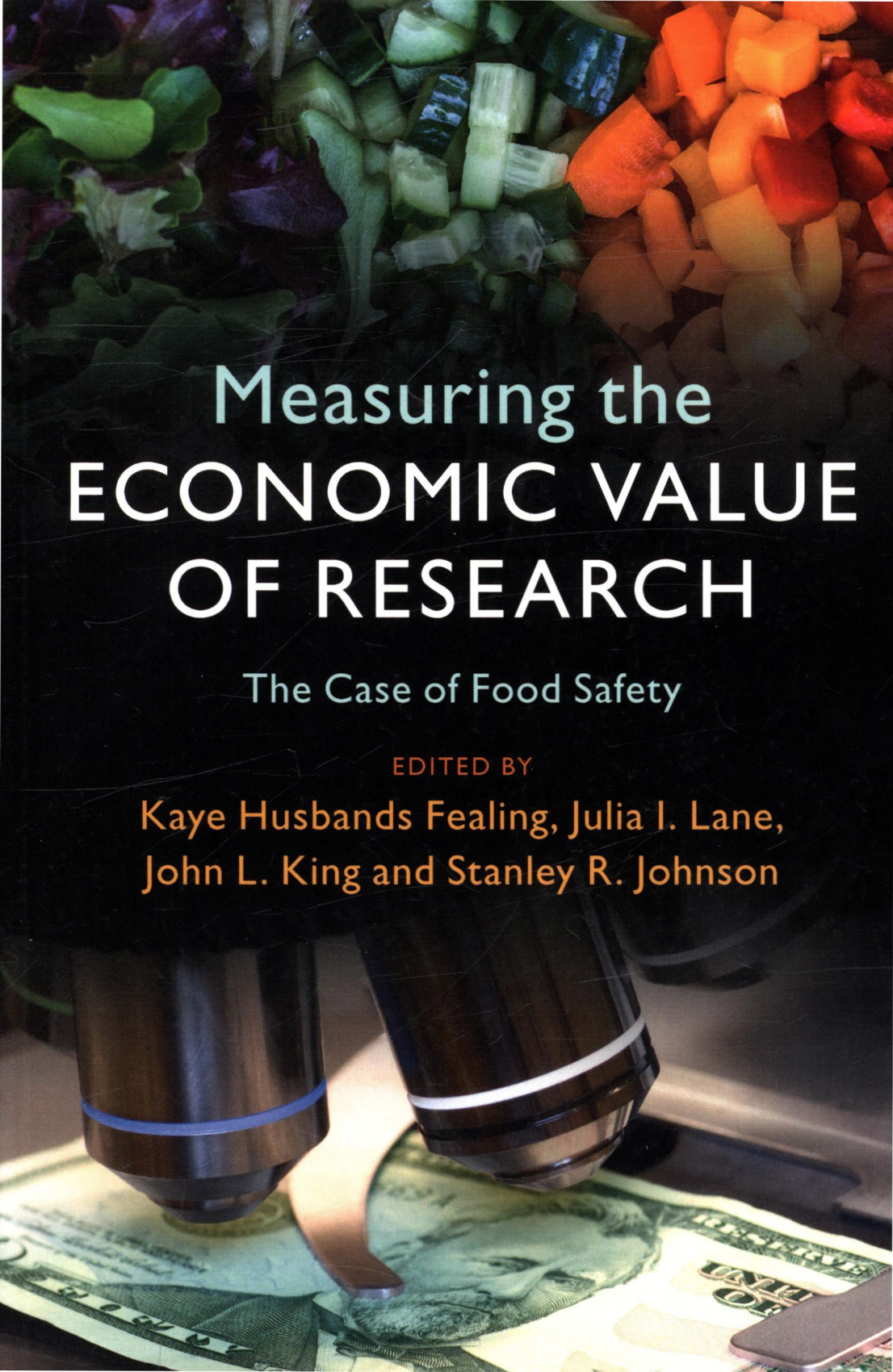




Measuring the ECONOMIC VALUE OF RESEARCH

The Case of Food Safety

EDITED BY

Kaye Husbands Fealing, Julia I. Lane,
John L. King and Stanley R. Johnson

"This book is the first to bring the 'Science of Science Policy' to bear on the important subject of food safety research. The authors develop and describe novel data resources and apply innovative approaches to glean insight into the roles of people in the complex pathways linking bench scientists to food consumers. The book sets the scene and provides a foundation for further work both to apply the same approaches to other contexts and to extend the analysis to quantify further the economic value of food safety research."

