

Has the golden age of American farm productivity growth ended?



There is robust and compelling evidence of a structural slowing of productivity growth in U.S. agriculture, following a mid-century surge. [Philip G. Pardey](#) and [Julian M. Alston](#) come up with three possible factors that, taken together, help explain the slowdown and indicate what to expect from now on.

Farm productivity growth has been central to the development of agriculture in the United States and around the world, and continuing farm productivity growth remains crucial for enabling the sustainable production of safe, healthy, and affordable food. Many of us might think we can take all these things for granted. But recent periodical spikes in commodity prices and emerging evidence of a secular slowdown in farm productivity growth have sparked renewed concerns about the future path of agricultural productivity and its implications for the supply and price of food; especially with a changing climate and competing demands for agricultural land, water, and other resources.

Can we hope or expect to repeat in the coming decades anything like the rapid growth in measured farm productivity and hence in global agricultural abundance experienced during the second half of the twentieth century? A better understanding of the past patterns and their causes may help us to better answer these questions about the future of food.

In our [recent article](#), we analyse the patterns of U.S. farm productivity growth revealed by detailed data encompassing more than a century of profound changes in American agriculture, and we dig into evidence on the underlying determinants of those patterns. To begin, we present robust and compelling evidence of a structural slowing of productivity growth in U.S. agriculture, following a mid-century surge. Rather than a constant rate of productivity growth, the data are more consistent with a “big wave” surge in productivity growth peaking in the 1960s; a secular pattern in U.S. agricultural productivity similar to what others have found with reference to the economy as a whole, but with different timing. These farm and non-farm phenomena are clearly connected, and the explanations could involve parallels.

Having settled the question of the existence, extent, and timing of a U.S. farm productivity surge and slowdown, we examine three potential explanations. One possibility is that the surge and slowdown were caused by an earlier surge and slowdown in agricultural R&D and the related knowledge stocks. To explore this possibility, we compare the time paths of growth in agricultural productivity and growth in U.S. agricultural R&D knowledge stocks measured using the two predominant models from the literature. The measures imply progressively slowing growth in knowledge stocks that would, in turn, imply a progressively slowing rate of productivity growth, one part of the phenomena in question. However, these R&D-knowledge stock trajectories cannot account for the other part: the surge. A different representation of knowledge stocks or some other explanation is required to account for the surge as well as the slowdown.

An alternative, but related, explanation is that a big wave of technological progress through the middle of the century contributed to a sustained burst of faster-than-normal productivity growth throughout the third quarter of that century—along with concomitant profound changes in the structure of agriculture. We present detailed data on the adoption patterns over time for waves of mechanical, chemical, biological and digital innovations. All these innovations resulted from some combination of organised agricultural and other R&D and less-organised inventing by farmers and others, but we cannot confidently say much more than that. The normally difficult attribution problem in linking these factors to productivity patterns is made worse here by the role of the “farm problem” (essentially too many farmers and low wages for farm operators). The farm problem was both caused by and influenced the timing of the adoption of innovations and their eventual consequences for productivity, production, and prices for farm products and inputs. Of course, not all farming innovation was labour-saving; but much was, and many innovations entailed economies of size that implied an increase in the efficient size of farms and a reduction in the number of farms.

Our third potential explanation for the surge and slowdown in farm productivity centres on the dynamics of the structural transformation of the U.S. farm economy, in particular to shed most of its labour. This explanation is supported by our evidence that the agricultural transition gathered pace at the same time as the surge in productivity growth, after which both phenomena returned to more normal, long-term rates of change. This structural transformation involved a one-time shift, to reduce the number of farmers and the total farm labour force by two-thirds or more. We speculate that a surge in farm productivity, such as we have documented for the United States, might be inherent in the economic transition from an agrarian to an industrial emphasis. Since that transition is necessarily a one-time phenomenon, in that sense, so too is any associated productivity surge and slowdown.

In sum, each of our three explanations appears relevant, and taken alone can account for part of the story—albeit in some cases with some mismatching with respect to timing of the presumed cause and the supposed effect: the attribution problem here is wickedly difficult and formal quantitative causal attribution is challenging. However, while individually they might be somewhat unsatisfying, taken together these candidate explanations have much to say about what happened over the period of our data and what may be expected looking forward. Specifically, we are in a new normal; indeed, just to preserve recent, slower farm productivity growth rates will be challenging given a changing climate and an ever-more demanding regulatory environment.

- This blog post is based on [Unpacking the Agricultural Black Box: The Rise and Fall of American Farm Productivity Growth](#), *Journal of Economic History* 81(1)(March 2021): 114–155, and first appeared at [LSE Business Review](#).
- Featured [image](#) by [Daniel Beckemeier](#) on [Unsplash](#)

[Please read our comments policy before commenting](#)

Note: The post gives the views of its authors, not the position USAPP– American Politics and Policy, nor of the London School of Economics.

Shortened URL for this post: <https://bit.ly/3layUjn>

About the authors



Philip G. Pardey – *University of Minnesota*

Philip G. Pardey is Professor, Department of Applied Economics and director of International Science and Technology Practice and Policy (InSTePP) center, University of Minnesota.



Julian M. Alston – *University of California-Davis*

Julian M. Alston is Distinguished Professor, Department of Agricultural and Resource Economics, University of California-Davis.