

4. Agricultural R&D

Julian Alston and Phillip Pardey

For more than 50 years, the supply of food commodities has grown faster than demand, in spite of increasing population and per capita incomes. Consequently, the real (deflated) prices of food commodities have steadily trended down. The increased abundance and affordability of food have been profoundly important for the world's poor. Between 1960 and 2006, the world's population more than doubled, from 3.1 billion to 6.7 billion but, over the same period, global production of cereals grew from approximately 878 to over 2,221 million metric tons, resulting in a per capita increase in grain availability of about 37%. The increase in production was largely due to increases in crop yields rather than increases in acreage planted. Over the period 1949-2002 U.S. farm commodity prices fell in real terms by 55 percent for livestock and 72 percent for field crops.

The increases in agricultural productivity and production, and the resulting real price trends over the past 50 years are attributable in large part to improvements in agricultural productivity achieved through technological changes resulting from investments in agricultural R&D. Evidence is beginning to emerge of a slowdown in the long-term path of agricultural productivity growth. Agricultural productivity growth in the United States slowed from a rate of about 2 percent per year over the period 1950-1990 to less than 1 percent per year over 1990-2002. Although we do not have comparable measures of total or multifactor productivity for every country, the evidence from grain yields around the world tells a similar story. Grain yields grew at 2-3 percent per year on average for the period 1961-1995, but since then the average rate of growth has slowed to barely 1 percent per annum for most food and feed grains in most countries. Over 10-20 years, the difference between 1 and 2 percent yield growth is enough to have a material effect on the total supply and the price of food commodities.

These productivity patterns mirror a slowdown in the growth rate of total spending on agricultural R&D and a redirection of the funds away from farm productivity. From 1951 to 2006, in inflation-adjusted terms, total U.S. public spending on agricultural

research grew by 1.84 percent per year; but from 1981 to 2006, spending growth slowed to only 0.45 percent per year. Similar shifts in agricultural research spending and productivity growth have also occurred in other countries. The slowdown in R&D spending and productivity may have contributed to the current high commodity prices, though other factors are responsible for most of the recent rapid increases. The main effects of a productivity slowdown are likely to be of a secular, long-term nature, but they may be more important, ultimately, than the recent spikes because they are cumulative and enduring. These effects are particularly useful to study because governments can do something about R&D and productivity.

Our current research documents the links between agricultural R&D and productivity growth, and their effect on food commodity price movements. We will describe and quantify the role of the slowdown in agricultural productivity and grain yields both in influencing the long-term path of food commodity prices and as a contributor to the current high prices. We will also link those developments to the shifts of funding for agricultural R&D both in national systems and in national support for the international agricultural research centers.