Julian M. Alston, the University of California, Davis, co-author of *Persistence Pays: U.S. Agricultural Productivity Growth and the Benefits from Public R&D Spending*.

"This book exploits new data tools to understand better the effects of public spending on research and development. The authors make creative use of research grant awards, employment records, and bibliometrics to trace the pathways through which food safety research affects the formation of knowledge networks and labor force skills necessary to improve the safety of our food supply."

Keith Fuglie, agricultural economist

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MEASURING THE ECONOMIC VALUE OF RESEARCH

The Case of Food Safety

The scientific advances that underpin economic growth and human health would not be possible without research investments. Yet demonstrating the impact of research programs is a challenge, especially in areas that span disciplines and industrial sectors and encompass both public and private sector activity. All areas of research are under pressure to demonstrate benefits from federal funding of research. This exciting and innovative study demonstrates new methods and tools to trace the impact of federal research funding on the structure of research and the subsequent economic activities of funded researchers. The case study is food safety research, which is critical to avoiding outbreaks of disease. The authors make use of an extraordinary new data infrastructure and apply new techniques in text analysis. Focusing on the impact of US federal food safety research, this book develops vital data-intensive methodologies that have a real-world application to many other scientific fields.

Kaye Husbands Fealing is Chair of the School of Public Policy at the Georgia Institute of Technology in Atlanta, GA. She was inaugural director of the National Science Foundation's Science of Science and Innovation Policy program and study director at the National Academy of Sciences. She serves on the executive board of the American Association for the Advancement of Science and is an elected distinguished AAAS Fellow.

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Foreword

The safety of food marketed to the public and promoting science for the public good have been concerns of local, state, and the federal government in the United States for a very long time. Safe food is essential to good health, as are clean air and water. The public cannot by sight, smell, or taste determine if food is safe, and unsafe food can spread disease and lead to debilitating illness and sometimes death. Hence, government has a role in assuring that food producers, processors, and retailers do what they can to deliver a safe product to consumers.

Creating the conditions conducive to science and economic growth was seen by the Founding Fathers as a role for the federal government. Its importance is underscored by its prominent placement in the US Constitution. Article 1 stipulates that Congress has the authority “to promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.” A century later as the United States was entering the Civil War, Congress enacted a series of laws to promote science. In 1862, Congress created the Department of Agriculture and assigned in the preamble of the Act “the general designs and duties of which shall be to acquire and to diffuse among the people of the United States useful information on subjects connected with agriculture in the most general and comprehensive sense of that word, and to procure, propagate, and distribute among the people new and valuable seeds and plants.” That same year, Congress passed the Morrill Act, which established a Land Grant University in each state dedicated to “teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.” The following year, the National Academy

of Sciences was created through an act of Congress to “whenever called upon by any department of the Government, investigate, examine, experiment, and report upon any subject of science or art.” In its early years, the federal government repeatedly asked the new National Academy of Sciences to provide advice on food-related questions, especially ones related to weights and measures and how to determine the sugar composition of foods.

Fast forward to today, and both these topics – food safety and government’s role in sponsoring scientific research – are still current concerns. There is a resurgent public interest in food safety. A foodborne outbreak of the past might have affected the attendees at the local church social, but today, due to the volume of production and rapid national and international distribution of food, a foodborne outbreak can affect hundreds or even thousands of people in multiple locations. Unlike measles, mumps, and other infectious diseases of childhood, there is no vaccine to protect a child from the common foodborne pathogenic bacteria and viruses. And the public is increasingly weighing in on concerns about other aspects of modern agriculture and the science of genetic engineering of food.

Public attention to accountability in government extends to the agencies that conduct and sponsor scientific research. Congress has stepped up its oversight of the science agencies through hearings and additional reporting requirements. Since passage of the Government Performance and Results Act of 1993 (GPRA), science agencies (along with all federal agencies) must set goals, measure results, and report annually on their progress. This scrutiny along with GPRA’s legal requirements has led the federal science agencies to seek new ways to measure and evaluate the impact of their research programs on the economy, on health, and on other issues of public importance.

From the beginning, the science agencies struggled to find meaningful short-term and medium-term metrics for the impacts of their research investments that could be reported to Congress. The ways in which the scientific community evaluated research productivity – through numbers of publications, citation indexes, patents, awards, and other recognitions – met with little understanding in Congress and the public. Stories that related how research by multiple performers contributed to some public good were better received; for example, more milk is produced in the United States today with fewer cows than 40 years ago due to improved genetics, better nutrition, and advances in veterinary medicine, which can be attributed to a combination of specific breakthroughs from publicly and privately funded research.