chapter 15: Macroeconomic Challenges for the 21 st Century	1
1. Macroeconomic Goals: Looking Forward	1
Discussion Questions	2
2. Macroeconomics and Human Development	2
2.1 Human Development Defined	2
Economics in the Real World: What is Human Development?.....	3
2.2 The Relationship of Human Development to Economic Development.....	4
2.3 Human Development When There is Already “Enough”	5
2.4 Human Development Goals and Policies	7
Economics in the Real World: Millennium Development Goals	7
2.5 Whither Human Development?	8
Discussion Questions	9
3. Macroeconomics and Ecological Sustainability	9
3.1 Major Environmental Issues	10
3.2 The Relationship between Economic Growth and the Environment.....	13
Economics in the News: The Stern Review – The Economics of Climate Change	14
3.3 Policies for Sustainable Development	17
3.4 Sustainability and Consumption	19
3.5 Sustainability and Investment	21
Economics in Context: Discounting the Future	22
Discussion Questions	23
4. Concluding Thoughts.....	23
Discussion Questions	25
Review Questions	26
Exercises	26
Appendix: Demographic Challenges	29
A.1 Basic Demographic Terms and History	29
A.2 Global Population Patterns and Policies	32
Economics in the News: Shrinking Italy	32
A.3 The Issue of Aging Populations	34
A.4 Demographic Challenges Ahead.....	37

Macroeconomics in Context, Goodwin, et al.
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Chapter 15: Macroeconomic Challenges for the 21st Century

What will the world be like in the year 2050, or 2100? Will the world situation be characterized as one of widespread material affluence and social peace? Or will the gap between the “haves” and the “have-nots” be even bigger, and the planet afflicted by widespread social conflict and environmental damage? What will the world be like for your children, when they get to be your age? What will it be like for your grandchildren? Of course, no one can foresee the future. But we can at least consider how some especially pressing social and environmental challenges will affect the macroeconomics of the future.

1. Macroeconomic Goals: Looking Forward

Macroeconomics is, at its base, concerned with human well-being. The goals of macroeconomic institutions and policies are (as described in Chapter 1) the achievement of good living standards; stability and security; and financial, social, and ecological sustainability. Much of traditional macroeconomics, as we have seen, tends to focus on the stability and growth rate of real GDP. To the extent that GDP growth leads to well-being growth, this is a sensible strategy. But as we saw in Chapter 6 on alternative national accounts, GDP does not take into consideration many important well-being issues such as environmental deterioration, unpaid home production, and inequality in the distribution of wealth and income. Increased production of goods that are damaging to society or the environment, or that simply make up for damage already done, cause GDP to rise. A narrow focus on stability and growth in GDP also ignores changes in the conditions of work, stresses imposed on families, and developments in the social and financial infrastructure of an economy.

Some people believe that continued GDP growth and technological innovation will solve the social and environmental problems of the present and future. Others, however, believe that many of the social problems of today – including environmental degradation, growing inequality, and gaps in health care and child care – can be traced to the fact that existing forms of economic growth and development have in some ways worked against “true” or sustainable well-being.

This final chapter examines two important challenges to macroeconomics in the 21st century. The first has to do with the nature of society and human experience. As economic development has progressed in many parts of the world, it has solved some problems, created others, and also revealed that economic development alone is not sufficient – though it is often necessary – for fostering and maintaining human well-being. The second challenge has to do with the impacts of economic growth and development on the environment.

To comprehend the broad sweep of issues that will be taken up here it is useful to recall the major types of economic activity that were defined in Chapter 3: resource maintenance, production, distribution, and consumption. In Section 3 of this chapter you will see strong reasons for emphasizing resource maintenance. You will also see the

global relevance of the issue of distribution, which, otherwise, is often viewed as a microeconomic issue. First, however, in Section 2, we will compare the broader concept of “human development” to the narrower concept of “economic development.” There we will concern ourselves with the well-being implications of the other two types of economic activity: consumption and production.

Discussion Questions

1. Review the problems with GDP as a measure of well-being outlined in Chapter 6, and the alternative measures of well-being – the Genuine Progress Indicator and the Human Development Index – described there. Do you think discussions of growth and development in Chapter 14 would have been different, if changes in GPI or HDI had been the focus, instead of GDP?
2. What do you think is the most pressing current macroeconomic problem? The most pressing problem for the next 100 years? Are the problems that occur to you national, or global, or both?

2. Macroeconomics and Human Development

Scholars and commentators have used a variety of terms to talk about kinds of “development” that go beyond a focus on GDP, productivity, and industrialization. In Chapter 1 of this book we talked about “living standards growth.” Others talk about “people-centered development,” “development with a human face,” or “socially sustainable development.” In this section we will explore the concept of “human development” as proposed by the United Nations Development Program (UNDP). While a basic index generated by the UNDP – the Human Development Index (HDI) – was covered in Chapter 6, the concept of human development actually arises from a more sophisticated philosophical base, and has wide-ranging implications for policy.

2.1 Human Development Defined

How do we judge whether a particular kind of society, economic structure, or policy helps people or harms people? Nobel laureate economist Amartya Sen has argued that our evaluations should be based on the notion of **capabilities**, that is, on the opportunities that people have to be well-nourished, decently housed, and in many other ways live lives that they find worthwhile. The capability approach evaluates institutions, policies, and actions according to the opportunities (or freedoms) they give people for valuable ways of living. In a very broad way, the capability approach tries to answer the question “What do we really want from development?” The capabilities view shifts attention away from measures of income or wealth, and focuses instead on issues like opportunities for health and participation in society.¹

¹ The capabilities approach focuses on the *opportunities* created, rather than how much health or participation people actually *achieve*, in order to preserve some space for individual freedom. It is important that a society provide access to food and health care, for example, even though some individuals may choose to fast or refuse medical treatment (perhaps for religious reasons).

capabilities: the opportunities people have to pursue important aspects of well-being, such as being healthy and able to participate in society

In 1990 the UNDP issued its first *Human Development Report*, influenced by the work of Sen and under the direction of economist Mahbub ul Haq. The UNDP defined **human development** as being about expanding people's choices, so that they can develop their full potential and lead productive, creative lives.

human development (United Nations Development Program): the process of creating an environment which expands people's choices, allowing people to develop their full potential and lead productive, creative lives in accord with their needs and interests.

Economics in the Real World: What is Human Development?

The United Nations Development Program describes "Human Development" as follows:

Human development is about much more than the rise or fall of national incomes. It is about creating an environment in which people can develop their full potential and lead productive, creative lives in accord with their needs and interests. People are the real wealth of nations. Development is thus about expanding the choices people have to lead lives that they value. And it is thus about much more than economic growth, which is only a means —if a very important one —of enlarging people's choices.

Fundamental to enlarging these choices is building human capabilities —the range of things that people can do or be in life. The most basic capabilities for human development are to lead long and healthy lives, to be knowledgeable, to have access to the resources needed for a decent standard of living and to be able to participate in the life of the community. Without these, many choices are simply not available, and many opportunities in life remain inaccessible.

This way of looking at development, often forgotten in the immediate concern with accumulating commodities and financial wealth, is not new. Philosophers, economists and political leaders have long emphasized human wellbeing as the purpose, the end, of development. As Aristotle said in ancient Greece, "Wealth is evidently not the good we are seeking, for it is merely useful for the sake of something else."

In seeking that something else, human development shares a common vision with human rights. The goal is human freedom. And in pursuing capabilities and realizing rights, this freedom is vital. People must be free to exercise their choices and to participate in decision-making that affects their lives. Human development and human rights are mutually reinforcing, helping to secure the well-being and dignity of all people, building self-respect and the respect of others.

Source: <http://hdr.undp.org/hd>

Some have suggested that development should be primarily geared to meeting basic needs for food, shelter, and health care. The human development approach includes attention to such basic needs, but goes further to encompass other dimensions of a worthwhile life. Recent UNDP reports have, for example, examined how rampant domestic violence limits the human development of women in many regions, and how human development may be limited by political oppression along ethnic or other lines. Such issues affect countries with high material standards of living, as well as those still unable to supply basic goods.

2.2 The Relationship of Human Development to Economic Development

The Human Development Index, as discussed in Chapter 6, combines measures of life expectancy and literacy with a measure of GDP. While very simple, a shift from looking at only well-being “input” measures (such as GDP per capita) to including even a single “outcome” measure (such as life expectancy) can be revealing.

As an example, Figure 15.1 plots average life expectancies for various countries against GDP per capita, with spheres proportional to the population of the country represented. A curve is drawn to fit the general pattern made by the data points. Looking at the far left side of the figure, it is clear that living in a very poor country dramatically increases the chance that one will die prematurely. In nations with very low per capita incomes, many people do not have access to adequate food, clean water, or basic knowledge of health and sanitation. It is clear that substantial increases in the provision of at least some goods and services are necessary to increase human well-being in such countries.

In the middle section of the graph, moving from left to right, there appears to be some relationship between income and life expectancy, but the relationship is less clear than for the lowest-income countries. Countries such as Mexico and Argentina have achieved average life expectancies that are fairly close to those of the richest countries, even though their average incomes per head are not even half as high.

The spheres that lie far below the line in the middle region represent sub-Saharan African countries hard-hit by HIV/AIDS. Life expectancy in Botswana is currently less than 35 years. The situation in these countries illustrates how factors other than GDP can have dramatic implications for human development.

Looking at the spheres representing Western Europe, Japan, and the United States at the right of the figure, yet a different story emerges. The positive relationship between income and life expectancy essentially disappears. At high incomes, further increases in GDP per capita are associated with little or no gain in average life expectancy. In the industrialized countries access to basic foodstuffs, clean water, and basic health and sanitation are not generally a problem (though they remain a problem within some poorer groups and regions). While highly sophisticated medical care can extend the lives of some ill individuals, the effect on average life expectancy of these gains is quite small relative to the gains from more basic kinds of provisioning.

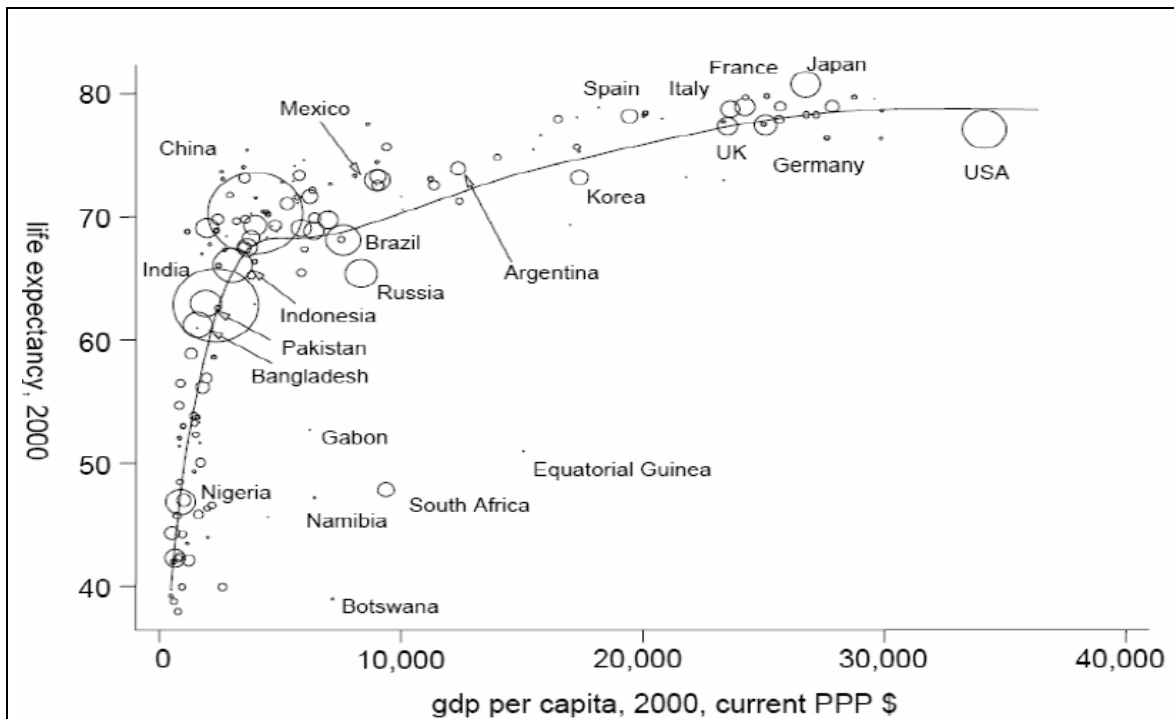


Figure 15.1 The Relation Between Average Life Expectancy and GDP Per Capita, with Area Proportional to Population

At very low levels of income per head, increases in per-capita income are associated with steep increases in life expectancy. Once a middle-income level of GDP per capita is reached, however, increases in income are associated with much more modest increases in life expectancy, and at high incomes the curve flattens out.

