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MEASURING THE BENEFITS OF SOCIAL SCIENCE RESEARCH

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Little is known about the impact of social science research in general, and food policy research, in particular. In order to expand the scope of available academic research and to develop quantitative methods for estimating the impact of IFPRI's work, several papers were commissioned from social scientists. Furthermore, IFPRI held an essay contest to solicit research from a broader range of scientists. The resulting papers were discussed at a two-day symposium organized by IFPRI in 1997. This Discussion Paper is a revised version of a paper prepared for and discussed at the symposium. Other papers will be published in this Discussion Paper series over the next months.

CONTENTS

Page

ABSTRACT

This paper addresses two questions. The first is "What are the benefits of social science research?"; the second is "How should they be measured?" The response to the first is that, as with research in the physical sciences, the benefits should be identified in terms of changes in economic surplus for different groups. It may be useful to use a framework that considers the incidence of the effects of social science research on firms, households, and government agencies. The response to the second question is that estimating returns to social science research using conventional econometric techniques may be particularly difficult. Instead, it may be necessary to resort to a case study approach, but care must be taken to ensure that the cases selected for study are genuinely representative.

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1. INTRODUCTION

Social science research is widely regarded as providing substantial benefits to individuals and to local, regional, national, and international communities. Some social scientists have identified a broad array of categories of such benefits. But they have not often done this in a systematic fashion. On occasion they have asserted that, if estimated using a monetary measure, these benefits would be large. For example, one claim made for the often maligned field of macroeconomics is that because of the insights of researchers ranging from John Maynard Keynes to Milton Friedman developed economies have avoided catastrophic recessions and rampant hyperinflation since the end of the 1930s. By anyone's accounting, if macroeconomic research has allowed Europe and North America to avoid even a 5 percent decline in the gross national product (GNP) in only one of the last 20 years, those savings will have more than paid for the salaries of all social science professionals in the entire post-war period.[1]

This does not necessarily mean that too little has been invested in social science research. The *ex ante* optimal amount of social science research, as with science and technology research, can be (assuming a risk neutral decisionmaker) determined, ideally, by the intersection of the relevant marginal expected benefits and marginal expected cost curves. It is not the integrals of the marginal expected benefits and cost curves that matter, but the marginal curves themselves.

The above example shows that social science research can yield large benefits for individuals, households, and communities. But social science research can be a double-edged sword. When, for example, influential economists are wrong, as economists in the late 1950s and early 1960s were clearly wrong about the policy implications of the Phillips Curve, the costs of poor research can be large. If inflation is costly, then social science research is cast in a more dismal light. In the 1960s the policymaking response to the argument for the existence of at least a semi-permanent trade-off between unemployment and inflation resulted in unwarranted increases in inflation rates in developed economies for almost 20 years. Paul Krugman's observations on the roles of policy peddlers are relevant here. The damage done by social scientists who pander to the preconceived agendas of politicians can be substantial.

This suggests that social science research can generate both positive benefits, in the form of improved policies for managing economic systems, and negative benefits, in the form of poor policies, over and above any "production" costs associated with carrying out research. Some social science research wells are not merely dry, but poisoned. The relevant question, therefore, especially in relation to policy-oriented social science research in general and the programs of specific institutions, is "what are the net benefits of social science research?"

The purpose of this paper is to identify alternative methods for assessing the contributions of social science research, especially in light of the above concerns. Thus, the paper examines two major questions. First, what are the benefits of social science research? Second, how can those benefits be estimated? It is argued that, in principle, social science is no different than research in the physical sciences in that it provides new knowledge that alters the economic welfare of households. In addition, it is likely to be useful to identify the effects of social science research by recognizing that the initial impacts often alter total factor productivity within firms, households, and government agencies. An uncomfortable attribute of this exercise is that social scientists have given little effort to measuring the effects of their work and, therefore, the field is virtually uncharted territory.[2] It also requires the investigator to examine the house she inhabits.

Social science includes many disciplines and subdisciplines—anthropology, economics, history, geography, psychology, and sociology. This paper focuses largely on economics and agricultural economics and, in particular, on the benefits associated with policy-oriented rather than "pure" social science research.

2. A PRELIMINARY: MEASURING BASIC AND APPLIED RESEARCH

Before addressing the two major questions with which the paper is concerned, it will be useful to consider the empirical utility of the typology of basic and applied research for measuring social science research benefits. One reason for doing this is that while there is a well developed body of knowledge about measuring the benefits of applied research, there is a consensus that measuring the benefits of basic or pure research (which is largely a public good) is much harder.[3] In part, it is more difficult because identifying the amount of basic research inputs, the immediate changes in the stock of useful knowledge that results from those inputs, and the effects of these changes in the stock of useful knowledge on economic welfare all present extremely difficult problems of measurement or estimation. In particular, if the effects of basic research are to be identified separately from the effects of applied research, then there should be some sensible method of determining what constitutes basic and applied research that can be used to produce effective measurements of the investments in each type of research.

