Food Manufacturing Productivity and Its Economic Implications

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Introduction

Advances in industrial productivity—measured as the rate of output growth in excess of growth due to increases in factor inputs—are a significant source of increase in national income and improvements in the standard of living and global competitiveness. Most agricultural productivity studies in the United States have focused on productivity changes and the relationship between inputs and outputs at the farm level. Considerably less attention has been devoted to research on productivity beyond the farmgate, such as food manufacturing. Only a few studies (e.g., Ball and Chambers; Heien; MacDonald and Ollinger) addressed the productivity of U.S. food manufacturing industries. This study contributes to the gap in food manufacturing research with a focus on measuring the productivity of U.S. food manufacturing.

U.S. food manufacturing plays an important role in the U.S. food system, stretching from farms and ranches to retail food markets, and has contributed significantly to the Nation's economic growth. According to the *Annual Survey of Manufactures*, the U.S. food manufacturing sector accounted for 10.3 percent of the value of shipments and 9 percent of employment from all U.S. manufacturing sectors in 2000. This study measures the productivity growth of the food manufacturing sector and provides information pertaining to the following questions: What are the productivity trends of food manufacturing? What are the sources of growth in food manufacturing outputs? Does productivity explain a decline in real prices of processed foods in recent years? How does food manufacturing contribute to the Nation's gross domestic product (GDP)?

In addition, the food manufacturing industries have undergone substantial structural changes in recent years because of mergers and acquisitions and a trend toward substituting computers and automated machines for human operations. To better understand the effects of this evolution on the performance of food manufacturing industries, this study analyzes industry production structure and answers the following questions: What are the input-output relationships of food manufacturing? Is there any evidence showing that capital is substituting for labor? Have the recent mergers and acquisitions affected food manufacturing productivity?

Although Bureau of Labor Statistics (BLS) productivity indicators are available for all U.S. manufacturing sectors, this study uses different data and focuses on measuring productivity changes in food manufacturing specifically for the following reasons. First, this study provides net-output (value-added) productivity measures as a linkage to the gross-product-originating GDP to meet the gap caused by the elimination of productivity indexes from BLS news releases of productivity trends for all manufacturing sectors since 1994. Second, the food manufacturing industries are fundamentally different from other manufacturing industries in the sense that food processing is quite materials-intensive. Instead of using the BLS productivity index alone, it is necessary to explore the detailed input-output relationships of food manufacturing. Third, it is useful for this study to compile data and establish a data bank for food manufacturing suitable for online analysis, estimation of productivity changes, and some other productivity-related issues.

This study begins by focusing on the input-output relationships of U.S. food manufacturing with respect to the growth of production and the utilization of labor, capital, and material inputs. Particular attention is given to identify some data sources for factor inputs and outputs that can be used for measuring productivity. The second part of this study discusses the methodology for measuring productivity and its application to U.S. food manufacturing. Since productivity growth is most closely identified with technological gains, the goal of the methodology is to measure these gains as the rate of output growth in excess of growth due simply to increases in combined factor inputs.