Source: "Health in an age of globalization," Angus Deaton, Research Program in Development Studies, Princeton University, July 2004, p. 37.

To summarize, “more” – at least more of key goods and services that make for a healthy life – is clearly needed in very poor countries, for human development to occur. Specifically health-related interventions are needed in some countries, particularly in Africa. At high incomes, as we will see below, more material wealth does not necessarily bring more of all the other things that constitute well-being.

2.3 Human Development When There is Already “Enough”

In rich countries it has become increasingly important to recognize that “too much” can be a problem as well as “too little.” Increasing consumption can actually be worse for individuals who may suffer ill health from overeating, psychological disturbances from certain kinds of overstimulation, and (some say) spiritual malaise from exclusive or excessive attention to material things. For example, diets high in sugars and fats can lead to people becoming overweight. Obesity, in turn, is a risk factor for all four leading causes of death in the industrialized world – stroke, heart disease, cancer, and

diabetes. In the U.S. about 300,000 people a year die from health problems related to obesity. Obesity is a growing problem among the more affluent classes in less developed countries as well, even as hunger remains a serious problem for the very poor.

Does having “more” make people feel that their lives are more satisfactory and valuable? Psychological research indicates that people’s feelings of well-being adapt over time to their situation, and that they pay attention to how what they have compares to what people around them have. To the extent that a society emphasizes the consumption of material goods, this means that subjective feelings of happiness and satisfaction can be maintained only by continually ratcheting up consumption levels. A long line of distinguished economists has pointed out this ratcheting-up effect, and the great degree to which consumption in affluent societies tends to be less about staying alive and healthy than about achieving status or “keeping up with the Joneses.”²

Over time, and on a society-wide scale, more income does *not* seem to be related to more happiness in already affluent societies. In 1957, for example, 35 percent of respondents to a U.S. survey indicated that they were “very happy.” Between 1957 and 1998 the purchasing power of the average citizen of the U.S. roughly doubled. In 1998, the proportion saying they were “very happy” was a little lower, at 32 percent. The situation of rising consumption levels has been compared to one in which the front row of a crowd of spectators stands on tiptoe to see better. Everyone else has to stand on tiptoe also, just to see as well as before. All are more uncomfortable, but none except the front row are better off. There is probably no net gain.

At high income levels, other dimensions of human development, such as freedom from violence, closer and more peaceful families and communities, investments in the productive and creative capacities of the next generation, or the opportunity to have a satisfying work life (whether paid or unpaid) may be more important than having more marketed goods and services.

A large portion of every country’s social and individual well-being depends on the maintenance of homes and families, including care of sick and elderly people, and other productive activities that go on in homes and communities but are not bought and sold in formal markets. Many adults today feel squeezed between the demands of conventional, 40-hour (or more) per week paid employment, and the time requirements of their families. As we saw in Chapter 7, full-time employment in Europe, in contrast, requires the equivalent of 5 fewer weeks of work, annually, on average, than full-time employment in the U.S. It is commonly believed that Europeans have chosen to translate part of their increased labor productivity into increased leisure, instead of using it all to increase earnings and consumption.

Economic practices that make people “rich” as consumers but “poor” as family and community members is not consistent with the human development goal of having

² Thorstein Veblen (1857–1929) wrote about “conspicuous consumption.” John Kenneth Galbraith’s *The Affluent Society* (1958), Tibor Scitovsky’s *The Joyless Economy* (1976), Juliet Schor’s *The Overspent American* (1998), and Robert Frank’s *Luxury Fever* (1999), took up this theme.

the freedom to live a valuable life. Supporting people in their roles as parents, friends, community builders and citizens has often been overlooked in macroeconomics, with its emphasis on paid employment. But providing such a broader base for human development is an important challenge for the 21st century. Public support for essential tasks of caring can help both care receivers and caregivers “participate in the life of the community” (as outlined in the UNDP human development goals).

2.4 Human Development Goals and Policies

In September 2000 the member states of the United Nations unanimously declared their intention to try to reach a set of development objectives called the **Millennium Development Goals (MDGs)**. These goals focus on improvements in the life of the very poorest people in the world, emphasizing food security, education, gender equity, and health care. The MDGs include mention of environmental sustainability (to be discussed in Section 3 of this chapter). Most of the goals set a deadline of 2015 for achievement.

Millennium Development Goals (MDGs): A set of goals declared by the United Nations in 2000, emphasizing eradication of extreme poverty; promotion of education, gender equity, and health; environmental sustainability, and partnership between rich and poor countries.

Economics in the Real World: Millennium Development Goals

1. **Eradicate extreme poverty and hunger** – Halve, between 1990 and 2015, the proportion of people whose income is less than \$1 a day, or who suffer from hunger
2. **Achieve universal primary education** – Ensure that, by 2015, children everywhere, boys and girls alike, will be able to complete a full course of primary schooling.
3. **Promote gender equality and empower women** – Eliminate gender disparity in all levels of education no later than 2015
4. **Reduce child mortality** – Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate
5. **Improve maternal health** – Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio
6. **Combat HIV/AIDS, malaria, and other diseases** – By 2015 have halted and begun to reverse the spread of HIV/AIDS, malaria and other major diseases
7. **Ensure environmental sustainability** – Integrate the principles of sustainable development into country policies and program and reverse the loss of environmental resources; Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation; Have achieved, by 2020, a significant improvement in the lives of at least 100 million slum dwellers
8. **Develop a global partnership for development** – Including fair trade, debt relief, and access to health and information technology

Each of the eight main *goals*, such as “reduce child mortality,” is accompanied by one or more specific *targets*, such as “reduce by two-thirds, between 1990 and 2015, the under-five mortality rate.” These targets in turn may relate to a number of policy actions, such as increasing education for mothers, vaccinating against measles, and distributing malaria-fighting mosquito nets. The eighth goal, “develop a global partnership for development,” points to some policies the richer countries should enact. These include eliminating tariff barriers to poor country products, canceling and/or restructuring debts, increasing foreign aid, easing the flow of essential drugs, and sharing technology.

The MDGs have been criticized by some who believe the goals do not go far enough in addressing inequalities and injustices between rich and poor countries. The 2005 *Human Development Report*, for example, points out that “The \$7 billion needed annually over the next decade to provide 2.6 billion people with access to clean water is less than Europeans spend on perfume and less than Americans spend on elective corrective surgery. This is for an investment that would save an estimated 4,000 lives each day.”³ As a high profile, specific commitment of United Nations members, however, the MDG declaration has served to increase the attention paid to the promotion of human development.

Regarding human development in richer countries, advocacy has largely been led by non-profit organizations. In the United States, non-profits such as Redefining Progress and the Center for a New American Dream are encouraging people to examine what they really want from their economic life. Throughout the United States and other industrialized countries, groups are experimenting with ways of getting off the consumer treadmill, both through personal changes in patterns of work and consumption, and community changes such as co-housing (community-oriented housing) and bicycle-friendly urban environments. In some cases, private companies and local governments are aiding experiments in new kinds of work-life patterns and community life.

2.5 Whither Human Development?

While the Millennium Development Goals are a noble statement of intent, the follow through on them since their declaration in 2000 has been disappointing. If current trends continue, the United Nations estimates that the goals regarding hunger, child and maternal health, sanitation, and gender equity will not be met. The United Nations currently projects that the MDG of halving the proportion of people in developing countries living on less than \$1/day between 1990 and 2015 will be met by 2015, but primarily as a result of poverty reductions in China and India. In Africa, in contrast, the number of people living in extreme poverty *increased* by 140 million between 1990 and 2002.

New HIV/AIDS infections continue to increase, although the prices of drugs to treat it have been brought down. Debts are being cancelled for 19 of the very poorest highly indebted countries, but debts remain a burden for many others. Only five countries (all European) have met the United Nations target for international aid of 0.7% of gross

³ *HDR 2005*, Overview, p. 8.

national income, and the Doha Round of WTO trade negotiations failed to make substantial progress in opening up rich country markets to the products of poorer countries.⁴ The spread of some kinds of technology (particularly cell phones), has been rapid in some areas, but a technological gulf between rich and poor countries persists. As stated in the 2005 *Human Development Report*, “the promise to the world’s poor is being broken.”

Real human development is still an unattained goal for many, in both rich and poor countries. Consideration of the environmental impact of growth makes this issue even more complicated, as we will see in the next section.

Discussion Questions

1. How important are your income goals to you, relative to your other goals? A recent survey, for example, asked respondents to say whether each of the following was absolutely necessary, very important, somewhat important, not very important, or not at all important “for you to consider your life as a success.” How would you answer?

Earning a lot of money
Seeing a lot of the world
Becoming well-educated
Having a good marriage
Having a good relationship
with your children

Having an interesting job
Helping other people who are in need
Living a long time
Having good friends
Having strong religious faith

2. Looking at the issue of human development, in what ways do the interests of people in rich countries and people in poor countries come into conflict? Are there also shared areas of concern, that could justify and motivate cooperative action?

3. Macroeconomics and Ecological Sustainability

In Chapter 14 we noted that world economic production has more than quadrupled since the early 1960s. Further economic growth is clearly desirable in developing nations in order to improve the well-being of over a billion people who are now living in desperate poverty. Continued economic growth has been a principal policy objective in developed countries. But as we enter the 21st century, we must consider whether it is possible, or even desirable, to continue along the economic growth trajectory of the 20th century. Economic growth has been accompanied by an increasing demand for natural resources, as well as increases in waste, pollution, and ecosystem damages. Many ecologists warn us that current scale of human impacts on the natural world is already unsustainable. The ecological implications of a further doubling,

⁴ The failure of the Doha Round to open up rich country markets was discussed in section 3.7 of Chapter 13.

quadrupling, or more, of human economic activity is an issue which, to date, has received little attention from macroeconomists.

In this section we consider the implications of current environmental issues for economic growth and development. First, we present an overview of some of the most pressing global environmental problems. Then we explore the relationship between economic growth and environmental quality, and discuss policies to promote ecologically sustainable development.