In practice, it is difficult to distinguish pure and applied research, especially in the social sciences. While some economists specialize in abstract mathematical modeling (for example, in the areas of game theory and general equilibrium modeling) or, alternatively, in highly applied research (assessing the economic feasibility of a food processing plant in a specific location), most scholars include both basic and applied elements in their research. Much work that appears to be applied policy analysis or empirical research often provides the direct or indirect basis for the research programs of others.

Unlike specialized applied scientists such as plant breeders, who produce tangible and physical product innovations such as yield-improving crop varieties, the research of many social scientists is both basic—in the sense that sooner or later they become part of the foundation of other research—and applied—in the sense that they address a current empirical or policy issue of interest to a "client." An effort to obtain meaningful empirical measures of separate aggregate investments in basic and applied social science research, therefore, is likely to be a sterile exercise. Similarly, approaches to the measurement of social science research benefits through an assessment of the effects of basic and applied social science research on total factor productivity may prove to be difficult, even at modest levels of aggregation.

3. THE BENEFITS OF SOCIAL SCIENCE RESEARCH

Categorizing aggregate investments in social science research into the "usual" broad categories of basic and applied research can be an empirical nightmare. Categorizing the benefits that flow from those investments might be easier. Moreover, there is more literature about this, at least in the fields of economics and agricultural economics. The current literature includes two approaches to the problem of identifying the benefits of social science research. One is to develop "grocery lists" of different types of benefits (Norton and Schuh 1981). The other emphasizes the importance of social science research in inducing institutional change (Ruttan 1982 and 1984). In this section, both of these approaches are reviewed. However, an alternative approach is recommended. This is to focus directly on the effects of social science research on economic welfare and to identify the effects of social science research through their initial incidence on particular sectors of the economy.

Norton and Schuh (1981) argued that "A common thread running through most types of social science research is that the output is information rather than a new or improved product." Clearly, they did not mean to imply that information is not a commodity, but that social scientists, unlike some physical scientists, do not generally directly produce new physical products other than the products needed to create and transmit information such as books, reports, computer software, and articles.

Norton and Schuh also suggested a "grocery list" typology for categorizing the information through which agricultural and rural communities derive the benefits of social science research. One category is management information. This enables producers to implement initiatives that improve technical and allocative efficiency. A second category, price information, improves the accuracy of price forecasts and leads to improvements in allocative efficiency. Third, institutional information makes it possible for policymakers to make welfare enhancing changes in economic institutions or "rules of the game." Information on product and environmental quality improves the choices of households for consumption and policymakers for policy. Norton and Schuh's three other categories are nutrition information, information to aid adjustments to disequilibria, and information to aid in the reduction of rural poverty.

The real theme that underlies this typology is that social science research produces findings that alter the economic welfare of individuals, households, and communities, largely through improvements in total factor productivity (TFP). TFP is broadly defined here to include effects on the productivity of households, government, and the private sector. Only in the case of information to aid in the reduction of rural poverty do Norton and Schuh deviate from this focus, at least in part, to address income redistribution.

In contrast, Ruttan (1982 and 1984) argued that social science research is important primarily because it fosters institutional change, almost to the exclusion of any

other type of benefit.[4] Following Commons (1950) and Knight (1952), he defined institutions to include "[B]oth the behavioral rules that govern patterns of relationships and actions as well as decision making units such as government bureaus, firms and families" (Ruttan 1984, 550). Institutional change, in this definition, refers to the creation or destruction of institutions and also to changes in institutional performance. If institutions and institutional change are defined in this manner, then Ruttan is correct. Any outputs from social science research or, for that matter, physical science research are accounted for, but the "typology" provides few insights. If we consider Ruttan's examples, however, it seems that his focus is on major changes in the organization of political institutions and government policies. In this interpretation, Ruttan's argument is really that social science researchers' major contributions are to social changes in the large rather than the small.

Ruttan suggests that the first step in measuring the benefits of social science research should be to specify the sources of demand for that knowledge. He then argues that:

> The demand for knowledge in economics and in the other social sciences—as well as in related professions such as law, business and social service—is derived primarily from the demand for institutional change and improvements in institutional performance (Ruttan 1984, 551).

It is not clear that Ruttan's optimism about "improvements" is completely justified, perhaps especially because the examples on which he focuses refer to large-scale changes in either political institutions or the policies they implement (Ruttan 1982). As Krugman has recently noted, the public choice literature on rent-seeking implies that *ex ante* demands often exist for social science research that justifies particular institutional changes that benefit the parties seeking to make those changes. However, the resulting changes do not necessarily improve aggregate economic welfare. Thus the observed "market" demand curve for social science research is unlikely to be the social demand curve.[5] This divergence between the social demand and the market demand for social science research should be taken into account in any assessment of benefits.

