



DEPARTMENT OF
AGRICULTURAL, ENVIRONMENTAL,
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Long-Term Trends in the World Food Economy

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During the second half of the twentieth century, human numbers and the global demand for food grew at an unprecedented pace. Just shy of 2.5 billion in 1950, the world's population rose above six billion in 2000. In addition, improved standards of living in China and other emerging nations translated into increased per-capita consumption of livestock products and other edible items.

Remarkably, food supplies grew faster than food demand during this period. Moreover, increased production had less to do with expansions in farmed area than with technological advances, which raised agricultural yields. Thanks to these advances, commodities became cheaper – a lot cheaper. Between 1950 and the middle 1980s, inflation-adjusted prices of corn, wheat, and other grains fell by 75 percent.

The products that nourish us remained cheap for another twenty years or so, up until a spike in prices in 2007-2008 caused by rising energy costs, biofuel development, and trade restrictions adopted by several grain-exporting nations. Prices have spiked again during the past couple of years, which reinforces the need to think seriously about the future course of demand, supply, and prices in the world food economy.

Demographic Trends

Currently approaching seven billion, human numbers are on course to stabilize at a little over nine billion four or five decades from now. This stabilization will not be the result of an upswing in mortality. Rather, growth will cease as women have fewer children apiece – in other words, as human fertility has declined.

- In prosperous nations, human fertility fell to or below the replacement level (approximately 2.1 births per woman) many years ago. Exactly equal to the replacement level in 2007, U.S. fertility is actually relatively high for this group.
- A demographic collapse has occurred east of the old Iron Curtain. Just under the replacement level in 1982, the number of births per woman in Russia is now 1.4: on par with Germany, for example.

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- In China, where urban households are discouraged from having more than one child, there are 1.7 births per woman. However, the world's most populous nation does not really stand out in terms of human reproduction. Thai women, for example, have 1.8 children apiece.
- In India, there are 2.7 births per woman, although this number is barely half the level registered three decades ago. Human fertility is at or below the replacement level in Latin America's two largest nations: Brazil (1.9 births per woman) and Mexico (2.1). During the past three decades, human fertility in Iran has declined from more than 6.0 births per woman to 2.0 births per woman.

In just a few years, average human fertility throughout the world will be right at the replacement level and still be declining. The population will still rise for a few more decades because human fertility above the replacement level a generation ago has swollen the ranks of the age-cohort of child-bearing age today. However, human numbers could well stabilize around the middle of this century.

Food Consumption and Income

With population growth decelerating and on track to cease entirely around the middle of this century, trends in food demand will be driven increasingly by non-demographic factors, led by improvements in living standards.

These improvements are greatest outside the United States and other high-income nations, where the average annual growth in GDP per capita was 1.7 percent from 2000 through 2007. During the same period, annual rates of increase averaged 2.1 percent in Latin America, 2.8 percent in Sub-Saharan Africa, and 3.2 percent in the Middle East and North Africa. The fastest yearly growth occurred in South Asia (5.5 percent), Eastern Europe and the Former Soviet Union (6.1), and East and Southeast Asia (8.0 percent).

Diets change dramatically as people and nations emerge from extreme poverty. In particular, consumption of livestock products goes up as earnings rise. Demand for feed grains consumed by cattle, chickens, etc. increases as well. However, direct and indirect consumption of cereals seems to reach a plateau as GDP per capita equals or exceeds \$5,000. India is well under this threshold, but China has reached it. Brazil, Mexico, Russia, and Turkey are comfortably above this threshold, as are several other emerging economies.

Commodity Demand and Supply, 2009-2050

Along with human numbers, food consumption per capita is still increasing, and will continue doing so for a few more decades. The median demographic forecast of the United Nations is that 9.15 billion people will inhabit our planet in 2050. If per-capita consumption continues to grow at 0.3 percent per annum, as it has done in the recent past, then food demand will be 50 percent higher in the middle of the century than it is today.

This demand growth probably can be accommodated without any increase in real food prices if anticipated gains in food supplies – resulting much more from yield-gains than from agriculture's geographic expansion – truly materialize. Inflation-adjusted prices could go up however – if for example the global population is 10.46 billion in 2050, which is possible according to the United Nations.

But another round of declining real prices is also possible. This would be the outcome of slower annual growth in per-capita consumption (0.2 percent instead of 0.3 percent) and a population of just 7.96 billion in 2050, which is another possibility recognized by the United Nations.