3.1 Major Environmental Issues

A number of environmental issues are closely related to economic growth. These include:

- **Global population.** Economic and technological growth since the Industrial Revolution has fostered a dramatic increase in the world's population. Global population was approximately one billion in 1800, increasing to two billion around 1930 and three billion in 1960. By 2000, it had increased to six billion. Human population growth contributes to increases in many environmental pressures, including those related to food production. While intensification of food production has so far kept pace with population growth, it has led to significant costs in terms of land degradation, pollution from fertilizers and pesticides, and overdraft of water supplies.

Global population growth rates are currently declining and many projections indicate that the human population will peak sometime in the 21st century (see Appendix). A stable or declining global population would eventually ease environmental pressures, but a substantial population increase is still predicted in the coming decades. The United Nations projects a global population of approximately nine billion in 2050, with almost all future population growth occurring in developing nations.⁵

- **Resource Depletion.** Depletion of important renewable and non-renewable resources has accompanied economic growth. Many of the world's fisheries are in decline due to over-fishing. Tropical forests are being lost at a rapid rate. Nearly a billion people live in countries where water is in scarce supply. In almost all of these areas, water supplies continue to be overdrawn and polluted. Stocks of key mineral resources, such as aluminum and copper, are for the most part not close to exhaustion, but high-quality reserves are being depleted, and recovery of lower-quality reserves tends to involve higher energy and environmental costs.

Probably no other natural resource has been more critical for modern economic growth than fossil fuels. These fuels (oil, coal, and natural gas) currently provide

⁵ This is the median projection (estimate) for 2050, between the high of 10.6 billion and the low of 7.7 billion. The United States, with a current population of 300 million, projected to increase to 400 million, is the only major developed nation still experiencing significant population growth.

86% of global energy supplies. The U.S. Department of Energy projects that global demand for fossil fuel energy will increase approximately 60% between 2006 and 2030. However, many estimates suggest that global production of oil, the most-used energy source, will peak within the next few decades. If this occurs – and global demand continues to climb – it will create a situation of increasing scarcity and rising prices. Given the current dependence on fossil fuels, this threatens both the potential for developed countries to maintain their living standards and for developing countries to reduce poverty.

- **Pollution and Wastes.** As discussed back in Chapter 6, damages from pollution are not reflected in traditional national accounting measures, even though they clearly reduce welfare. Industrial countries generate the vast majority of the world's pollution and waste. While the rich countries have only about one-sixth of the world's population, they generate about two-thirds of global industrial wastes by volume. But pollution also jeopardizes economic development in poorer nations. For example, a "Green GDP" estimate for China's Shaanxi province indicated that costs attributed to pollution alone amounted to over 10% of the official GDP for 2002. In some cases, toxic wastes are exported from industrialized countries to low-income nations that are ill-equipped to receive them. Rapid future development will mean that such problems are likely to grow, despite efforts to control them with environmental regulations.

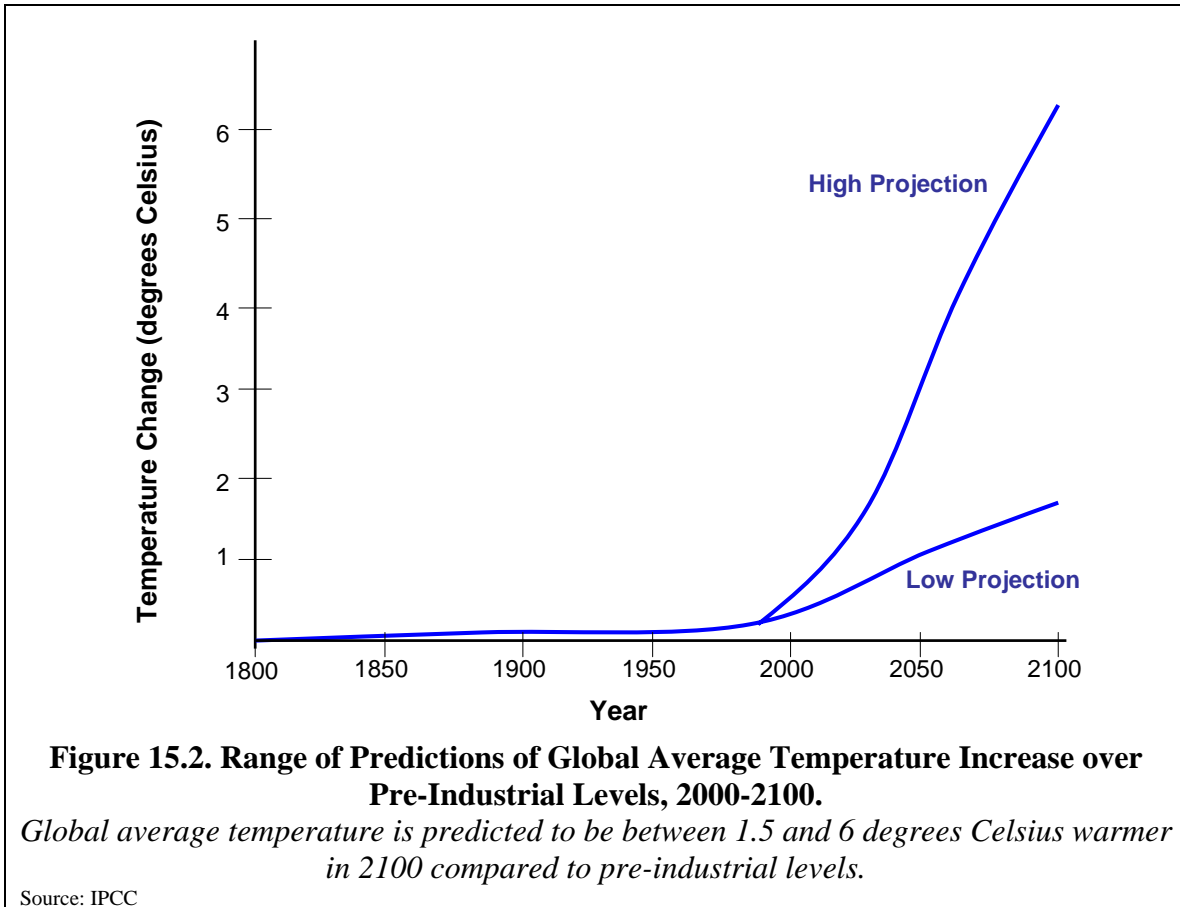
While all of these issues are important, global climate change⁶ has recently emerged as the primary environmental challenge of the 21st century. Research over the last several years has virtually eliminated any doubts that human activities are affecting the earth's climate. Emissions of various greenhouse gases, particularly carbon dioxide, trap heat near the earth's surface, leading not only to a general warming trend but to sea level rise, ecological disruption, and an increased frequency of severe weather events such as hurricanes, floods, and droughts.

Greenhouse gases persist for decades or more in the earth's atmosphere. In addition, there is a time lag between the time a gas is emitted and the time when its effects are fully realized. Thus even if annual emissions of greenhouse gases were immediately stabilized at current levels, the concentration of these gases in the atmosphere would continue to rise for some time. Global emissions of greenhouse gases will eventually need to be reduced significantly – from 25 to 70% lower than current levels by 2050 if we are to avoid the most dangerous effects of climate change, with further reductions in the second half of the 21st century. However, rather than declining, emissions of the major greenhouse gases are rising rapidly, primarily driven by fossil-fuel-based economic growth. According to the U.S. Department of Energy, global emissions of carbon dioxide rose by 13% between 2000 and 2004. U.S. DOE projects a further increase in global carbon dioxide emissions of over 60% by 2030.

⁶ The term "global climate change" is preferred to "global warming" because not all areas of the world will necessarily warm and there are several additional impacts besides warming.

Predicting the precise effects of climate change is subject to substantial uncertainty. In 2001 the Intergovernmental Panel on Climate Change (IPCC)⁷ produced a report summarizing the predictions of various climate change models. They reported a range in which the average global temperature was expected to be between 1.4 and 5.8 degrees Celsius (2.7 and 10.8 degrees Fahrenheit) warmer in 2100 when compared to pre-industrial levels, as illustrated in Figure 15.2. The IPCC's median-range projection is for a temperature increase of about 2.8 degrees Celsius (5.0 degrees Fahrenheit). The likely effects of only a 2°C increase in global average temperature include:

- A 20-30% decrease in water supplies in already vulnerable regions such as Southern Africa and the Mediterranean;
- Significant declines in crop yields in tropical regions;
- 40-60 million more people exposed to malaria in Africa;
- Up to 10 million more people affected by coastal flooding each year, with major low-lying areas swamped and coastal cities endangered
- 15-40% of species may face extinction.



⁷ The IPCC was formed in 1988 by the World Meteorological Organization and the United Nations Environment Program to assess the scientific and socio-economic information relevant to understanding human-induced climate change.

While these conclusions regarding the effects of a 2°C increase in global average temperature have gained additional scientific support, findings since the 2001 IPCC report have made use of new data and new analysis to conclude that climate change will likely occur more rapidly than was anticipated just a few years ago, and that the impacts will be more severe. A report sponsored by the British government in 2006 finds that under a “business as usual” scenario there is at least a 50% chance of an average temperature increase of more than 5°C (9° F) by the early 22nd century. Climate change of this magnitude could lead to catastrophic effects such as the irreversible melting of the Greenland ice sheet, the collapse of the Amazon forest, and flooding of major cities including London and New York. (See the “Economics in the News” box for more on this report).

The 2006 British report estimates the costs of climate change in the 21st century as equivalent to 5-20% of global GDP, while the most severe effects of climate change could be avoided at a cost of around only 1% of global GDP. Thus it now appears that the benefits of current actions to minimize climate change significantly exceed the costs.

Two other climate change issues should also be mentioned. First, while the most dangerous impacts of climate change will not occur for several decades or more, the actions taken in the next few decades will have a profound effect on those ultimate impacts. Delaying action for a decade will lead to a much greater risk of catastrophic effects. Second, the impacts of climate change will fall disproportionately on the developing countries, including coastal flooding, agricultural yield reductions, spreading of tropical diseases, and water supply shortages. While the rich nations will, to some extent, be able to adapt to many of the effects of climate change, the poor countries lack the financial and technical resources to adapt. As the IPCC notes, climate change will likely exacerbate global inequalities and impede economic development in poorer nations.

3.2 The Relationship between Economic Growth and the Environment

Some researchers have suggested that economic development eventually reduces environmental damages per capita when sufficient wealth and technology allows nations to adopt clean production methods and move towards a service-based economy. Further, environmental quality is generally considered a “normal good” – meaning that people will demand more of it as they become wealthier. The Environmental Kuznets Curve (EKC) hypothesis posits an inverted U-shaped relationship between economic development and environmental damages. According to this logic, environmental damage per capita increases in the early stages of economic development, reaches a maximum, and then diminishes as a nation attains higher levels of income. If the evidence supported this hypothesis, then it would imply that economic development will eventually promote a cleaner environment.

Economics in the News: The Stern Review – The Economics of Climate Change

Published in October 2006, the British government report written by former World Bank chief economist Nicholas Stern presents an urgent case for strong and immediate action to respond to the threat of global climate change. Excerpts from the report:

The scientific evidence is now overwhelming: climate change presents very serious global risks, and it demands an urgent global response. ... Under a BAU (business as usual) scenario, the stock of greenhouse gases could more than treble by the end of the century, giving at least a 50% risk of exceeding 5°C global average temperature change during the following decades. This would take humans into unknown territory. An illustration of the scale of such an increase is that we are now only around 5°C warmer than in the last ice age. Such changes would transform the physical geography of the world. A radical change in the physical geography of the world must have powerful implications for the human geography - where people live, and how they live their lives.

