Economic Statistics and U.S. Agricultural Policy

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Abstract

Economic statistics can be used to inform policy as it is being designed, avoid policy design mistakes, or implement government programs once they are established into law. Oftentimes, statistics are used for all three purposes. This paper considers the relationships between statistics and agricultural policy in the case of the United States. We address first the broad historical picture of U.S. official economic statistics concerning agriculture, and then turn to selected examples that relate policies to economic statistics in more detail. The examples show diversity in the interplay between statistics and policy. As policies have become broader in scope, addressing not only farm commodity markets but also differences among farms and a widening set of activities on farms, policymakers have asked for more detailed information about the financial situation of individual farm businesses and households, sources of risk in farm returns, and production practices that affect the environment.

Keywords: Agricultural policy (Q18); Data collection and estimation (C8); Economic history of U.S. agriculture (N52)

1. Introduction

An important but relatively neglected topic of the political economy of agriculture is the role of economic statistics in the evolution of policy. This paper considers the relationships between statistics and policy in the case of the United States. We address first the broad historical picture of U.S. official economic statistics concerning agriculture, and then turn to selected examples that relate policies to economic statistics in more detail: the distribution of government subsidies, the relationships between U.S. agricultural commodity programs and agricultural economic statistics, crop insurance and disaster payments, and conservation policies. The examples illustrate the differing roles

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that statistics play in the policy arena, from having little effect on policies to being used directly in program implementation.

2. Overall Historical Picture

Causal relationships between the statistics and policy run in both directions: policy implementation and legislation have generated demands for statistics, and statistical information has influenced policy debate. Sometimes the development of specific economic statistics is undertaken at the request of elected officials through appropriations of agency funds. Sometimes there are also requirements by elected officials to cease producing particular economic statistics, as has been the case for forecasts of cotton prices since 1927 (Agricultural Marketing Act of 1929). Farmers are often the primary providers of agricultural economic data, and are often viewed as a major beneficiary of agricultural statistics. However, farmers often report that the information they provide and receive back in the form of publicly available reports is of more value to others than to them (Jones, Sheatsley, and Stinchcombe). Farmers have even expressed suspicions that statistics are used to manipulate markets against their interests.

When President Abraham Lincoln established the USDA in 1862, he specified that one of the duties of the Secretary of Agriculture was to provide agricultural statistics to the nation. Estimates of farm acreage and numbers go back to 1850, and commodity production and price data were published starting in 1866. Nationally-representative economic information about farming was first collected by the Census of Agriculture of 1910. The scale and scope of economic information expanded steadily in the 1930s and 1940s as government policies required more information for both the implementation and

evaluation of policies, particularly those that were focused on managing surpluses of products and low farm incomes. More recently, policy issues and data needs have added a focus on distributional consequences of farm programs and globalization.

The U.S. government expresses its demand for information about the agricultural economy in two main ways: appropriation of funds for statistical purposes and legislation mandating particular data and related information about the rural/farm sector. The appropriation of funds for agricultural statistics historically has been directed to the U.S. Department of Agriculture (USDA) and to the Census of Agriculture (carried out by the Department of Commerce until 1992, and the U.S. Department of Agriculture thereafter). In 1895, the Secretary of Agriculture reported that "the annual cost of securing agricultural statistics which are published from time to time by this department is about $100,000" (USDA, 1896, p. 33).[4] With the GDP deflator in 2005 at about 24 times its level of 1895, in today's dollars that expenditure would amount to $2.4 million. The actual budget of the National Agricultural Statistics Service (NASS), which covers essentially the same statistical area as the Division of Statistics did, was $128 million in 2005. Thus real federal spending on basic agricultural statistics rose by a factor of 53 during the 110-year interval from 1895 to 2005, an annual rate of increase of 3.6 percent.[5]

The NASS budget does not include significant statistical activities in the Economic Research Service, the Foreign Agriculture Service, the Farm Service Agency, the Risk Management Agency, and the National Resource and Conservation Service, and various other agencies, but in these agencies statistical spending is not sufficiently

[4] Concerning the Department's Division of Statistics (forerunner of NASS) the Secretary also noted that: "From its origin, the conclusions and reports of this division have been frequently subjected to more or less severe criticism" (USDA, 1895, p. 33).

