Introduction

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We have assembled in this book a collection of our prior research on program evaluation. This is a topic that has been on our ‘front burner’ for a number of decades. We became interested in program evaluation through requests from the National Institute of Standards and Technology (NIST) within the U.S. Department of Commerce to help the then Program Office develop a systematic approach to approximating the social value of new technology developed in, or with the assistance of, the NIST laboratories. Much of the new technology of interest to the Program Office was research and development (R&D) based, and our prior academic research had long been centered around R&D activities. A portion of the collection herein is focused on NIST programs, but over the years our application of evaluation methods and tools has found other application venues.

The papers that follow are divided into three groups. The first group of papers relies on what we call the counterfactual evaluation method, and the second group relies on what we call the spillover evaluation method. The proverbial third group contains papers that use other evaluation methods.

To frame the emphasis of these chapters as examples of program evaluation, it is important to distinguish between program assessment and program evaluation, regardless of whether or not the program is R&D or technology based. Although many use the terms *assessment* and *evaluation* interchangeably, we think that a distinction is warranted. Policy assessment is based primarily on the criterion of *effectiveness*: Has the program met its stated goals and objectives; have its designated outputs been achieved? Program evaluation is based on the criterion of *efficiency*: How do the social benefits associated with the program compare to the social costs? Critical to the program evaluation methods discussed in this book is who conducts the R&D under question: Is the publicly-funded R&D publicly performed or is it privately performed? The chapters that follow illustrate through example the appropriate methods.

As we explain in Chapter 1, ‘The Theory and Practice of Public-Sector R&D Economic Impact Analysis’ (Link and Scott, 2013), the counterfactual method asks a general question about publicly funded investments: What would the private sector have had to invest to obtain the same level of social benefits achieved through the public’s investments? In other words: Are the public investments a more efficient way of generating the technology than private sector investments would have been? In comparison, the spillover method asks a general question about whether the public sector should be underwriting activities that occur in private-sector firms: What is the social rate of return from the program (including spillovers) compared to the private rate of return?

Chapters 2 and 3, ‘An Economic Evaluation of the Baldrige National Quality Program’ (Link and Scott, 2006) and ‘On the Social Value of Quality: An Economic Evaluation of the Baldrige Performance Excellence Program’ (Link and Scott, 2012), focus on the Baldrige National Quality Program, a national program administered at NIST. The evaluations in these two papers differ in time but not in method. Each evaluation of the program was done using a

different set of information, but the conclusions from each evaluation were the same; the program is socially valuable.

Chapter 4, 'The Impact of Public Investment in Medical Imaging Technology: An Interagency Collaboration in Evaluation' (O'Connor et al., 2015), applies the counterfactual evaluation method to Canada's investments in medical imaging technology at national universities, and the evaluation reaches favorable conclusions about the social value relative to social cost.

Chapters 5 through 8 are applications of the spillover evaluation method. Chapter 5, 'Public/Private Partnerships: Stimulating Competition in a Dynamic Market' (Link and Scott, 2001), illustrates a detailed application of this method to a NIST program, the Technologies for the Integration of Manufacturing Applications (TIMA) Program.

Chapter 6, 'Financing and Leveraging Public/Private Partnerships: The Hurdle-Lowering Auction' (Scott, 1998), proposes a theoretical mechanism – the hurdle-lowering auction – for leveraging the public funds invested in public/private partnerships to promote technology development.

Chapters 7 and 8, 'An Assessment of the Small Business Innovation Research Program in New England: Fast Track Compared with Non-Fast Track Projects' (Scott, 2000) and 'An Assessment of the Small Business Innovation Research Fast Track Program in Southeastern States' (Link, 2000), are empirical applications of the spillover method to a U.S. Department of Defense program. The method used in these two applications is similar, although the data in each come from companies in different regions of the United States.

The collection of papers in Chapter 9 through 13 are either based on a traditional method of program evaluation or on hybrids of the various methods. The conceptual arguments in Chapter 9, 'Cost-Benefit Analysis for Global Public–Private Partnerships: An Evaluation of the Desirability of Intergovernmental Organizations Entering into Public–Private Partnerships' (Scott, 2009), are focused on evaluations of global public–private partnerships that combine international intergovernmental organizations with national governments, businesses, and the non-profit organizations of civil society in order to allocate scarce resources to projects that, from an *international* perspective, are socially desirable. The paper considers the need for modifications to traditional cost-benefit analysis when evaluating the projects initiated by global partnerships, explaining why market-centered valuations are still needed despite the role of alternative valuations in such partnerships.

Chapter 10, 'Evaluating Public Sector R&D Programs: The Advanced Technology Program's Investment in Wavelength References for Optical Fiber Communications' (Link and Scott, 2004), is focused on a NIST-based program providing standard reference materials for measuring the wavelength of light, measurements needed to enable optical fiber communications. The paper applies, using interview or survey data, the Griliches/Mansfield methods for measuring the social rates of return to public sector innovative investments.

Chapter 11, 'Intelligent Machine Technology and Productivity Growth' (Leech and Scott, 2008), departs from the conventional benefit–cost metrics for program evaluation and provides information to guide future program investments by developing industrial experts' expectations about the path of the technology and its benefits. It defines the productivity gains to society from the adoption of intelligent machine technologies, and it presents industry's expectations for the productivity growth and the rate of return to R&D investments in those technologies.

Chapters 12 and 13, ‘Public Gains from Entrepreneurial Research: Inferences about the Economic Value of Public Support of the Small Business Innovation Research Program’ (Allen et al., 2012) and ‘Public/Private Technology Partnerships: Evaluating SBIR-supported Research’ (Audretsch et al., 2002), also focus on yet another publicly funded program, the U.S. Small Business Innovation Research (SBIR) program; and in both chapters, a variety of traditional evaluation methods and metrics are used to quantify the social value of new technology funded through that program.

Program evaluation is not, in our opinion, a passing fancy. In the United States, its origins date to the Presidency of Woodrow Wilson nearly a century ago, and we suspect that other nations that exercise public accountability have a similar history. In a global environment in which there are competing social needs for the public’s funds, program evaluation is becoming more and more an, if not the, appropriate strategic policy approach for decision making. We hope that our collection of papers paints a broad picture of evaluation methods and practices, and that the picture not only serves to lead the way to effective implementations but also to inspire younger scholars entering the field.