[T]he evidence gathered by the Review leads to a simple conclusion: the benefits of strong, early action considerably outweigh the costs. The evidence shows that ignoring climate change will eventually damage economic growth. Our actions over the coming few decades could create risks of major disruption to economic and social activity, later in this century and in the next, on a scale similar to those associated with the great wars and the economic depression of the first half of the 20th century. And it will be difficult or impossible to reverse these changes. Tackling climate change is the pro-growth strategy for the longer term, and it can be done in a way that does not cap the aspirations for growth of rich or poor countries. The earlier effective action is taken, the less costly it will be.

In summary, analyses that take into account the full ranges of both impacts and possible outcomes - that is, that employ the basic economics of risk - suggest that BAU climate change will reduce welfare by an amount equivalent to a reduction in consumption per head of between 5 and 20%. Taking account of the increasing scientific evidence of greater risks, of aversion to the possibilities of catastrophe, and of a broader approach to the consequences than implied by narrow output measures, the appropriate estimate is likely to be in the upper part of this range. ... It is still possible to avoid the worst impacts of climate change; but it requires strong and urgent collective action. Delay would be costly and dangerous.

Source: The Stern review is online at www.sternreview.org.uk.

Does this principle really work? The EKC relationship does seem to hold for some pollutants. Figure 15.3 shows the findings of a study that estimated the relationship between per capita sulfur dioxide emissions (the primary cause of “acid rain”) and the level of economic development in a nation. Sulfur dioxide emissions per capita peak at a GNP per capita of around \$5,000 and decline as incomes rise further. Studies of some other pollutants, predominantly other air pollutants, also give limited support to the EKC hypothesis.

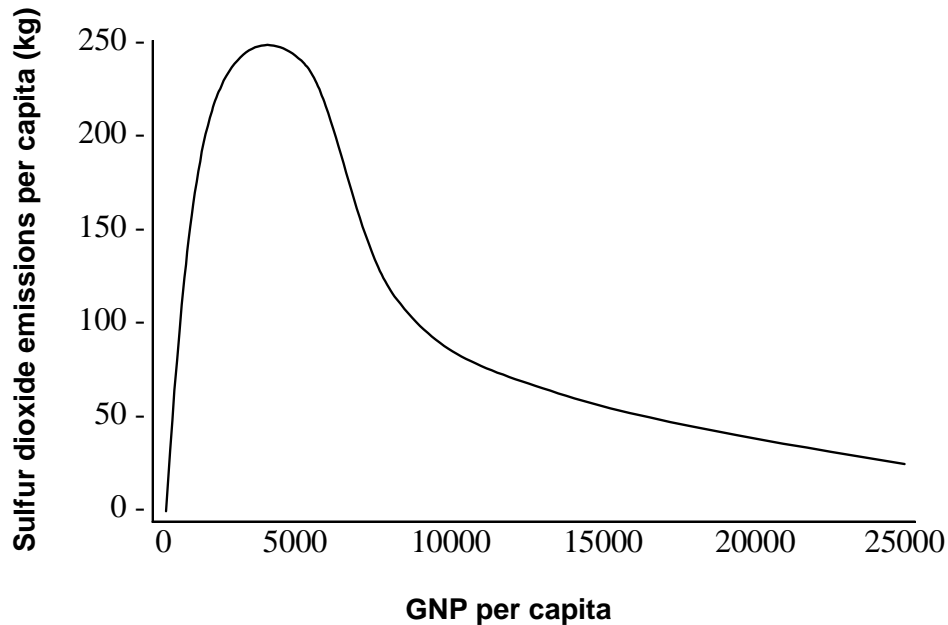
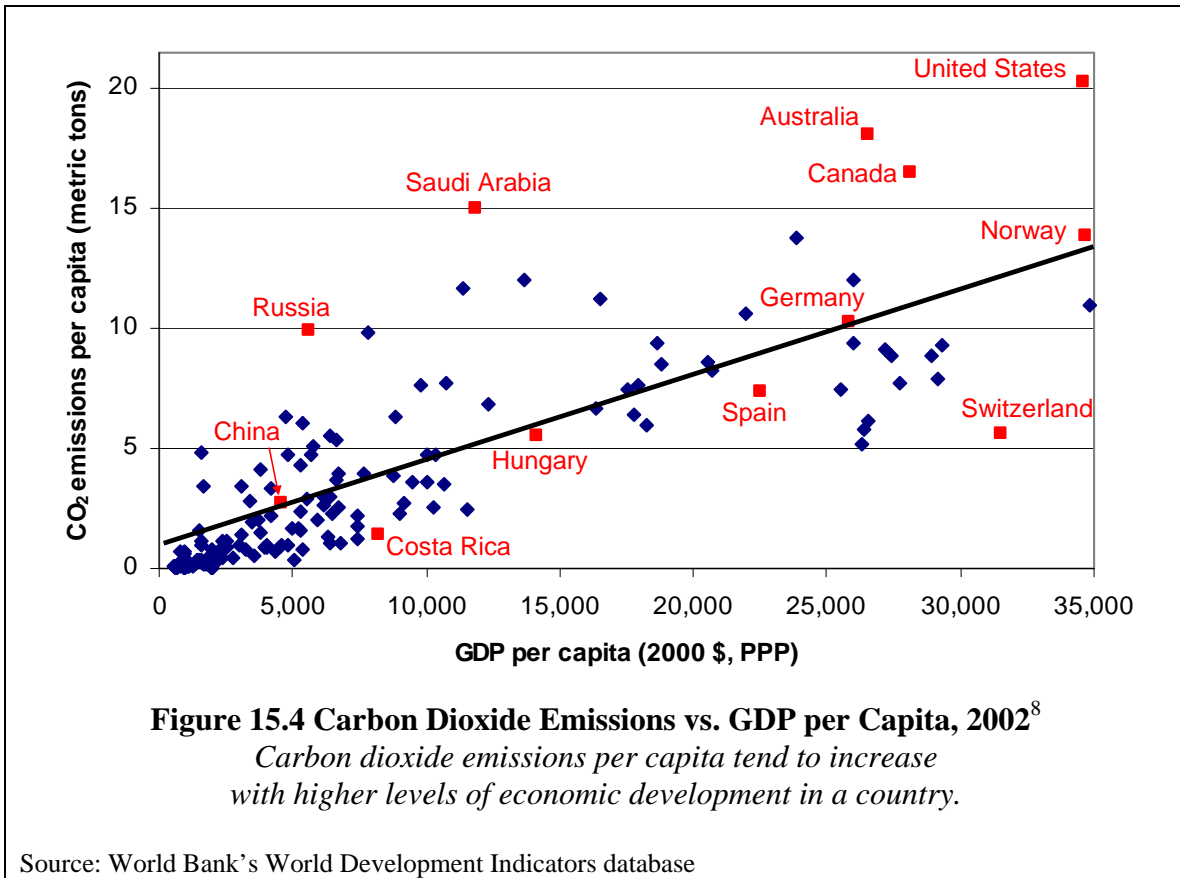


Figure 15.3. Environmental Kuznets Curve for Sulfur Dioxide Emissions
The empirical relationship between sulfur dioxide emissions and the level of economic development in a nation supports the EKC hypothesis.

Source: Panayotou, T., “Empirical Tests and Policy Analysis of Environmental Degradation at Different Levels of Development,” 1993.

However, the EKC relationship does not appear to hold for many other environmental problems. Studies of municipal waste and energy use find that environmental impacts generally continue to rise as incomes rise. Perhaps most importantly, carbon dioxide emissions tend to show a positive relationship with average income, as shown by the upward-sloping trend line in Figure 15.4 below. This means that carbon emissions can be generally expected to increase as economies grow, unless current dependence on fossil fuel energy is drastically altered.



Thus economic development alone appears unlikely to provide a guaranteed path towards environmental sustainability. The relationship between economic development and the environment is, in reality, more complex. Not only is the level of economic development a relevant factor in determining environmental impacts, but the distribution of resources also plays a key role. Most definitions of sustainable development focus on the imperative of reducing economic inequalities along with preserving the environment.

Some environmental damages, such as soil erosion and deforestation, often occur because poor people undertake unsustainable practices simply to survive. Programs to eliminate poverty in developing nations can provide people with choices that are less destructive towards the environment. Meanwhile, environmental degradation typically hits the poorest people the hardest.

Policies that improve the environment can thus also act to reduce poverty and economic inequality. So we see that the objectives of human development and environmental protection are actually interlinked goals. The promotion of human development in poor nations can improve environmental quality while policies to improve the environment can also reduce economic disparities. This suggests the need for

⁸ Five countries appear outside the range of this figure: Luxembourg, United Arab Emirates, Kuwait, Bahrain, and Trinidad and Tobago. The last four are oil-producing nations with high per-capita CO₂ emissions.

a coordinated policy response that considers the linkages between human development and the environment.

3.3 Policies for Sustainable Development

Much of macroeconomic theory and policy is currently oriented towards promoting continuous economic growth. What kind of policies would be required to promote ecological sustainability? How can these policies be designed to also maintain well-being and promote human development, especially in developing countries?

Some ecologically-oriented economists view "sustainable growth" as a contradiction in terms. They point out that no system can grow without limit. However, some kinds of economic growth seem essential. For the large number of people in the world who cannot satisfy their basic needs, an increase in consumption of food, housing, and other goods is clearly required. For those who have achieved a high level of material consumption, there are possibilities for improved well-being through expanded educational and cultural services which do not necessarily have a large negative environmental impact. But there is nothing in standard macroeconomics which guarantees that economic growth will be either equitable or environmentally benign. Specific policies for sustainable development are therefore needed.

What might such policies involve? Some possibilities include:

- "Green" taxes which make it more expensive to undertake activities that deplete important natural resources or contribute to degradation of the environment. They discourage energy- and material- intensive economic activities, while favoring the provision of services and labor-intensive industries.⁹ An example of a green tax would be a tax on fuels such as gasoline and diesel in proportion to the carbon emissions of the fuel. All countries have implemented environmentally-based taxes to some extent. As shown in Figure 15.5 environmental taxes in industrial countries can range from 3.5% to over 10% of total tax revenues.

Green taxes are strongly supported by economic theory as a means to internalize negative externalities such as pollution. When there exists a negative externality like pollution, an unregulated market will result in an inefficient allocation.¹⁰ Two common objections arise to green taxes. First, green taxes would likely fall disproportionately on lower-income households. A rebate or credit to these households could be implemented to avoid making a green tax regressive. The other criticism is that green taxes are politically unpopular – no one particularly wants higher taxes. Increases in green taxes can be offset by decreases in other taxes, such as income taxes, so that the tax burden on a typical household remains unchanged. And unlike income-based taxes, households would have options to

⁹ Labor-intensive production systems are those that use large amounts of labor relative to other factors of production. Similarly, energy-intensive systems use large amounts of energy. For example, automobile transport is energy-intensive; bicycle transport is labor-intensive.

¹⁰ Externalities were discussed in Chapter 2.

lower the amount of green taxes they pay by undertaking energy conservation measures and other environmentally-friendly practices.