[5] Currently, NASS publishes more than 70 major statistical series.

distinguishable from other activities to permit meaningful comparisons over time. The U.S. Office of Management and Budget combines data collection, analysis, and dissemination into a federal statistical budget category that, for agriculture, includes the entire budgets of NASS and ERS, but none of the budgets of other USDA agencies. Similarly, in the Department of Commerce the statistical budget covers both the Census and the Bureau of Economic Analysis with respect to economy-wide data. Agriculture's share of the statistical budget has declined over time as more funds have been devoted to health statistics (National Center for Health Statistics, 2005 budget $109 million), energy statistics (Energy Information Administration, 2005 budget $84 million), with the most recent addition science statistics (Science Resources Statistics of the National Science Foundation, 2005 budget $31 million), among others. Overall in 2005 the total NASS and ERS budgets together accounted for 9% of the $1.9 billion total U.S. federal statistics budget. In 1977 agriculture's share of the statistical budget comparably measured was 19% and as recently as 1995 it was 14%.[6] But even in FY2005, agriculture's share of statistical spending far exceeded its 0.8 percent share of U.S. GDP. In short, the demand for agricultural statistics has increased continually over the long term, even though the demand for nonagricultural statistics has increased even faster.

Farm legislation calling for particular data or reports that require data collection go back to the original New Deal farm legislation of 1933, and the scale and scope of such mandates have expanded vigorously in recent years (see Appendix A). The requirements are however in authorizing legislation, not appropriation acts, and so do not

[6] The data for these calculations are from publications of the U.S. Office of Management and Budget (1985, 1990, 2005) which are not fully consistent over time. These publications are from OMB's Statistical Policy Branch created under the Paperwork Reduction Act of 1980.

provide funding for the mandated data and analysis. Nonetheless, agencies typically find resources within their budgets to carry out the necessary work.

3. Examples of the Role of Economic Statistics in U.S. Agricultural Policies and Programs

Economic statistics can be used to inform policy as it is being designed, avoid policy design mistakes, or implement government programs once they are established into law. Oftentimes, economic statistics are used for all three purposes. In most of the remainder of this paper, we describe examples of the roles economic statistics have played in informing the larger policy process. In no way does our list include all of the important series, and only a brief discussion of the issue is provided. We have selected examples related to major farm policies and programs and show how the role played by statistics has varied greatly. Sometimes, statistics seemingly have had little impact on policies and other times they are used directly to implement programs. Our examples also indicate the breadth in the type of statistics that are relevant for policy design and program implementation. Some of the statistics are not traditionally defined to be economic statistics, such as land erodibility. The first example we describe in section 3.1 is the statistics on direct government payments, a basic indicator of government involvement in agriculture. An issue with this series is more about how the source of information affects coverage of the levels and distribution of payments, and hence, the implications of the statistics. The second example we provide in section 3.2 covers how various statistical series were used, or simply discussed, in commodity policy design and implementation since the 1930s. The third example we provide in section 3.3 examines

how statistics, economic and otherwise, have been used in the implementation of non-commodity programs over time.

3.1. Government payments

A contentious issue in farm commodity programs from their inception has been the question of who benefits most from them. A key element of this issue is share of benefits accruing to large, financially better-off farmers as compared to small, low-income farm operations. As early as 1938 there have been payment limits established and a call for transparency in who is receiving payments:

*"The Secretary shall submit to Congress an annual report of the names of persons to whom, during the preceding year, payments were made under the Soil Conservation and Domestic Allotment Act, as amended, together with payments under section 303 of this Act, if any, if the total amount paid to such person exceeded $1,000." (*Agricultural Adjustment Act of 1938, *Sec. 384)*

In 1938, the payment limit was $10,000 per producer; the current limit is $360,000 (i.e., in 2000 dollars, $101,937 and $313,152, respectively). In the most recent comprehensive farm legislation, enacted in 2002, Congress asked the Secretary of Agriculture to establish a commission to study payment limitations and, in the 2005 President's budget, the White House called for a $250,000 limit on farm subsidy payments. Section 1614 of the 2002 Farm Bill contained explicit provisions requiring tracking of benefits provided directly or indirectly to individuals and entities. The purpose of this legislation was to improve the transparency of farm program benefits and to allow USDA a means to verify that payment limits were not being exceeded. Senators Grassley, Dorgan, Hagel, and

Johnson have introduced a bill limiting federal payments to no more than $250,000 per farmer.

It is useful to consider the breadth and magnitude of government payments made to farmers—even though, as we note, it is difficult to assign a direct measurement to the scale and distribution of these payments. Using payment data (consisting of the sum of payments over the 1990-2005 period) from the Farm Service Agency, USDA at the county level and farm acreage statistics from the 2002 *Agricultural Census, we calculated* payments in real dollars per acre. Figure 1 illustrates the fact that there is a large degree of heterogeneity across space in terms of the level of direct government support, at least when it is expressed on a per-farm-acre basis. Note that payment benefits in the Midwest far exceed those in other areas. Such heterogeneity has served to heighten some of the more controversial aspects of farm payments, including the fact that support levels vary substantially across crops and regions.

