Alternative Perspectives on Population Growth

The Solow growth model highlights the interaction between population growth and capital accumulation. In this model, high population growth reduces output per worker because rapid growth in the number of workers forces the capital stock to be spread more thinly, so in the steady state, each worker is equipped with less capital. The model omits some other potential effects of population growth. Here we consider two—one emphasizing the interaction of population with natural resources, the other emphasizing the interaction of population with technology.

The Malthusian Model In his book *An Essay on the Principle of Population as It Affects the Future Improvement of Society,* the early economist Thomas Robert Malthus (1766–1834) offered what may be history's most chilling forecast. Malthus argued that an ever increasing population would continually strain society's ability to provide for itself. Mankind, he predicted, would forever live in poverty.

Malthus began by noting that "food is necessary to the existence of man" and that "the passion between the sexes is necessary and will remain nearly in its present state." He concluded that "the power of population is infinitely greater than the power in the earth to produce subsistence for man." According to Malthus, the only check on population growth was "misery and vice." Attempts by charities or governments to alleviate poverty were counterproductive, he argued, because they merely allowed the poor to have more children, placing even greater strains on society's productive capabilities.

The Malthusian model may have described the world when Malthus lived, but its prediction that mankind would remain in poverty forever has proven very wrong. The world population has increased about sixfold over the past two centuries, but average living standards are much higher. Because of economic growth, chronic hunger and malnutrition are less common now than they were in Malthus's day. Famines occur from time to time, but they are more often the result of unequal income distribution or political instability than the inadequate production of food.

Malthus failed to foresee that growth in mankind's ingenuity would more than offset the effects of a larger population. Pesticides, fertilizers, mechanized farm equipment, new crop varieties, and other technological advances that Malthus never imagined have allowed each farmer to feed ever greater numbers of people. Even with more mouths to feed, fewer farmers are necessary because each farmer is so productive. Today, fewer than 2 percent of Americans work on farms, producing enough food to feed the nation and some excess to export as well.

In addition, although the "passion between the sexes" is just as strong now as it was in Malthus's day, the link between passion and population growth that Malthus assumed has been broken by modern birth control. Many advanced nations, such as those in western Europe, are now experiencing fertility below replacement rates. Over the next century, shrinking populations may be more

likely than rapidly expanding ones. There is now little reason to think that an ever expanding population will overwhelm food production and doom mankind to poverty.[6]

The Kremerian Model While Malthus saw population growth as a threat to rising living standards, economist Michael Kremer has suggested that world population growth is a key driver of advancing economic prosperity. If there are more people, Kremer argues, then there are more scientists, inventors, and engineers to contribute to innovation and technological progress.

As evidence for this hypothesis, Kremer begins by noting that over the broad span of human history, world growth rates have increased together with world population. For example, world growth was more rapid when the world population was 1 billion (which occurred around the year 1800) than it was when the population was only 100 million (around 500 B.C.). This fact is consistent with the hypothesis that having more people induces more technological progress.

Kremer's second, more compelling piece of evidence comes from comparing regions of the world. The melting of the polar ice caps at the end of the ice age around 10,000 B.C. flooded the land bridges and separated the world into several distinct regions that could not communicate with one another for thousands of years. If technological progress is more rapid when there are more people to discover things, then the more populous regions should have experienced more rapid growth.

And, indeed, they did. The most successful region of the world in 1500 (when Columbus reestablished technological contact) included the "Old World" civilizations of the large Eurasia–Africa region. Next in technological development were the Aztec and Mayan civilizations in the Americas, followed by the hunter-gatherers of Australia, and then the primitive people of Tasmania, who lacked even fire-making and most stone and bone tools. The least populous isolated region was Flinders Island, a tiny island between Tasmania and Australia. With few people to contribute new innovations, Flinders Island had the least technological advance and, in fact, seemed to regress. Around 3000 B.C., human society on Flinders Island died out completely.

Kremer concludes from this evidence that a large population is a prerequisite for technological advance.[7]

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[6] For modern analyses of the Malthusian model, see Oded Galor and David N. Weil, "Population, Technology, and Growth: From Malthusian Stagnation to the Demographic Transition and Beyond," *American Economic Review* 90 (September 2000): 806–828; and Gary D. Hansen and Edward C. Prescott, "Malthus to Solow," *American Economic Review* 92 (September 2002): 1205–1217.

[7] Michael Kremer, "Population Growth and Technological Change: One Million B.C. to 1990," *Quarterly Journal of Economics* 108 (August 1993): 681–716.