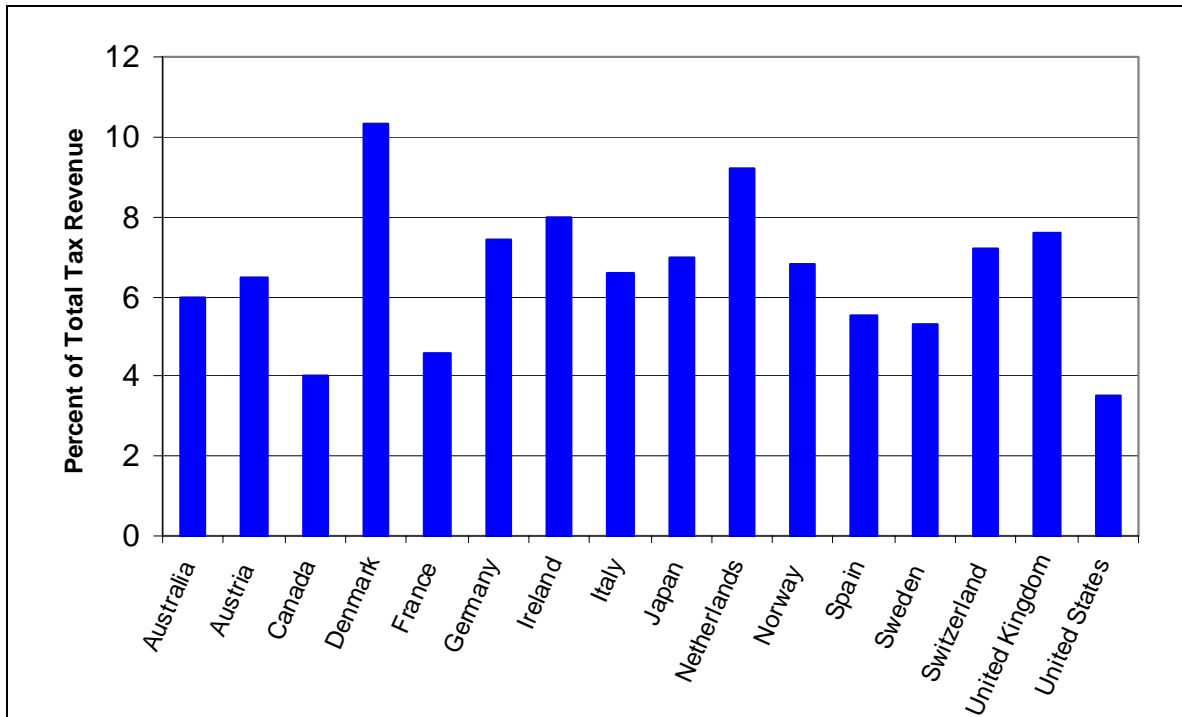


Figure 15.5 Environmentally-Based Taxes as a Share of Total Tax Revenue, Selected Developed Countries

Environmentally-based taxes account for over 10% of total tax revenue in Denmark but only about 3.5% of total revenue in the United States.

Source: Organization for Economic Cooperation and Development

- Elimination of agricultural and energy subsidies which encourage the over-use of energy, fertilizer, pesticides, and irrigation water. Sustainable agricultural systems rely on the recycling of nutrients, crop diversification, and the use of natural pest controls, minimizing the use of artificial chemicals and fertilizer. These systems also tend to be more labor-intensive and thus could boost employment.
- Policies to promote greater recycling of materials and use of renewable energy. Through research and development grants, subsidies, and tax breaks, governments can support the expansion of energy from solar power, wind, and geothermal heat. Strategic public investment in new technologies such as fuel cells and high-efficiency industrial systems can eventually make these technologies cost competitive.
- Tradable permit systems that set an overall limit on pollution by offering a limited number of permits which allow permit holders to emit specific quantities and types of pollution. These plans are based on the principle that a process of

pollution reduction may be most efficiently achieved by allowing businesses to choose between finding economical ways to reduce their emissions or paying to buy permits. Once the permits are distributed to firms, they can then buy or sell them from or to other firms. Pollution reduction will occur first where it can be done most economically. This efficiency characteristic makes tradable permit systems popular among economists. While environmentalists have sometimes objected, on principle, to the idea of government issuing “permits to pollute,” it is recognized that tradable permits have been used successfully in several instances, most notably to reduce sulfur dioxide emissions in the United States. Such permits can also be purchased by environmental groups or private citizens in order to retire them and thus reduce the overall level of pollution.

- Policies to promote efficient transportation systems that replace energy-intensive automotive transport with high-speed trains, public transit, greater use of bicycles, and redesign of cities and suburbs to minimize transportation needs. In countries like the United States where automobile-centered systems are already extensively developed, the use of highly fuel-efficient cars would be important; in some developing countries automobile dependence might be avoided altogether.
- Debt-for-nature swaps where the debt of developing countries would be forgiven if they agree to protect nature reserves or pursue environmentally-friendly policies. For example, in 2002 the United States canceled \$5.5 million of debt owed by Peru to the U.S. in return for Peru’s agreement to conserve 10 rainforest areas covering more than 27.5 million acres. This innovative international form of international fiscal policy was authorized by the Tropical Forest Conservation Act of 1998.

As many modern environmental problems are global in scope, they require a coordinated international response. The challenge of global climate change presents an illustration of how difficult this can be in practice. The Kyoto Protocol, drafted in 1997, committed developed nations to reduce their greenhouse gas emissions an average of 5% below their 1990 emissions by 2008-2012. Enough nations ratified the treaty so that it entered into force in 2005. The United States, the world’s largest emitter of greenhouse gases, has refused to ratify the treaty on the grounds that it would hurt the U.S. economy, and because it does not bind developing nations to any emissions targets. It also now appears that many of the nations that have ratified the treaty will not meet their emissions targets. In November 2006 representatives from 189 nations met in Kenya to begin the process of drafting a climate change treaty to replace the Kyoto Protocol when it expires in 2012.

3.4 Sustainability and Consumption

As discussed earlier, global inequalities currently mean that many people in the world have too little to live, while others consume at high levels. Some theorists have suggested replacing the goal of ever-increasing consumption with the goal of *sufficiency*. This idea is developed at two levels. On the individual level there is the question of what

levels of consumption are sufficient to support human well-being. On the macro or global level there is the question of what kinds and amounts of consumption can be continued, by humanity as a whole, without destructive environmental consequences. Note that the second question includes two importantly different issues: the *kinds* of consumption, and the aggregate *quantities* consumed. Alan Durning, author of *How Much is Enough: The Consumer Society and the Future of the Earth*, has proposed dividing the global population into three groups classified according to their consumption levels and environmental impacts. Table 15.1 presents a similar classification using updated data. We see that energy use, carbon emissions, and vehicle use for those in the global lower-income class are all much lower than in the rest of the world. While these households are often forced to undertake ecologically unsustainable actions simply to survive, their impact on global environmental problems is relatively minor. Durning identified “the global middle class” as the group that leads the most environmentally sustainable lifestyle. They rely primarily on bicycles and public transportation, eat a grain-based diet, and use a moderate amount of energy. Durning suggests that the entire world population could live at this level of affluence without overstepping the ecological carrying capacity of the planet. The global upper-income class rely on private vehicles and air transportation, eat a diet with daily meats, and use a significantly greater amount of energy than the other classes. Their lifestyle could not be emulated by the rest of the world without exceeding the capacity of the biosphere.

Table 15.1. Global Population Classification by Income and Environmental Impacts, 2005

	Global Lower- Income Class	Global Middle- Income Class	Global Upper- Income Class
Population (millions)	2,343	3,018	1,004
Average income per capita (US dollars)	507	2,274	32,112
Energy use per capita (kg oil equivalent)	501	1,373	5,410
Electricity power consumption per capita (kWh)	358	1,720	9,503
Carbon dioxide emissions per capita (metric tons)	0.8	3.3	12.8
Passenger cars per 1,000 population	6	51	433

Source: 2006 Little Green Data Book, the World Bank. Classification based on Durning, *How Much is Enough: The Consumer Society and the Future of the Earth*.

Each group must approach environmental sustainability with different objectives. For the lower-income group, the focus must be on improving material living standards and expanding options while taking advantage of environmentally-friendly technologies. The challenge for the middle-income group is to keep overall environmental impacts per capita relatively stable by pursuing a development path that avoids a reliance on fossil fuels, disposable products, and ever-increasing levels of material consumption. Finally, the high-income group must find a way to reduce environmental impacts per capita

through technological improvements, intelligently-designed policies, and changes in lifestyle aspirations.

3.5 Sustainability and Investment

If an ecological perspective implies limits on consumption, what happens to investment? As we have seen earlier in this book, investment spending has often been crucially important for aggregate demand and employment. Yet additional investments in traditional sorts of plant and equipment, heavily reliant on fossil fuels, may work against environmental sustainability. This dilemma can only be resolved by forms of investment which improve well-being but do not increase “throughput” of natural resources and creation of wastes. Fortunately the social and environmental challenges that have been outlined in this chapter define the need for large investment expenditures many of which are not directly related to increasing material consumption. Rather than being a burden or threat, the need for such investment expenditures may be the solution to maintaining employment with limited consumption.

As we saw in the preceding chapter, many countries in the past used industrial policies successfully, to push an economy from one phase to another. The United States could not have gone from a mostly agrarian economy to an industrial one without government assistance in developing transportation and communication systems. Japan’s government carefully selected a sequence of industries to support, going from low-tech, labor-intensive, to high-tech, information-intensive. All of the successful European, Asian and North American economies have depended on essential support from national investments in education and public health. Many such investments are “public goods” because, while they provide widespread benefits, it is hard to collect payment from the people who benefit from them; hence, if they are to occur, they need to be supported through national action. A similar set of strategic investments, focused on areas such as public transportation and alternative energy, could move nations towards a more environmentally sustainable economy. Such investments contribute to economically and environmentally positive development, but may not themselves pay the kind of return that would encourage private companies to undertake them. Yet with such strategic investments in place, the private sector can be relied on for much of the follow through – much as, in the past, the United States government provided interstate highways, while the private sector supplied cars and trucks.

It is also important to remember that, as discussed in Chapter 6, “investments” should really refer to much more than just factories and equipment. Environmental policy is concerned with protecting – that is, avoiding *disinvestment* in – the global commons – the oceans, the atmosphere, the world’s store of living species, and other aspects of natural and social capital that greatly affect the possibilities and the quality of life for present and future human generations.

This kind of long-term investment requires a more future-oriented perspective than is used for most business investments. The use of market discount rates (see Economics in Context box, below) tends to limit the planning horizons of most

Economics in Context: Discounting the Future

In economic theory, future costs and benefits are often evaluated with a technique called discounting. The theory behind discounting is that a dollar today is worth more than a dollar tomorrow – even correcting for inflation. The discount rate, sometimes referred to as the “time discount rate”, is the annual rate at which dollar values are considered to change over time (this is a different, broader use of the term than the Federal Reserve Bank discount rate offered to member banks, discussed in Chapter 11).

Thus, at an 8% discount rate, \$1.00 today becomes worth \$1.08 next year and $(\$1.00)(1.08^{10}) = \2.16 ten years from now. Similarly, \$1.00 to be received ten years from now is worth only $(\$1.00)/(1.08^{10}) = \0.46 today. For most commercial and financial calculations, the use of a discount rate makes sense. However, its application to social and environmental costs and benefits is more complicated.

For longer time periods, the impact of discounting becomes much more dramatic. The present value of \$1,000 50 years from now is only \$87.20 at a 5% discount rate, and the value of \$1,000 100 years from now is only \$7.60. At a 10% discount rate, the value of \$1,000 100 years from now is only 7 cents! This would mean that, applying a discount rate of 5%, it is not worth spending more than 7 cents today to avoid \$1,000 worth of damages 100 years from now. This has led to a serious criticism of the discounting approach. How can we justify a technique that may evaluate serious damages to future generations as less important than moderate costs today?