In fact, if the concern is with the benefits of publicly funded social science research, then the relevant question is: What are the effects of the research on the economic welfare of all affected parties?[6] An understanding of the aggregate willingness of the "market" to pay for the rationales for institutional change that participants in the policy process desire may be worthwhile for wealth-maximizing social scientists, but it is unlikely to lead to an accurate measure of the aggregate benefits of social science.

From an empirical perspective, Norton and Schuh's approach is more useful. However, Ruttan's observation that the benefits from social science research flow to

individuals and communities through effects on firms, households, and government agencies (or bureaucracies) is also important. Moreover, it is the effects of social science research on economic welfare that really constitute the benefits of that research.

The approach adopted here, therefore, is to categorize the outputs of social science research in terms of both separate or sector-specific effects and joint effects of the research on the total factor productivity of firms, households, and government agencies and, as a result, on the economic welfare of individuals and communities.[7]

Sector-specific effects initially affect a particular type of organization—the firm, the household, or a government agency. They can be viewed as changing the costs of the resources that type of organization needs to produce its outputs. Clearly, however, innovations that have their initial incidence in a specific sector lead to benefits for other sectors and those benefits must be accounted for in any assessment of benefits (just as they would be in the case of innovations derived from general science research).

Joint effects have their initial incidence on more than one type of organization or sector. They often derive from institutional changes such as adjustments in social and economic policy (for example, "reforms" to agricultural income-support policies) associated with social science research.

SEPARATE EFFECTS OF SOCIAL SCIENCE RESEARCH

As with any typology, the clarity of the demarcation lines and how they have been drawn and used is subject to question and criticism. However, the emphasis on three types of organization or sectors—firms, households, and government—has the virtue of being in accord with widely used constructs in national income accounting and models of economic systems.

Firms

Social science research provides many different kinds of information that influence the economic welfare of individuals and aggregates of individuals. As Norton and Schuh noted, some of this information can directly affect the supply curves for individual commodities by enabling firms to use resources more efficiently. Norton and Schuh's categories of management information and price forecast information are relevant here. In fact, general market information, which includes crop forecasts, trade policy updates, and so forth, is an additional important source of potential benefits through its effects on the productivity of firms.

In an agricultural context, for example, management information includes results from applied economic research on the capacity, configuration, and location of processing

plants; the management of livestock herds and fisheries; the economically efficient use of inputs such as land, fertilizers, and pesticides; the development and use of new marketing instruments such as options, futures, and derivatives; and the adoption rate for new technology.[8] Social science research has contributed to increases in the total factor productivity of firms in these ways (and many others). The result has been increases in economic welfare for households through changes in the welfare of both producers and consumers.

Several commentators have identified market information, especially forecasts of prices, as a potential source of benefits from social science research (Freebairn 1976a and 1976b; Antonowitz and Roe 1986; Norton and Schuh 1981; Sumner and Mueller 1989; Colling and Irwin 1990; Carter and Galopin 1993). Much of this information has the characteristics of a public good, and the socially optimal price for access to that information is either zero or close to zero and below the average cost of providing it. It seems unlikely that economists' direct contributions in the form of improved price forecasts (through "better" structural or time-series statistical models of prices) have been, or are likely to be, substantial, at least where futures markets exist.[9] However, better information on underlying production conditions may be more important.[10]

One indicator of the value of USDA data on agricultural commodity markets may be the extent to which private firms include that information in newsletters and other media that they market to agricultural producers, processors, and input suppliers.[11] Another approach, considered by Carter and Galopin (1993), is to examine private returns by market participants (traders on futures markets) to early access to data contained in the reports.[12] Freebairn (1976a and 1976b), Antonowitz and Roe (1986), and Nelson and Schuh (1981) have all addressed the question of how to value improved price forecasts under the assumption that improvements in forecasts are shown by reductions in the dispersion of the probability density function associated with the forecasts. While, as suggested above, it seems unlikely that economists do better than private agents in directly forecasting prices, social science researchers do produce improved market information such as crop forecasts that indirectly improve the price forecasts of private agents. A third approach to valuing the benefits of this type of market information may be to identify links between the release of market information and the dispersion of price forecasts and then to apply the techniques developed for valuing improved price forecasts.

Households

Contributions of social science research to household productivity have not been ignored in discussions of the benefits of social science research.[13] Norton and Schuh (1981), for example, argue that agricultural economics research that leads to improved nutrition information has the potential to "cause a shift down in the supply curves for

many goods and services due to a reduction in medical costs and increased labor productivity." However, this perspective is a little too narrow. Social science research in many disciplines (including economics, sociology, anthropology, and psychology) has led to innovations that enable household members to function more effectively in both the workplace and the home.

