

## CHAPTER 1

# Introduction and Overview

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The predominant feature of agricultural commodity markets, since at least the 1950s, has been falling real prices, which can only come about if supply grows faster than demand. The source of much of the supply growth has been rapid growth in agricultural productivity. Recent high commodity prices combined with increased price volatility have raised concerns about whether the price structure has permanently changed. Can we expect a return of falling food commodity prices to a long-term trend like that of the latter half of the twentieth century? Has the path permanently shifted? Or had the trend rate of decline in prices already begun to slow before the recent spike in global prices?

The demand side of the world food equation is relatively uncontroversial and reasonably predictable: population and income growth will lead to sustained increases in the demand for food over the next 40 years. The long-term issues turn mainly on the future path of agricultural supply, in particular, the growth of agricultural productivity given increasing constraints on the natural resource base available for food production. Can we expect global agricultural productivity to grow at rates like those of the second half of the twentieth century or has the rate of productivity growth generally slowed? Certainly some evidence has begun

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to emerge suggesting a slowdown in agricultural productivity in some parts of the world. What is the nature of that evidence? Is the pattern common among all, or even many, countries? Such questions, motivated mainly by an interest in the long-run supply and demand balance for food commodities, provide one motivation for this book. Related questions concern the implications of differential productivity paths among countries for comparative advantage and competitiveness in agricultural commodity markets.

In this book we assemble a range of evidence from a range of sources with a view to developing an improved understanding of recent trends in agricultural productivity around the world. The fundamental purpose is to better understand the nature of the long-term growth in the supply of food and its principal determinants. We pursue this purpose from two perspectives. One is from a general interest in the world food situation in the long run. The other is from an interest in the implications of U.S. and global productivity patterns for U.S. agriculture.

The approach in this book is opportunistic. The project was conceived in January 2009 as something that could be completed within a year, based primarily on research that was already underway or recently completed. We set out to draw on a significant body of such work, conducted in and applying to different parts of the world, to provide a reasonably broad picture of global agricultural productivity patterns. In such an approach, primarily drawing on independently conducted pre-existing works, it is not possible to make the elements totally consistent, compatible, and coherent in terms of their methods and emphasis. We had to take many aspects of the individual studies as essentially given. In addition, the nature of available data varies enormously around the world, so even if we had the opportunity to design the elements in advance, we would not have been able to standardize methods, measures, and approaches very much. Even so, the results and stories are to a great extent comparable across the individual chapters, though not without some significant differences.

Almost all of the chapters use datasets that end in the beginning or the middle of the first decade of the twenty-first century. Such a common endpoint anchors the chapters and makes the results somewhat comparable. In all of the studies the emphasis is on discerning longer-run trends in input, output, and productivity (and any systematic shifts in those trends), with some studies providing evidence for three to four decades, others extending back to the middle of the twentieth century, and some stretching back to almost the beginning of that century.

Most of the chapters in this book relate to productivity patterns in individual countries or groups of countries. Three of the chapters take a global perspective. These three chapters comprise Part 1 of the book. The spatial structure and location of agricultural production varies over time both between and within countries, with implications for agricultural production and productivity. In Chapter 2, Beddow, Pardey, Koo, and Wood use data on the evolving spatial patterns of agricultural production to provide a context for the other chapters that follow. Next, in Chapter 3, Alston, Beddow, and Pardey present a range of information on prices and productivity around the world. Using U.S. commodity prices as an index of global prices, they show that the rate of decline in deflated food and feed commodity prices had slowed significantly since 1990. Similarly, various partial productivity indexes, such as grain yields or land and labor productivity, showed significant slowdowns in their growth rates since 1990, albeit with significant exceptions in some places—in particular Latin America and China. In Chapter 4, Fuglie presents some alternative measures of global, regional, and country-specific agricultural productivity patterns, based on the use of Food and Agriculture Organization data to compute measures of multifactor productivity or total factor productivity (MFP or TFP). He concludes there is no evidence of a general slowdown in sector-wide agricultural TFP growth rates. The contrast in results between these two chapters is striking and demands an explanation. The role of differences in data, estimation methods, and other aspects of the respective treatments of the data in contributing to such contrasts is discussed in Chapter 15.

The main part of the book is in Part 2, which contains a total of 10 chapters, providing country-specific evidence. These chapters cover countries for which work had been done recently that we considered to be both of suitable nature and quality for inclusion in this volume, and relevant for understanding the phenomena of interest. They cover Australia and New Zealand (Chapter 5, by Mullen), Canada (Chapter 6, by Veeman and Gray), the United Kingdom (Chapter 7, by Piesse and Thirtle), the United States (Chapter 8, by Alston, Andersen, James, and Pardey), China (Chapter 9, by Jin, Huang, and Rozelle), the Former Soviet Union and Eastern Europe (Chapter 10, by Swinnen, Van Herck, and Vranken), India (Chapter 11, by Singh and Pal), Indonesia (Chapter 12, by Fuglie), South Africa (Chapter 13, by Liebenberg and Pardey), and Argentina (Chapter 14, by Lence). The most significant omissions are Brazil and the countries of Western Europe as well as most of Africa. Otherwise the coverage is quite broad and representative and accounts for a great share of global agricultural production.

In a few countries, data are available to allow the computation of indexes of MFP using suitable measures of prices and quantities, with reasonably complete coverage of inputs and outputs. In the case of the United States, detailed data are available to measure aggregate MFP for individual states in long time series (Chapter 8). Similarly good aggregate national data are available for the United Kingdom (Chapter 7), parts of Canada (Chapter 6), Australia and New Zealand (Chapter 5), and South Africa (Chapter 13), although among them there are important differences in details. In the case of China (Chapter 9), the authors present estimates of TFP at the level of individual commodities whereas for other countries such measures are typically available for an aggregate of total agriculture or for a substantial aggregate (e.g., “broadacre” agriculture in Australia; crops versus livestock in Canada). In other countries, only crop yields and other partial productivity measures are available. But for those countries for which we have a range of measures available, they tend to tell similar stories—that is, partial productivity measures and MFP or TFP show similar patterns. To the extent that this is expected to be true for other places for which we do not have complete measures, we can draw crude inferences from the available evidence for what the more complete measures would show.

Chapter 15 concludes the book with a summary and, to the extent possible, a synthesis of findings across the chapters comprising this volume. As noted, the different chapters were commissioned from authors who had independently conducted the underlying research; they were not coordinated in advance. Consequently the chapters exhibit significant differences in style, coverage, methods, and issues, some of which were dictated by the nature of the available data and by differences in relevant issues among countries. Across the chapters, along with different concepts and measures of inputs, outputs, and productivity, different approaches were used to test for a slowdown, and to some extent different approaches may have contributed to some differences in findings. These contrasts raise several questions: What is the appropriate measure of productivity? What is the appropriate method to test for a slowdown? What is the appropriate interpretation of a slowdown and its likely causes? What are the policy implications? These questions are addressed in Chapter 15.

## **Part 1**

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# **International Evidence and Interpretation**

