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Farm Labor, Human Capital, and Agricultural Productivity in the United States

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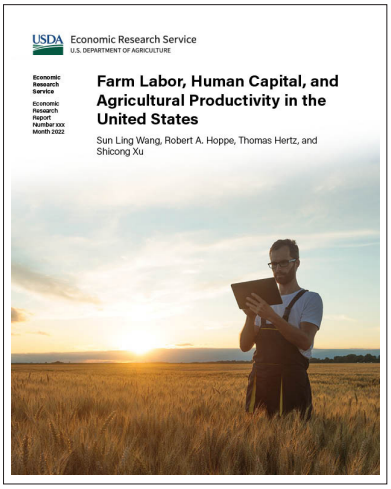
What Is the Issue?



Agricultural output in the United States nearly tripled between 1948 and 2017 even as the amount of labor used declined by nearly 76 percent. These opposing trends reflect continuing high labor productivity growth in agriculture. Total factor productivity (TFP) accounts developed and tracked by the USDA, Economic Research Service (ERS) show farmers adopted new technologies in production practices and increased their use in farm equipment, farm structures, seeds, livestock, chemical fertilizers and pesticides, and purchased services to replace self-employed and hired labor while maintaining or promoting output.

The composition of the farm labor force also changed. In 1948, self-employed and unpaid family labor accounted for more than two-thirds of the farm workforce (which includes hired labor, self-employed, and unpaid family labor). With a faster declining pace than the hired labor, the total hour share of self-employed and unpaid family workers declined from 70 percent in 1948 to 52 percent in 2017. Moreover, the farm workforce attributes changed. In particular, the hired workforce and farm operators showed an increase in educational attainment. It is unclear how labor quality improvement through higher education affected productivity estimates and output growth in different time periods in the U.S. farm sector. This report draws on multiple data sources to assess how the farm workforce changed over the last 70 years. It evaluates the impact of changes in farm labor characteristics, especially educational attainment, on U.S. agricultural productivity estimates and output growth in different periods.

What Did the Study Find?

Agricultural employment and hours worked fell during the 20th century. Total farm labor hours declined by 83 percent between 1948 and 2017, with self-employed and unpaid worker hours declining by 88 percent and hired labor hours declining by 73 percent. The farm sector share of total U.S. employment, 32.6 percent in 1910, fell to 12.2 percent in 1950 and to 1.6 percent in 2017. However, the decline in labor hours in the farm sector slowed in the last decade.

U.S. agricultural output grew consistently even as labor input fell over time. Between 1948 and 2017, U.S. agricultural output grew by nearly 187 percent at an average annual growth rate of 1.53 percent. While other inputs such

as chemical use or purchased services may have been substituting for labor, total input use (an implicit quantity measure based on the deflated total input cost drawn from ERS data) was flat over that time period. This left total factor productivity—an indicator of technical change—measured as total output per unit of aggregate input as the major driver of agricultural growth post-World War II.

The educational attainment of farmworkers and operators has grown. In 1950, nearly three-quarters of the total hours worked in the farm sector were by people with less than 9 years of schooling. By 2017, only 17 percent of hours worked were by people with less than 9 years of schooling. In contrast, people with at least some college contributed 4 percent of farm labor hours in 1950 but 40 percent by 2017.

Labor productivity has grown dramatically in the U.S. farm sector since 1948. Agricultural output per worker grew by 16 times between 1948 and 2017, while output per hour grew even faster, by 17 times. According to ERS estimates, after adjusting for the changes in labor quality (human capital), labor productivity grew by about 12 times. The differences indicate that increased educational attainment contributed about 8 percent to annual agricultural output growth on average, with higher contributions (up to 25 percent) occurring in the late 1940s and 1950s.

Education's contribution to output growth slowed in recent decades. Increasing educational attainment continued to improve labor quality, reaching its peak during the 1960s, contributing more than two-thirds of labor quality improvement and nearly 0.3 percentage points to annual agricultural output growth rate, on average. In recent years, while education still dominated other factors in improving labor quality, its impact declined to about 0.1 percentage points in the last decade as the overall trend growth of educational attainment slowed in the U.S. employment pool.

How Was the Study Conducted?

This study draws data from the USDA, Economic Research Service (ERS) U.S. agricultural productivity statistics (USAP), USDA, National Agricultural Statistics Service (NASS), ERS Agricultural Resource Management Survey (ARMS), the Employment and Training Administration National Agricultural Worker Survey (NAWS), and the Bureau of Census Current Population Survey (CPS). The authors constructed various estimates of labor productivity based on alternative labor input measures—including employment, total hours worked, and quality-adjusted labor input.