In general, economists have not been successful in developing widely accepted aggregate measures of changes in nonmarket output and total factor productivity. However, much social science research is directed at improving well-being derived from activities outside the workplace and marketplace (as traditionally defined in national income accounts). For example, providing measures of the benefits of improved relationships between family members that come from social science research is clearly important in evaluating the benefits of research in the disciplines of sociology, anthropology, and psychology. Nor is this a trivial consideration for research in economics that examines and facilitates improvements in resource allocation and total factor productivity within the household in food preparation and consumption, other work within the household, education, leisure activities, and so forth.

In this context, particular care must be taken in evaluating the benefits of social science research that affects the health of household members. Norton and Schuh (1981), for example, argue that reduced health care costs are a benefit of research that improves nutrition. Barro (1995) has noted that reductions in tobacco consumption may lower mortality and morbidity, but that this improvement might not lower health care costs for each person. We all become ill and die eventually, and the terminal diseases we suffer from later in life (instead of dying earlier from malnutrition or excessive consumption of tobacco, alcohol, and other "recreational" drugs) may involve more extensive and expensive treatments. Reduced tobacco consumption or better nutrition may cause each person to live longer; it may also cause them to have more days of ill health over the course of their lives.

In fact, the relevant benefits from improved nutrition are both the net benefits to the individual of his or her improved health status and any spillover benefits to household members and the community at large. The greatest benefits are probably enjoyed by individuals whose health has improved, and not by taxpayers and philanthropists, because of lower burdens associated with income transfers to provide health care for others.

Since the inception of organized research on social science issues, an important (perhaps the most important) role for social science research has simply been to inform people about how their communities work as social and economic entities and how, as individuals, they function in those communities. The significance of social science research in this respect is highlighted by recognizing that this may have been the primary function of the classic works of Adam Smith, Freud, Rousseau, and Marx. It is also clear

that the influence of more recent works (for example, the public choice literature) on the understanding that the general public has of the roles of institutions has been profound.

To the extent that the "general education" role of social science research allows individuals to function more effectively within existing institutional arrangements, it can be viewed as having its initial incidence on household productivity. However, the effects of social scientists as different as Karl Marx and James Buchanan on social institutions and economic productivity have not been limited to their effects on activities within households. Spillover effects on voting and other forms of political action have caused major changes in the economic and social organization and operation of communities and countries. With hindsight, though, some of these "macroeconomic" effects may not always have been particularly desirable, at least from the perspective of aggregate economic welfare (North 1994; Ruttan 1984). It is, in fact, difficult to sort out how the benefits that flow from the educational effects of social science research can be measured with any degree of accuracy using a monetary measure. Nevertheless, there is widespread agreement that they have been and will continue to be important.[14]

Government Agencies

Much—in fact, most—social science research is commissioned by government agencies. A substantial proportion of this research is directed toward policy issues and is intended to inform policy debates, just the sort of grist for the institutional change mill emphasized by Ruttan. These types of research outputs typically have simultaneous effects on firms, households (as consumers and taxpayers), and government organizations. Some social science research, however, explicitly addresses the operational efficiency of the operations of government agencies and leads to improvements in resource use and productivity within those agencies. The analysis of allocations of resources for data collection among competing objectives fits in this category (Gardner 1983b; Just 1983; and more recently Zilberman 1996). Perhaps a more important set of contributions in this area flows from the work of public choice economists (Niskanen 1971; Peltzman 1976; Becker 1983) that has led to the literature on the size of government agencies and the optimal incentive structure for efficient bureaucracies (that is, bureaucracies that are cost efficient in the sense of minimizing resource costs to achieve the given outputs or services used by their clients)[15]

JOINT EFFECTS

Many social science research findings have direct implications for changes in institutional arrangements within the household, firm, or government sectors or throughout an economy or society. Social science research programs often lead to, or are partially the cause of, both large and small policy changes and innovations in the structure of social institutions. The initial incidence of these changes is not limited to one type of

organization (firms, households, or government agencies); instead there are simultaneous direct effects on organizations within two or all three of these sectors. For example, many policy changes that affect tax yields have their initial effects on both firms and households. However, most policy changes begin by affecting more than one sector. For convenience, both types of adjustments are lumped together here.

Economists have usually chosen to assess the benefits of policy changes (which may be positive or negative) in terms of how they affect the economic surplus of appropriately disaggregated groups. The effects of potential policy changes on producers, consumers, and taxpayers have frequently been analyzed, either in a partial equilibrium setting (Gardner 1983b; Alston and Hurd 1990) or a more general equilibrium setting where effects on the welfare of different groups of households are evaluated (Chambers 1991; Martin and Alston 1994; Innes and Rausser 1989).