Discounting is essential if we are considering the economics of, for example, taking a mortgage to buy a house or a loan to finance a business investment. The benefits of being able to own and live in the house starting today may well outweigh the future costs of paying interest on the mortgage over the next twenty years. Similarly, the income generated by the business investment can be compared to the annual payments on the loan – if the rate of return on the investment exceeds the discount rate, it brings net benefits.

In such cases it makes sense to use the commercial discount rate, determined in current markets, to compare present and future costs and benefits. But can we say that a GDP gain today, or in the near future, outweighs major damage in the next generation? How should we evaluate broader environmental impacts which will continue over long periods of time?

We can try to resolve the problem by defining a **social discount rate** – a rate which attempts to reflect the appropriate social valuation of the future. Estimates of social discount rates vary, but are usually significantly lower than commercial discount rates. But of course private market actors such as corporations will base their decisions on the current market rate of interest, not a social discount rate. Public investments, in contrast, can be made based on a judgment that the appropriate social discount rate is lower – which means that the future should be weighed more heavily. This might justify, for example, more investments in energy efficiency and carbon-free energy sources today, to avoid damages from climate change that are likely to occur in future decades.

businesses and individuals to about twenty to thirty years. But long-term sustainability demands a generational perspective, since many of the most severe impacts of problems like global climate change will take decades, or even centuries, to unfold.

social discount rate: a discount rate that reflects social rather than market valuation of future costs and benefits; usually lower than the market discount rate. (see Economics in Context box)

Discussion Questions

1. Considering the environmental problems discussed in this section, in what ways do the interests of people in rich countries and people in poor countries come into conflict? Are there also shared areas of concern that could justify and motivate cooperative action on environmental problems?
2. How do you think your environmental impacts compare with those of the average person in the world? Would overall environmental impacts be greater or lesser if everyone had impacts similar to you?

4. Concluding Thoughts

Throughout the 20th century the main objective of macroeconomics has been steady, strong economic growth. Looking to the challenges we face in the 21st century, it seems that macroeconomics itself is in need of further development. Employment, price stability, and GDP growth are, and for any foreseeable future will continue to be, issues of great importance – not as ends in themselves, however, but as means to the broader goals of human development and sustainability.

With the ultimate well-being goals in mind, macroeconomics needs to look beyond the experience of the past, and ask some bold questions.

A fundamental question confronting macroeconomics in the twenty-first century is how the majority of the world's population, currently at relatively low standards of living, can improve their well-being. The issues of “human development” involve a combination of traditional economic growth and new approaches more oriented to dealing with problems of poverty, inequity, and ecological sustainability.

Much work needs to be done in coming decades to develop technologies that can provide energy and materials for human consumption in ways that are far less destructive to the environment. Other work is needed for remediation of past damages. And there are some kinds of work that need to be prevented – such as fishing for species that are near extinction, or fishing in ways that are destructive to ocean ecosystems, or destructive mining practices, etc.

Another set of essential questions have to do with how macroeconomics can be reformed to take account of the distant future. A first step in this direction must be to

recognize that there are important areas where it is inappropriate to discount the future. When our great-great-grandchildren are living, their lives and well-being will be as important to them as ours are to us. (This perspective, though often neglected in economics, is not new, and was emphasized by John Maynard Keynes in the 1930s – see Box: “Economic possibilities for our grandchildren”)

A macroeconomics that chooses not to discount the future when addressing serious, irreversible harms that may come out of present actions will make different calculations of risk and reward when making social investments. The very definition of externalities tells us that markets cannot be counted on to create the strategic, social investments necessary to deal with macro-level negative externalities; for these we must look to governments and other socially-motivated actors. Many scholars and policymakers believe that irreparable damage will soon occur on a large scale, unless there is immediate and dramatic action. They believe that what is needed is a national – and international – mobilization, along the order of how countries respond to threatening military invasions.

The macroeconomics of the twenty-first century must be truly global. The social problems of poverty reduction, as well as major environmental problems such as global climate change, can be partly addressed at the national level, but the roles of international trade and global institutions are critical. Our earlier analyses of national income, fiscal and monetary policy, unemployment and inflation, etc., remain relevant, but need to be placed in the global context of development and environment challenges.

With these sorts of questions in mind, you may look back over all that you have learned in this book, and consider a variety of questions through the lenses of well-being and sustainability. In addition to those posed above, some additional questions requiring answers are: What sorts of fiscal and monetary institutions and policies can best serve the goal of ecologically and socially sustainable development? What sorts of small scale, national, and international economic developments will be helpful?

These questions remains to be answered – and acted upon. With a grounding in the best knowledge of the past, and an eye to the problems faced in the present and future, perhaps you can contribute to achieving these goals.

Economics in Context: Economic Possibilities for our Grandchildren

Excerpted from the essay “Economic Possibilities for our Grandchildren,” John Maynard Keynes, 1930:

What can we reasonably expect the level of our economic life to be a hundred years hence? What are the economic possibilities for our grandchildren?

... a point may soon be reached, much sooner perhaps than we are all of us aware of, when these needs are satisfied in the sense that we prefer to devote our further energies to non-economic purposes. ... I draw the conclusion that, assuming no important wars and no important increase in population, the economic problem may be solved, or be at least within sight of solution, within a hundred years. This means that the economic problem is not – if we look into the future – the permanent problem of the human race.

Thus for the first time since his creation man will be faced with his real, his permanent problem – how to use his freedom from pressing economic cares, how to occupy the leisure, which science and compound interest will have won for him, to live wisely and agreeably and well.

When the accumulation of wealth is no longer of high social importance, there will be great changes in the code of morals. ... The love of money as a possession – as distinguished from the love of money as a means to the enjoyments and realities of life – will be recognized for what it is, a somewhat disgusting morbidity, one of those semi-criminal, semi-pathological propensities which one hands over with a shudder to the specialists in mental disease. All kinds of social customs and economic practices, affecting the distribution of wealth and of economic rewards and penalties, which we now maintain at all costs, however distasteful and unjust they may be in themselves, because they are tremendously useful in promoting the accumulation of capital, we shall then be free, at last, to discard.

Of course there will still be many people with intense, unsatisfied purposiveness who will blindly pursue wealth – unless they can find some plausible substitute. But the rest of us will no longer be under any obligation to applaud and encourage them.

Discussion Questions

1. Do you agree with Keynes’ belief that developed nations will soon reach a point when needs will be “satisfied in the sense that we prefer to devote our further energies to non-economic purposes”? Do you think we are any closer to this point than when Keynes wrote his essay in 1930? Do you see any evidence that this is starting to occur?
2. Are you optimistic or pessimistic about the future when it comes to reducing global inequalities? Do you believe the world will be less or more unequal in 50 years? What about environmental problems – do you think they will get better or worse in your lifetime?

Review Questions

1. With whom did the concept of “human development” originate?
2. Describe the concept of “human development.”
3. How does “human development” differ from “economic development”?
4. What are some of the major issues concerning human development in rich countries?
5. What are the eight Millennium Development Goals?
6. Describe the degree of progress being made on the MDGs.
7. What are some of the environmental issues related to economic growth?
8. What are some of the projected effects of future climate change?
9. What is the environmental Kuznets curve (EKC) hypothesis? What is the evidence regarding this hypothesis?
10. What are “green” taxes?
11. What are tradable permit systems?
12. What is a debt-for-nature swap?
13. What is the idea of sufficiency?
14. How do environmental impacts differ across the three global income classes?

Exercises

1. The UNDP’s annual *Human Development Reports* are available on-line, at <http://hdr.undp.org/>. Each report begins with an Overview section. Answer the following questions, using the Overview section of the most recent issue:

- a. What special concern is highlighted in the most recent report?
 - b. How is this concern related to the Millennium Development Goals?
 - c. How does the report describe progress (or lack thereof) on this issue? (If this issue is part of a MDG, is the MDG likely to be met?)
2. Goal #8 of the Millennium Development Goals includes the following targets:

Develop further an open, rule-based, predictable, nondiscriminatory trading and financial system (includes a commitment to good governance, development, and poverty reduction—both nationally and internationally); Address the special needs of the least developed countries (includes tariff- and quota-free access for exports enhanced program of debt relief for Highly Indebted Poor Countries and cancellation of official bilateral debt, and more generous Overseas Development Assistance for countries committed to poverty reduction); Address the special needs of landlocked countries and small island developing states; Deal comprehensively with the debt problems of developing countries through national and international measures in order to make debt sustainable in the long term; In cooperation with developing countries, develop and implement strategies for decent and productive work for youth; In cooperation with pharmaceutical companies, provide access to affordable, essential drugs in

developing countries; In cooperation with the private sector, make available the benefits of new technologies, especially information and communications.

Declarations by international bodies, especially when they are based on wide consultation, must represent a variety of interests. Select four of the targets listed above, and see if you can identify some of the constituencies that are likely to have influenced them—perhaps by urging that the target be included, or by putting up resistance to making a stronger statement.

3. One of the objections the United States government has raised to the Kyoto Protocol is that it doesn't set emissions targets for developing nations such as China and India. Thus, while the treaty imposes emissions reductions on developed nations, developing nations are allowed to increase their emissions without restrictions. According to the United States, this gives developing countries an unfair competitive advantage in the global marketplace. Developing nations counter that any restrictions on them would limit economic development and that the developed nations should take action first, since they are responsible for the majority of global greenhouse gas emissions. Conduct some Internet research to locate articles supporting each of these positions. Then indicate whether you believe developing nations should be bound to emissions targets. Do you think an effective response to global climate change can be enacted without holding developing nations to emissions targets?

4. Match each concept in Column A with a definition or example in Column B.

Column A

- a. an international organization concerned with human development
- b. percent of tax revenue from green taxes in the United States
- c. two variables with a positive relationship
- d. projected cost of climate change in the 21st century as a percentage of global GDP (according to 2006 British report)
- e. a hypothesis regarding the relationship between economic growth and the environment
- f. adopted by the United Nations in 2000
- g. capabilities
- h. an international organization concerned with global climate change
- i. Percentage reduction in global greenhouse gas emissions necessary by 2050 if we are to avoid the most dangerous effects of climate change
- j. two variables with no relationship
- k. percent of global energy supplies from fossil fuels

Column B

- i. opportunities people have to live worthwhile lives
- ii. IPCC
- iii. 86%
- iv. income and happiness in societies, measured *over time*
- v. 25-70%
- vi. MDG
- vii. 3.5%
- viii. UNDP
- ix. income and happiness measured among people *at a point in time*
- x. 5-20%
- xi. EKC

Appendix: Demographic Challenges

One of the important issues in the area of human development and environmental sustainability is the question of *how many* humans we need to be concerned about. In 1700, the human population was about 600 million. By 1927, it was two billion. Currently, about 6.5 billion people share this planet. Will national and global populations continue to grow, level off, or even shrink? What are the macroeconomic challenges presented by likely demographic changes in the coming century?

The relations of demographic to economic issues are many and complex. On the one hand, growth in the size of economies is often associated with population growth, since more people means more workers, and hence more ability to produce. On the other hand, human well-being can be endangered when population growth outruns available resources, including environmental resources. If production of needed goods and services cannot keep pace with population, lower standards of living can result. In addition to the question of population size, issues about the composition of a population, when looked at according to characteristics such as age, can also be important in explaining economic change. This appendix, after introducing some basic concepts in demography (the study of populations), examines the macroeconomic challenges posed by continued growth in global populations and the dramatic aging of populations in many countries.

