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# Agricultural Research Investment and Policy Reform in High-Income Countries

Paul W. Heisey and Keith O. Fuglie

## What Is the Issue?

In recent years, public agricultural research systems in many high-income countries have faced new challenges. As agriculture's share of national economies in these countries has declined, public research and development (R&D) systems have faced stagnant or falling financial support while research costs have risen. At the same time, society's expectations of food and agricultural systems have evolved to include a broader set of issues. These forces have created pressure to reform agricultural research policies, and some countries have introduced reforms to broaden sources of financial support and refocus priorities of public agricultural R&D and accommodate a larger role for private-sector research and innovation. Comprehensive information on these developments is generally unavailable, however. This study aims to provide a more complete and up-to-date assessment of agricultural research funding trends in high-income countries that belong to the Organisation for Economic Co-operation and Development (OECD). It also provides a synthesis of selected research policy reforms with lessons for the United States.

## What Did the Study Find?

Public and private investments in agricultural R&D have been the primary drivers of long-term agricultural productivity growth in high-income countries. Productivity growth in agriculture has raised the competitiveness of the sector and enabled countries to expand output and withdraw resources such as labor and capital from the sector for use elsewhere in the economy. The economic value of productivity improvement has been high relative to R&D spending in these countries, leading to high economic returns to public agricultural research.

Aggregate public spending on agricultural R&D in high-income OECD countries has fallen in real (inflation-adjusted) terms since at least 2009. Converting national spending into inflation-adjusted dollars (using general price indices and consumer purchasing power exchange rates), the study finds that public agricultural R&D spending peaked in 2009 and fell by an average of 1.5 percent per year between 2009 and 2013 (see figure). The United States continues to spend the most of any high-income country on public agricultural R&D, although the U.S. share of the total fell from 35 percent in 1960 to less than 25 percent by 2013.

However, these figures likely understate the decline in the value of inflation-adjusted public agricultural research investment because the costs of research tend to rise *faster* than the general rate of inflation. Moreover, the U.S. share of total public R&D spending by high-income countries could actually be lower than indicated in the figure because the United States has relatively high research costs: that is, another country spending the same amount as the United States might get more research output because that country could hire more scientists than the United States for the same amount of money. Although lack of data precludes comparisons for all countries in all

years, data that are available indicate the costs of scientific labor are higher in the United States and Canada compared with other high-income countries.

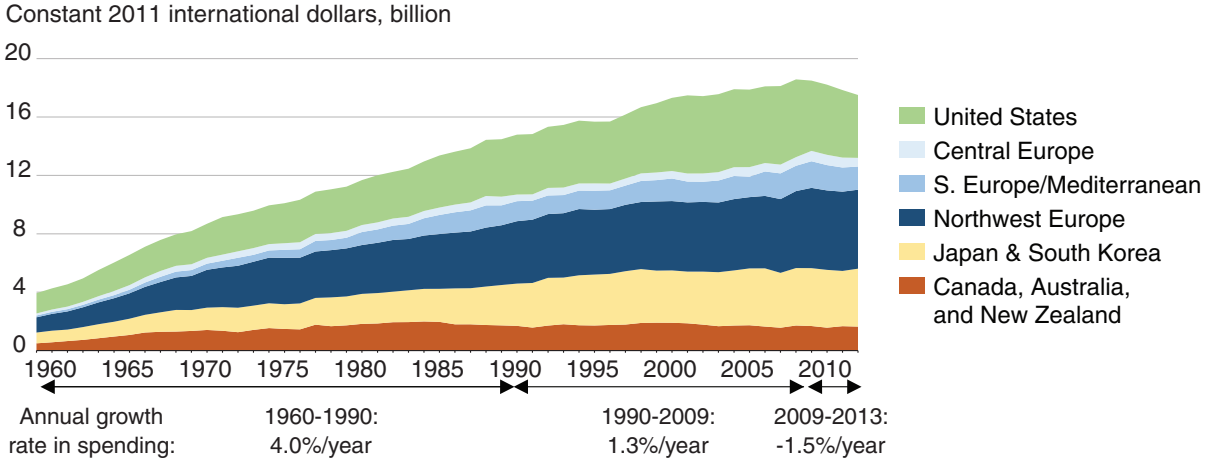
In response to financial and other pressures, several high-income countries have implemented reforms to their public agricultural research systems, with mixed results. Some lessons from these reforms are:

- Public agricultural research systems broadened the scope of their research investment to give more emphasis to social objectives such as environmental and food safety concerns.
- Public agricultural research systems have diversified their sources of funding, which in turn has affected their research priorities.
- Efforts to increase producer funding of research through levies on commodity production ("check-offs") have generated very little funding for production-oriented research without significant matching grants from governments.
- Growth in agricultural R&D spending by private firms has partially compensated for the stagnation in public R&D investment. However, public and private roles in agricultural R&D have generally evolved to be complementary, implying greater public investment can lead to increased private R&D. Premature withdrawal of public R&D in some applied areas can lead to productivity stagnation, as exemplified by the UK experience with wheat in the mid-1990s.

## How Was the Study Conducted?

The study focused on public agricultural R&D spending trends by 31 high-income countries that are members of the OECD. It drew upon OECD, national, and other statistical sources to construct comprehensive R&D investment spending trends for food and agriculture. It examined alternative ways of constructing internationally comparable measures of R&D spending—using purchasing power parity ratios and cost-of-science indicators. It measured growth in R&D spending over time, R&D spending relative to agricultural GDP, and public agricultural R&D spending relative to total public R&D spending. It also reviewed case studies of the impact of R&D policy reforms in the United Kingdom, the Netherlands, and Australia, and suggests possible lessons of these reforms for the United States.

**After many years of increase, real public agricultural R&D investment in high-income countries has fallen since 2009**




Note: Central Europe: Czech Republic, Estonia, Hungary, Poland, Slovakia, and Slovenia; Mediterranean: Greece, Israel, Italy, Portugal, and Spain; Northwest Europe: Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Iceland, Luxembourg, Netherlands, Norway, Sweden, Switzerland, and the United Kingdom. R&D = research and development.

Source: USDA, ERS analysis of data from the Organisation for Economic Co-operation and Development, Pardey and Roseboom (1989), World Bank, and numerous supplementary sources. See appendix B.