In principle, this approach works well both for marginal changes in existing policy instruments and for nonmarginal changes that involve the creation of new policy instruments and institutions. But the approach requires good information on underlying production technologies and individual (or household) utility functions for all relevant participants in the economy. In practice, it is particularly difficult to obtain parameter estimates either for the relevant technologies or utility functions over the "relevant range" when there are nonmarginal changes in policies. The problem is compounded when nonmarket goods such as improvements in environmental quality are at issue or when policy effects are to be assessed in the context of disequilibrium situations such as those that occur during major recessions. In the latter case, the possibility that household preference functions may change dramatically (because of strains created by unemployment) also complicates the empirical assessment of benefits associated with policy innovations.

Because of these difficulties, benefits are often couched in simpler terms. In the case of environmental regulations these would include reductions in morbidity and mortality. In the case of macroeconomic policy changes they would include reductions in the rates of unemployment or inflation. This can lead to incomplete accounts of the benefits of policy changes. For example, counting an increase in GNP associated with an increase in employment as a benefit of avoiding recessions misstates the increase in economic welfare. On the one hand, some benefits derived from the leisure time now forgone and some externality costs from environmental degradation are associated with increased output.[16] On the other hand, the economic surplus that households derive from increased consumption made possible by the additional income may be greater than that income. There may also be positive externalities from the economic expansion (associated, for example, with reduced crime rates). These are standard problems in measuring aggregate economic welfare that must also be addressed in assessing the benefits from social science policy research.

4. MEASURING THE BENEFITS OF SOCIAL SCIENCE RESEARCH

The effects of social science research on economic welfare in general and total factor productivity in particular are largely indirect, partly in the same way that the economic effects of basic and applied research in the physical sciences are indirect. Innovations in the sciences have to be used in technologies and products that have the potential to increase economic welfare. Those new technologies and products then have to be adopted and diffused among users.

For some innovations in the social sciences, particularly innovations that have their first effects in a specific sector, the process is identical. For others, especially innovations that stem from research that concerns public policy issues, the process is different in two crucial respects. First, the research itself often includes evaluations of existing policies or policies that have been proposed by policymakers or other participants in the political process (including interest groups that do not have direct control over policy but influence its formation). Second, it is often hard to attribute changes in economic and social policies that increase or diminish welfare to specific research findings by social scientists. For example, changes in agricultural policy that increase economic surplus may have been advocated by some economists but adopted purely out of considerations of the number of votes to be won (perhaps because of reductions in budget deficits) and lost (because of reductions in income transfers to well-organized interest groups). Any assessment of the benefits of social science research should take account of these problems. The latter is particularly relevant for policy-oriented social science research, and any method of identifying and valuing the benefits of policy-oriented social science research should deal carefully and honestly with the issue.

Benefits from social science research can be measured at different levels of aggregation. At a minimum, relevant assessments can be carried out for (1) individual social scientists, (2) academic departments or research teams, (3) social science research institutions, (4) social science disciplines and subdisciplines (economics, agricultural economics, sociology, rural sociology, anthropology, and so forth), and (5) all social science research. The focus here is on the second, third, and fourth levels of aggregation in relation to economics and agricultural economics.

Assessing the benefits of the work of individual social science departments (or research teams) and institutions (aggregation levels 2 and 3) is important in many countries. In Australia, for example, the Australian Bureau of Agricultural and Resource Economics (ABARE) has received a substantial proportion of the public resources available for agricultural economics research. It often employs more agricultural economists than all other state agencies and universities. In the United Kingdom, the Ministry for Agriculture, Fisheries, and Food, through its own staff and its relationships with a relatively small number of university academic departments, has been responsible for most of that country's agricultural economics research projects over the past 50 years.

The situation is similar in the Netherlands, where much agricultural research is concentrated at the University of Wageningen.

Honest and accurate assessments in these environments yield important insights about the total benefits derived from public investments in social science research in specific disciplines and provide information to guide policymakers' decisions about the amount of resources to be allocated to the social sciences in general (as opposed to other uses, including support for research in the physical sciences) and between disciplines within the social sciences. A second reason for carrying out such evaluations is to assess the performance of competing institutions.

An overall assessment of the benefits of social science research in each discipline or subdiscipline (aggregation level 4) is most important in determining the allocation of resources. Ideally, such assessments should be made ex ante rather than ex post. As has been typical in physical science research, however, ex post evaluations are likely to be more feasible.

CONVENTIONAL APPROACHES TO ESTIMATING THE PRODUCTIVITY EFFECTS OF RESEARCH: RELEVANCE FOR THE SOCIAL SCIENCES

If the focus is on how social science research affects productivity, the standard issues associated with the econometric measurement of the effects of research apply. There are, however, some wrinkles that deserve special emphasis. Most of the work that links the effects of research to changes in productivity is concerned with effects in sectors that produce marketed commodities for which there are, to some extent at least, well constructed measures for outputs (such as bushels of wheat or corn, kilowatt hours of electricity, rail car, oil tankers), inputs (such as hours of effort by class of labor, generator capacity, energy use), and prices. However, much social science research—including research in agricultural and consumer economics—is directed toward improving the productivity of households and government agencies, areas of economic activity for which few consistent time-series measures of outputs or inputs have been constructed. As the social sciences are more concerned with these two sectors than the physical sciences, ignoring the benefits that accrue directly to these sectors can increase biases in assessments of the benefits derived from those research programs.