A.1 Basic Demographic Terms and History

While the terms “birth rate” and “fertility rate” may seem like they should mean the same thing, in the field of demography they have different meanings. The **birth rate** is the annual number of births per 1,000 *people* in a population. The **fertility rate**, on the other hand, refers to the average number of births *per woman of reproductive age* in a population. So you can see that the birth rate in any country will depend on two things: first, the proportion of people in the country who are women of reproductive age, and, second, the rate of fertility among these women. Similarly, the **death rate** is the annual number of deaths per 1,000 people, while a **mortality rate** refers to deaths within a specific group (such as among mothers or children).

| **birth rate**: the annual number of births per 1,000 population

| **fertility rate**: the average number of births per woman of reproductive age

| **death rate**: the annual number of deaths per 1,000 population

| **mortality rate**: the average number of deaths among a specific group (such as mothers or children)

If the fertility rate is equal to what is called the **replacement fertility rate**, then the next generation will be the same size as the current one – women will, on average, produce just enough children to replace themselves and one other adult. Currently, the replacement fertility rate for industrialized countries is about 2.1 children per woman. It

is higher than 2 because slightly more males than females are born, and some females will not survive to reproduce. In countries with higher mortality rates or larger ratios of men to women, the replacement fertility rate is somewhat higher.

replacement fertility rate: the fertility rate required in order for each generation to be replaced by a next generation of the same size. This requires an average fertility of 2.1 children per woman in industrialized countries.

It might seem that a country with fertility rates that are exactly equal to the replacement rate should have a stable population. However this is not necessarily so, due to a phenomenon called **population momentum**. Recall that the birth rate depends not only on the fertility rate, but also on the size of the childbearing population. Suppose a country contains relatively few older people and large numbers of people of childbearing age. Its population will continue to grow even with a replacement fertility rate because the birth rate will be high (reflecting the size of the childbearing group), while the death rate will be low (since only a small proportion of the population will be reaching the end of life). Only when birth rates and death rates are equal does a population stabilize.

population momentum: the trend in population size that results from its age profile, in particular the number of women who are of childbearing age or younger. For example, a population can continue to grow, in spite of having a fertility rate at or below replacement, if a large proportion of its members are of childbearing age.

Over the last 200-300 years, the industrialized countries of the world have gone through a **demographic transition** from a combination of high birth rates and death rates to a combination of low birth rates and death rates. But this transition has not been smooth. Table A.1 outlines the four – or perhaps five – stages of demographic transition.

demographic transition: the change over time from a combination of high birth and death rates to a combination of low birth and death rates

In the First Stage women expend much time and effort in childbearing and childrearing, at much risk to their own health, only to see many of their children die young. Thus moving away from the First Stage is an important goal of human development. Populations in the Third and Fourth Stage have moved past the highest birth and death rates, making a higher quality of life possible.

Table A.1 Stages of Demographic Transition	
First Stage	Both birth and death rates are high. On average the number of children that survive in each family is just enough to keep the population stable or very slowly growing.
Second Stage	Death rates are reduced, while birth rates stay high, so that parents are typically survived by significantly more than the 2 children required to replace them. In the 18 th -20 th centuries this second stage developed in industrializing countries due to the nutritional advances that followed increased agricultural productivity, and also (especially after about 1850) better medical care and sanitation.
Third Stage	Birth rates start declining, but are still higher than death rates. The increased availability of contraception and improvements in female education contribute to this stage. In the third stage fertility rates are initially above replacement level, but will eventually drop to or possibly below replacement level. Population growth slows down, though it continues growing because of the number of child-bearing-age women.
Fourth Stage	Birth rates and death rates equalize at a low rate. Population growth is zero – but the population is considerably larger than it was when the process began.
Fifth Stage	Birth rates are lower than death rates. When the demographic transition was first conceptualized, the process was expected to stop at the Fourth Stage. In fact, however, some nations may move fairly rapidly from above- to below-replacement birth rates, <i>passing through</i> the fourth stage of equal birth and death rates. Population actually declines.

While birth and death rates are crucially important for explaining population trends in any country, for some countries the **net migration rate** is also important. The net migration rate is the number of people gained by migration (calculated as the number of people moving into an area minus the number of people who moved out of the area) over a year, usually expressed per 1,000 people.

net migration rate: the net gain in population from migration, per 1,000 population

A.2 Global Population Patterns and Policies¹¹

The industrialized countries of the world are generally in the Third or Fourth Stage of the demographic transition. The fertility rate in the United States is near 2.1, while most other industrialized nations have fertility rates well under 2. Italy was one of the first countries to be recognized as having a below-replacement birth rate, entering the Third Stage in about 1960. Its population nevertheless continued to increase, from 50 to about 57 million now. Given current trends, Italy's fifth phase is about to begin; the population is predicted to sink to 54 million in 2025 and 38 million in 2050 – a 33% decline from the peak.¹² Germany and Japan are other nations where population decline seems imminent. Government policies in such countries often now seek to increase births, especially among the ethnically dominant populations (See Economics in the News: Shrinking Italy).

Economics in the News: Shrinking Italy

Los Angeles Times, Tracy Wilkinson, February 9, 2005

While many environmentalists fret about overpopulation, Italians are fretting over the opposite. Despite the stereotype of its massive Catholic clans, Italy actually has one of the lowest birthrates in the world, a population set to shrink by a third by 2050, and the world's highest percentage of population aged 65 or older (18.6 percent in 2003). The country wants babies. Badly. Last year, the Italian government offered a \$1,300 one-time payment to couples who had a second child. The rural village of Laviano, fearful of disappearing altogether, is offering \$14,000 for every tyke produced. Studies show, however, that while cash payments may accelerate breeding schedules, they don't persuade tot-averse citizens to procreate. Some activists say what's really needed is more public-policy support for working mothers. If serious steps aren't taken, says Franca Biglio, mayor of Marsaglia (population 400), "Our bella Italia will become a deserted wilderness."

However, significant parts of the world still have growing populations. Many governments and international agencies working in poorer countries have tried to bring down fertility rates, in order to ease the stress that a quickly growing population puts on resources and productive capacities. These programs have often been successful, at least to a degree, and some population policies simultaneously serve other human development ends. Increasing women's access to health services and education has often played a crucial role, delivering not only knowledge about family planning but also often giving women the power to play a greater role in household decisions. However other policies, such as China's long-time policy of penalizing families that have more than one child, are

¹¹ Unless noted otherwise, data in this section come from the World Bank's *World Development Indicators* database, the CIA *World Factbook* on-line, and the UN's *World Population Prospects: The 2004 Revision* online database.

¹² Data from <http://www.library.uu.nl/wesp/populstat/Europe/italyc.htm>.

more coercive, and have more ambiguous effects on human freedoms. Forced sterilizations, forced abortions, and infant abandonment (especially of infant girls, in cultures that prize boys) are the darker side of a strong emphasis on population control.

Population trends in China and India are especially noteworthy, since together they contain nearly 40% of the world's population. Even though China has put downwards pressure on population with its one-child policy and had a fertility rate estimated at 1.73 in 2006, its population is still growing (due to population momentum). The United Nations projections suggest that its population will continue to grow until 2030, peaking at 1.45 billion. India currently has a smaller population than China, and its fertility rate has fallen by half since the 1960s. But with a current fertility rate of 2.9, India is expected to displace China as the world's most populous country within the next 50 years. Populations are also still growing in most middle-income countries, though their fertility rates vary, some being above and others below replacement.

Sub-Saharan Africa has had some of the world's highest fertility rates in modern times – up to seven children per woman, in some countries. Tragically, however, the HIV/AIDS pandemic has drastically increased mortality rates in many of these countries. Botswana, Mozambique, South Africa, Lesotho and Swaziland are expected to have negative population growth by 2010 due to AIDS. Rather than moving through the demographic transition, these countries seem to have been thrown back to the First Stage. The population story in the Russian Federation is also rather grim. Suffering from the special conditions of a poorly managed transition from socialism to a market economy, it has experienced both high death rates and low birth rates. Its population, at a high of 148 million in 1990, has fallen to 143 million today.

So what does this boil down to, as a global picture? It is impossible to see exactly what the future holds, but projections about population made by the United Nations Population Division forecast world population rising from its current level of 6.5 billion to between 7.7 billion and 10.6 billion by 2050. Most of the additional people will live in the less-industrialized parts of the world. These projections assume that countries will converge towards a fertility rate that is at or below replacement, though the range in projections comes from variations in how rapidly this is assumed to occur. The projections assume that life expectancy will increase except where affected by HIV/AIDS.

The United Nations projections, however, do not take into account the consequences of environmental degradation. Whether the resources of the world – including the sink function of the atmosphere in regards to carbon dioxide – will be able to continue to support such a growing population remains to be seen. If population should cease to grow in the coming century, will this be because of individual choices and human-development-oriented policies, such as increasing people's power to control their family size? Or because of coercive policies and/or high death rates due to flood, famine, and disease? Macroeconomic policies concerning resource use, development, and international economic relations hold part of the key to these important questions.

A.3 The Issue of Aging Populations

To those who have been concerned about the ecological, economic and social impacts of rapid population growth or excessively high population density, shrinking populations are good news. It is probably for this reason – as well as the difficulty of comprehending a dramatic reversal of a trend we have become used to – that development thinkers have only recently begun to think about the threats and challenges inherent in the Fourth and Fifth Stages of the demographic transition. The most obvious problems arise from the fact that a rapidly falling birth rates lead to changes in the age structure of a population.

A convenient way to visualize the age structure of a population is to chart the numbers of men and women in different age categories, as shown in Figure A.1 for the case of the United States. Such figures are called "population pyramids," because in populations with sizeable, steady birth rates and regular, steady death rates among older persons, they take on the triangular shape shown in Figure A.1(a), representing the United States population in 1900.

While fertility rates fell in the United States over the 20th century, this fall was not steady. Fertility was particularly low during the Great Depression, and then sprang part way back during the post-WWII years. People born between 1946 and 1964 are thus said to belong to the "baby boom" generation. Then, after the "baby boom" came the "baby bust," and a transition to a substantially lower fertility rate. As a result, the "pyramid" by 2000 did not look so triangular anymore. At the turn of the 21st century, an unusually high proportion of the population was in their prime working years, with relatively small numbers of the elderly and children, as shown in Figure A.1(b).

As the bulge created by middle-aged baby boomers moves farther up the pyramid over the coming decades, the proportion of the population who are in their retirement years will rise. (The first baby boomers turn 65 in 2011.) Government projections suggest that the age structure of the United States population is projected to look like Figure A.1(c) in 2040 – much more like a rectangle than a triangle.

Other countries that have experienced a "baby bust" will face similarly top heavy age structures. This means that there will be fewer people of working age around to support people who have retired. The **old-age dependency ratio** is often defined as the number of people age 65 and over for each 100 people age 15-64.¹³ Figure A.2 shows the projected rises in the old-age dependency ratio for three of the countries we have discussed: Italy, China, and the United States. In Italy, for example, the number of older people per working-age person is projected to rise from about 30 now to nearly 70 in 2050.

Old-age dependency ratio: the number of people age 65 and over for each 100 people age 15-64

¹³ An alternative definition considers working age as beginning at age 20.