To the extent that social science research programs affect the productivity of firms within specific sectors of the market economy, such as agriculture or the automobile industry, for example, or where data on outputs and inputs can be defined, those effects can be assessed conceptually using standard techniques.[17] Alston, Norton, and Pardey (1995, ch. 3) provide a detailed discussion of these methods and the difficulties associated with their empirical implementation in scientific research. They identify three methodological categories: parametric, nonparametric, and index number procedures.

Parametric procedures are divided by Alston, Norton, and Pardey into primal and dual models. They subdivide primal models into production function models (in which output is the dependent variable), response models (in which output is expressed per unit of a single input such as land), and productivity models (in which output is expressed per unit of aggregate inputs). Dual parametric models use either a profit function or a cost function, and parameters are estimated from the associated systems of factor demand and (in the case of profit functions) output supply relationships. Nonparametric approaches (see, for example, Chavas and Cox 1992) evaluate data on outputs, prices, and inputs for consistency with axioms of rational producer behavior such as the "weak axiom of profit maximization." Finally, Alston, Norton, and Pardey note that index number approaches are "often used directly or in conjunction with econometric models to assess sources of growth in ...output or ... productivity" to identify the share of output growth or total factor productivity growth attributable to research.

As Alston, Norton, and Pardey and others emphasize, while some approaches are almost surely preferable to others on theoretical grounds, none of the approaches is worth much if the data on which they are based are inadequate. The problems associated with measuring traditional inputs such as labor, land, energy, and capital are well documented. Particular difficulties, however, are associated with data for science research and technology transfer.[18] These difficulties are also relevant to data on social science research. They include problems associated with lengthy time lags between investment in research, innovations, and the adoption and diffusion of technology. The decay of the usefulness of knowledge generated by previous research also presents estimation problems. Just as new technologies depreciate or become obsolete, so insights from social science research become less useful, losing value, both to organizations (firms, households, and governments) and in the policy arena.[19] These problems create serious difficulties in evaluating the benefits of scientific research (as noted by Pardey and Craig 1989 and Chavas and Cox 1992). They are at least as problematic for an evaluation of social science research.

Measuring the quantity of inputs into social science research may also be difficult. Alston, Norton, and Pardey identify three categories of expenditures for research in agricultural science: core funding, other government funds, and donor funds and grants. As they note, there are significant difficulties in determining which research funds are directed toward projects that enhance productivity for specific commodities when a large proportion of all research funds are allocated to multicommodity projects. These difficulties are compounded in the social sciences where multidisciplinary projects are common and much research support is embedded in budgets that are ostensibly for other purposes, such as teaching and administration.[20] This is a common phenomenon in all disciplines, but it probably presents more of a problem in the social sciences because explicit research funding represents a smaller fraction of the total compensation and support received by social scientists actively involved in research.

Concerns about research with effects that cross the boundaries of regions and countries are also relevant to social science research. While some social science researchers (Atal 1983; Dube 1982), especially in developing countries, have argued that the effects of these "spillovers" from social science research in other countries (typically research done by researchers from Europe, North America, and Australia) have been negative because of cultural limitations, it seems clear that they are large.[21]

In addition, it is difficult to see how the welfare benefits that flow from policy-oriented social science research can be easily captured by conventional econometric approaches to estimating the returns from research. Many of these benefits, which are often asserted to be large, are not captured in established time series data sets, or they may occur in "lumps" and are difficult to identify.

THE CASE STUDY ALTERNATIVE

If estimating social science research benefits using the "usual" techniques is difficult at best, what should be done? One approach that has been suggested is to use case studies. It has even been implemented in at least one research institution (ABARE). The idea is simple. The benefits of the research output of a discipline, subdiscipline, or research institution should be assessed by selecting and estimating the benefits from a sample of research projects taken from the population of projects carried out by the entity of interest (or, if the relevant institution or discipline research program is small, the population of all research projects).

The approach is both challenging and full of pitfalls. First, given that a research project has been selected as a case study, there is the issue of what should count as a positive (or negative) benefit. The answer here, as Alston, Norton, and Pardey (1995) suggest for agricultural research projects, is any change in economic surplus, as conventionally defined by economists. Effects should also be estimated for each relevant aggregation of individual households, because policymakers in particular and societies as a whole are unlikely to place the same weights on welfare changes for each group. For example, information may be needed about effects on the economic welfare on low-income and high-income households, rural and urban households, farm households and nonfarm households, and food consumers, taxpayers, and food producers. Behind this response to the question of what counts as a benefit lies the presumption that the benefits of social science research should be assessed using the analytical frameworks developed by economists to measure changes in economic welfare and, to the greatest extent possible, using a monetary measure.

A second important issue is the definition of the population of research projects from which case studies are to be drawn. If the evaluation is to be made of the benefits derived from an institution's research program over a specified, reasonably long, time

period (say the last 20 years), then it may be feasible empirically to simply use the agency's annual reports and other records to identify all projects that have been carried out during the period.[22] If the evaluation is to be made of the benefits from economic research in, say, the United States, while the problem of identifying the population of interest is no more difficult conceptually, then it may not be feasible to obtain a list of the population of all relevant projects. But, as discussed below, all may not be lost if the goal is to obtain objective measures of research benefits from a discipline.

A third issue is the selection of the sample of projects for the case studies. In a recent self-assessment, ABARE reported "case study" estimates of the benefits from a small number of high-profile projects. It is not clear how those projects were selected. However, an objective approach would be to use a random sample of the population of relevant projects. For example, if an institution identified 250 projects in its research portfolio for the relevant period and case studies could be carried out for only 25 projects, then a random sampling approach would be used. This approach would ensure that projects that yielded modest or even negative benefits would have a chance of being included in the assessment and that benefits estimates could be unbiased in a statistical sense. If the population of research projects included a few large projects and many projects that were small in terms of research resource costs, then a stratified random-sampling approach could be adopted to ensure that the sample adequately represented the institution's research portfolio.

If the objective were to obtain estimates of the benefits from research by an entire discipline such as economics, where it may not be possible to list the relevant population of research projects, an alternative approach would be to identify institutions involved in research (universities, government agencies such as the Bank of England, and private for profit and nonprofit groups, such as the Brookings Institution). These could be stratified, perhaps by volume of external grants and contracts. Then a random stratified sample of institutions could be drawn and all (or samples of all) research projects carried out by those institutions during the relevant period.

In both these cases, the objective is to ensure that a statistically representative group of case studies is identified for the assessment of benefits. The alternative, convenience sampling, is subject to the criticism that the benefits assessment process is simply a self-serving exercise. It is also a two-edged sword in that critics and supporters of social science research could both use similar case study approaches but "conveniently" select different cases to make their points. In addition, a focus on a small number of conveniently selected case studies fails to provide meaningful information about expected payoffs from such research or the shape of the marginal benefits function. Information about the latter could perhaps be obtained for a discipline by assessing the benefits for work performed at institutions with different research rankings.

A fourth concern, especially in relation to policy-oriented social science research, is the crucial issue of the extent to which benefits derived from policy changes can be attributed to social science research programs. Evaluating these effects is clearly an art rather than a science, likely to involve a great deal of historical investigation, and to be the subject of furious disputes. For example, is it really fair to accuse Samuelson and Solow of causing policymakers to adopt overly expansionary polices that created unnecessarily high rates of inflation in the 1960s because of their 1960 article on the Philips curve? Similarly, should the work of agricultural economists such as Bruce Gardner and Dan Sumner be credited for recent shifts in U.S. farm programs that may lead to increased economic efficiency in that sector? Clearly these types of questions have to be addressed carefully and honestly, and full or partial credit or blame assessed if the benefits of social science research are to be estimated using case studies.

5. CONCLUSION

This paper has addressed two major questions: What are the benefits of social science research? How can those benefits be estimated? It has been argued that, in principle, social science research is no different than research in the physical sciences in that it provides new knowledge that can alter the economic welfare of households. It is likely to be useful to identify those effects by explicitly recognizing that the initial incidence of social science research often occurs by altering productivity within households and government agencies, as well as within firms. Because so much social science research is oriented toward relationships and activities within households, a failure to account for benefits that originate there, within the household, is a particularly serious source of potential bias in such research.

Difficulties associated with a lack of relevant time series data and those that arise from the policy focus of much social science research make conventional econometric techniques less effective in estimating the effects of social science research on productivity. One possible alternative is to rely on case studies. However, serendipity or convenience is an inappropriate basis for selecting the case studies. Instead, the population of relevant research projects should be identified and random (or stratified random) samples of research projects should be selected to ensure that the estimates of research benefits derived from analyses of those case studies can be viewed as statistically representative. Otherwise, any estimate of benefits will be viewed with suspicion by policymakers and research administrators (probably correctly) as a biased and, probably, self-serving waste of resources.

NOTES

1. This observation is not new. Professor Ruttan, for example, emphasized the importance of economists' contributions in the field of macroeconomics, arguing that one of the most dramatic examples of the effect of knew knowledge in the social sciences on institutional efficiency can be seen in the new understanding of macroeconomic relationships associated with the Keynesian revolution" (Ruttan 1982, 339).