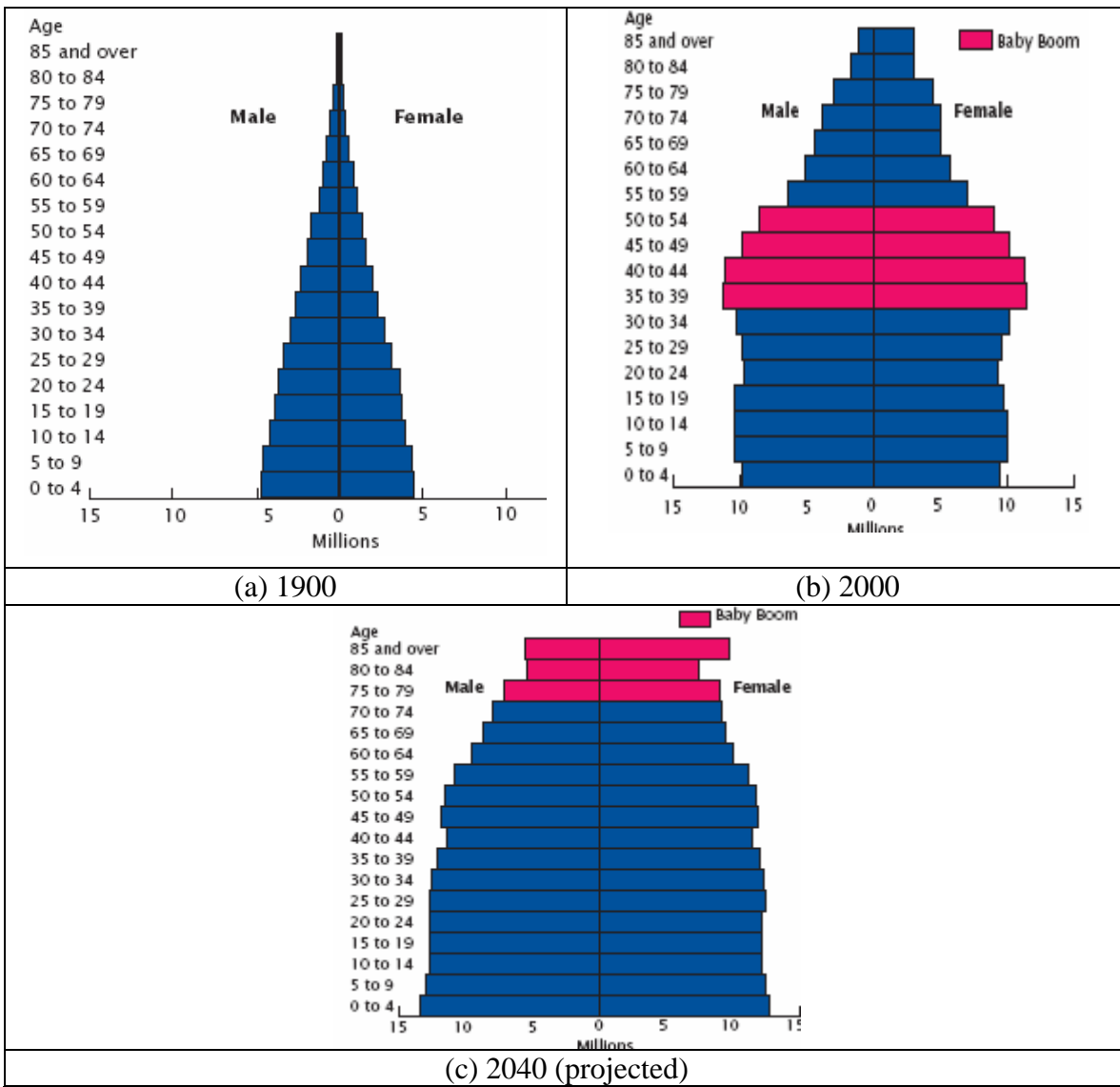


Figure A.1 Population by Age and Sex, United States, 1900, 2000, and 2040 (projected)
In 1900, the "population pyramid" shows a small elderly population, a larger middle-aged population, and an even larger population of children. By 2000, falling birth rates made the middle tiers of the "pyramid" bulge outward. The proportion of older people in the population is forecast to be unusually high in future decades.

Source: Wan He, Wan, Manisha Sengupta, Victoria A. Velkoff, and Kimberly A. DeBarros, U.S. Census Bureau, Current Population Reports, P23-209, *65+ in the United States: 2005*, U.S. Government Printing Office, Washington, DC, 2005.

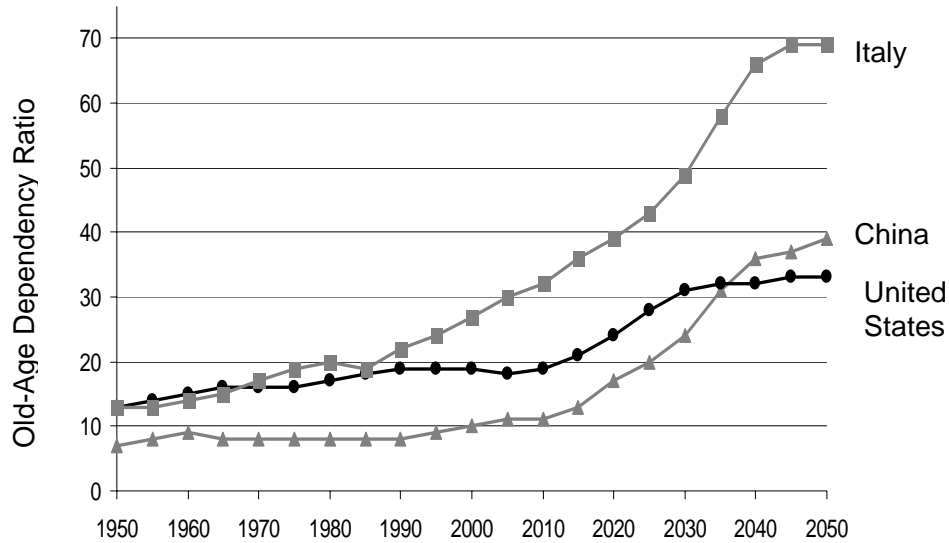


Figure A.2: Old-Age Dependency Ratios, 1950-2050

Nations with sharp declines in birth rates can expect to have a rising ratio of older people to working-age people over the next several decades.

Source: World Population Prospects: The 2004 Revision, Population Database, United Nations.
Figure based on medium variant projections.

Such a changing age structure has a number of implications for national macroeconomic considerations:

- First, each future worker will have considerably more retired people dependent on his or her services. Even though people can save in a financial sense for their own retirements, the real food, housing services, and health care they need can only be provided or maintained by current workers. This suggests that there may be pressure in the future for people to start work earlier in life, retire later, or work more intensely than they have in the past. The need of the elderly for health and social services may also lead towards a further sectoral shift towards service-sector employment. In some countries, the need for workers may be filled, in part, by increased immigration.
- Second, it has implications for savings rates. With more people drawing down their retirement savings, and fewer people in the process of building up their savings in preparation for retirement, one can expect national savings to be depressed. This may boost consumption and aggregate demand, but may also cause a lack of loanable funds needed for investment purposes.
- Third, it has implications for government budgets. An aging population means fewer people paying taxes, at the same time that more people become reliant on public retirement programs and publicly-provided social services and medical

care. Such strains on public finances may lead to higher taxes and/or lower benefits, or cuts in other areas.

In countries such as the United States, which has a long history of retirement support, the effect may be primarily felt through strains in public budgets – as current controversies over the future of Social Security and the financing of prescription drugs for the elderly already demonstrate. The aging of the population may be felt even more acutely in China, where pensions and medical and other support for the elderly are looming as possibly the leading social crisis.

A.4 Demographic Challenges Ahead

The population pyramids shown in Figure A.1 can be used, with a little assistance from your imagination, to illustrate another, very important point. Figure A.1(a) showed the U.S. in 1900; it can also serve as a generalized picture of any nation that has a growing population impelled by fertility rates above replacement. More than half of the world's population – about 3.5 billion people – fit this picture. At the same time, Figure A.1(c) is a reasonably good picture of the squared-off “pyramids” that will, in the foreseeable future, characterize nearly all the rich countries of the world: Western Europe, Japan, and a few other highly industrialized countries.¹⁴ Now you need to exercise your imagination to see how these relate to one another: the version of Figure A.1(a) that would represent all of the poor, growing-population countries is just about three times as large (represents about three times as many people, at all the ages shown) as the version of Figure A.1(c) that would represent the world's rich, declining-population countries.

These images illustrate a critical and growing aspect of global inequality. In the foreseeable future the rich countries will be concentrating their wealth among fewer people, while the poor in countries with expanding populations need to share the little they have with ever more people. This is an incendiary situation; the international strains and resentments that result are already evident in the statistics on border incidents, blocked migrations, and would-be migrants dying in the attempt to flee from severe poverty to the places that, as they have seen or heard in media, offer riches and opportunity.

These population images, and the underlying realities, including growing inequalities of living standards, will be of great global significance for at least the next 50 years.

While there is no certainty that inequalities between rich and poor will diminish in the foreseeable future, by mid-century there will be some important additional factors to add to the picture just painted. China's population (as noted earlier) will have begun to

¹⁴ Of the 1.2 billion people living in high-income countries, only about 40 million live in nations with average fertility rates above 2.1 children per woman. Saudi Arabia has the highest fertility rate of this group (4.09). About 1.8 billion people living in what are defined as middle-income countries also have below-replacement fertility rates; the large majority of these are in China.

decline by 2050. It also seems likely that India's declining fertility rate will not stop when it reaches 2.1, but will continue to fall, so that sometime in the second half of the 21st century India will join China in a new category of countries that, even if not yet rich, have nevertheless reversed the long growth trend of the Second Stage of the demographic transition.

With China and India, and a number of other countries as well, likely joining the list of nations with below-replacement fertility, it seems likely that within this century we will see a cessation of growth in the global human population. It is also possible that, beyond stabilization, the shrinking of populations will continue in the richer countries, and spread to others as well. In terms of Earth's ecological carrying capacity, this is desirable. However significant changes will be required in how people conceptualize and pursue their goals if a shift toward smaller populations is to be felt as positive rather than severely negative. Macroeconomic theory has a significant role to play in helping to conceptualize and plan for these changes, including the need to revise expectations, behaviors, policies, and theories to assist shrinking populations in adapting to a changing age profile, including a growing proportion of elderly people. This has potentially large implications for medical care and other services, GDP, policy, and culture. One important challenge is to discover how the elderly population can be more of a resource than a drain; this is desirable from an economic point of view, and also in terms of the psychological well-being (sense of meaning and purpose in life) of the elderly.

Pulling back from that longer view, an overriding concern for the first half of the 21st century must be the need to provide food, energy, education, and productive work for a likely sizeable increase in the number of people on Earth – with virtually all of that increase occurring in areas where economic as well as social, cultural, and political systems are already hard pressed to adapt to past and present population growth. Ecosystems everywhere in the world are showing signs of severe deterioration under the pressure of human populations that have multiplied since the early stages of the demographic transition.

The record of the last 300 years is one of astonishing achievement, in which the total human population has multiplied over 10-fold, with more than half of those now alive enjoying a level of material consumption that would have been considered great riches in any previous era. However the number still living in desperate poverty is also greater than the whole human population at the beginning of the demographic transition. And the natural capital on which humanity can draw is now much degraded compared to the riches with which our species was earlier endowed. The immediate moral of the demographic story is sobering: it is the need to find ways to provide better lives for more people, with diminishing natural resources.