2. Although little serious effort has been devoted to this problem, economists and agricultural economists have been willing to identify important research agendas for their disciplines [see, for example, Vickrey 1993 and Bonnen 1983]. Rare exceptions in the field of agricultural economics are studies by Ruttan (1982), Norton and Schuh (1981), Freebairn (1976a and 1976b), Roe and Antonowitz (1985), Sumner and Mueller (1989) and Carter and Galopin (1993).

3. The economics of the benefits of applied scientific research is now a significant subfield of economics and owes much to the path-breaking work of Professor Theodore Schultz and Professor Zvi Griliches. A recent exhaustive review of this work as it relates to agriculture is provided by Alston, Norton, and Pardey (1995). Assessing the effects on factor productivity of all research is a more difficult exercise, at least in part because of the difficulty in measuring knowledge and changes in the knowledge base over time (see, for example, Adams 1990).

4. Professor North has emphasized the importance of institutions throughout his career. He gave it particular attention in his Nobel laureate address in 1994.

5. This insight was provided to the author by Julian Alston in personal communications.

6. In other words, as Alston, Norton, and Pardey (1995) argued about assessments of the benefits of science and agricultural science research, social science research effects should be measured and evaluated using the standard techniques and criteria of positive welfare economics.

7. Oehmke (1995) noted that what makes social science research different from much physical science research (especially in agriculture) is that explicitly "[it] is designed to affect people. It is concerned with improving individual and social

welfare by influencing the actions which people take." This view implies the need to focus on more than private sector productivity in assessing the benefits that such research provides.

8. Note that only by a considerable stretch of the imagination can these types of contributions, which in the past have been substantial, be subsumed under the rubric of institutional change.

9. There is little or no evidence that time series and other econometric price forecast models do better in predicting future price movements than do participants in commodity markets through futures prices or even expert forecasts.

10. Sumner and Mueller (1989) provided compelling evidence that between 1961 and 1982 futures prices were significantly larger on the days when the USDA released its crop reports for corn and soybeans proportional movements in than on the five days before and after the crop forecasts were released. They concluded that USDA's (U.S. Department of Agriculture) crop information reports do contain new and significant information. The crop reports thus "passed the first necessary test" (Sumner and Mueller 1989, 7) to justify their existence; that is, they did provide some beneficial information. Sumner and Mueller did, however, point out that this was not a sufficient test; their results did not provide insights about the value of the information relative to its costs.

11. This idea was proposed to the author by David Zilberman.

12. Carter and Galopin (1993) examined the information content of USDA hog production reports. Their results suggested that while the reports contained some new information, the value of that information was zero or close to zero.

13. The need to consider the benefits from social science research that have their initial incidence within households accords well with Falcon's view that from the perspective of food and nutrition policy analysis, "the greatest analytical breakthrough in the past decade (the 1980s) was a reformulation of the household as an economic entity" (Falcon 1995). In an evaluation the benefits from social science research, if the household is important and important social science findings have been made about the household's operations, then the benefits of those findings should be estimated.

14. See, for example, Vickrey 1993 and Aaron 1989.

15. See Chapter 17 of Mueller 1989 for a recent discussion of this literature.

16. It can be argued that work yields a double benefit for some people in the form of income and increased enjoyment of their time. For many academics, bureaucrats, and other professionals this is indeed the case. But work is by no means fun for all workers either within affluent countries such as the United States or (especially) in many of the world's poorer communities.

17. For example, some social science research programs are intended to improve the health of individuals. If changes in the health of the target group—the outputs—can be identified along with changes in major inputs such as food consumption, then the creative econometrician concerned with estimating the benefits of the relevant social science research program may be in business.

18. In agriculture, technology transfer is often closely associated with and measured by investments in agricultural extension.

19. At one stage, it was almost axiomatic among agricultural economists that price stability increased welfare and therefore that government-supported price stabilization schemes were good. This view no longer dominates the literature, even when the policymaker's welfare function only includes the utility of producers. See, for example, the discussion of the Canadian Wheat Board in Carter and Loyns (1996) and the analysis of the Australian Wool Price Stabilization scheme in Bardsley (1994).

20. Oehmke (1995) provides an interesting empirical discussion of this issue in the measurement of agricultural social science research in Michigan.

21. To recognize that spillover effects can be large in the social sciences, all that is needed is to recognize the effect of the public choice literature on the property rights policies adopted by some of the emerging democracies in central and eastern Europe. In the context of agricultural productivity, the work of Heady and others on optimal fertilize use has been important in many countries while, in the context of agricultural policy, the work of Gardner and others on the decoupling of income transfers has been important.

22. The time period should not be too short for two reasons. First, as noted above, the effects of social science occur with long and variable lags. Second, benefits estimates can be biased if the intertemporal focus is too myopic.

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