Three distinct steps in the provision of data on government payments have contributed to documenting the facts about the levels and impacts of the major programs. We consider each in turn.

3.1.1 Administrative Data

There are currently approximately 70 different farm programs that make up the $13.3 billion in direct payments reported in the 2004 U.S. farm income accounts.[7] This $13.3 billion is the sum of payments made by the program agencies based on their administrative records. Government payment data are available by program for each of

[7] The farm income accounts are for the calendar year, compared to the original fiscal budget year data. The program count includes multiple types of EQIP and disaster programs. Direct payments exclude programs which provide benefits to exporters and users of commodities, as well as loans and crop insurance indemnities.

the 50 U.S. states. Tracking the total government payments over time can provide a data user a sense of the involvement of government in agriculture when compared to other sources of gross farm income or net farm income (figure 2) or on a per-farm basis.

An example of how these administrative data come into play in policy discussions followed the dissemination of payment data by the nonprofit Environmental Working Group (EWG). Under the Freedom of Information Act, the EWG was able to gain access to the USDA administrative data listing the payments made to individual payment entities, (i.e., those eligible for USDA programs). The EWG posted these data on-line during a period when farm legislation was being debated. The EWG data base has recently been updated and now covers 1995-2004. The data indicate that the top 20 percent of the payment recipients received 87 percent of all payments, and the top 1 percent received 23 percent of all payments during the 1995-2004 period. The EWG data tool does not allow a user to track payments to all individuals, but instead the payments are listed by individual "entities." The EWG access tool continues to have an impact in policy discussions (Laws).

3.1.2 Census of Agriculture

Farmers were asked to report their government payments for the first time in the 1964 follow-on survey to the 1964 Census of Agriculture.[8] Since 1987, the question about government payments has been included in the full Census of Agriculture. The Census data are provided in published form as aggregated tables on how payments are distributed by size of farm (measured as gross sales class). USDA's Economic Research

[8] The government payments data were also available from the 1969 and 1979 follow-on surveys, before being available approximately every 5 years in the Census of Agriculture.

Service constructed an annual series using the Census data as benchmark data (along with other sources) which showed the distribution by sales class of farms (USDA, 1988), beginning with data for 1960.

Having data from both the providers of payments, in the USDA administrative data, and the farm recipients of data, from USDA's Agricultural Censuses and surveys, enables further issues to be addressed about where payments go, and possibly the accuracy of reporting. Table 1 shows that for the U.S. as a whole, farmers reported on the Census of Agriculture receiving only 58% as much as USDA reported paying out. For some states the divergence is quite remarkable, notably in the Southeast where Georgia farmers for example reported receiving only 18% of what USDA reported as paid to that state. Besides reporting accuracy, what might account for this difference?

One reason explaining the difference between the administrative and the reported data is that the Census data only include payments going to farm operators. Others, besides farm operators, are eligible to receive payments if they are deemed to be "actively" engaged in farming through contributions of labor, management and/or resources and the sharing of returns in a way that is commensurate with their contributions. For example, for some programs, land owners who rent land out to farm operators on a share-basis are eligible to receive direct payments.[9] On USDA's Agricultural and Resource Management Survey (ARMS, described below), farm operators are asked to provide an estimate of what they think their landlords received in government payments from the land that the farm operators rented from their landlords.

[9] Unfortunately, there are no surveys of non-operating farmland owners which collect information on the government payments they receive. The last time a survey was conducted of farmland owners who do not operate farms was in 1999, for the calendar year 1997 (U.S. Department of Agriculture, 2001), but the government payments data were not collected. It should be noted that landowners may also be effective in receiving payments indirectly through higher rental rates on owners receiving payments.

(It should be noted that it is likely that many farmers do not know what their landlords receive, or prefer not to report financial data on another individual.) In 2002, that amount of $705 million was far below the more than $4 billion difference between the administrative data and the reported Census amount.

In addition to operators and non-operating land owners, other individuals can meet the eligibility requirements to receive payments. For example, a spouse of an operator--who does not consider himself or herself to be an operator--but has an ownership interest or makes management contributions to the farming operation can be eligible to receive payments. ARMS collects information on payments going to farming *operations*, in contrast to farm *operators* of an operation. In 2002, the ARMS-based estimate of Federal payments received by *operations* was $9.4 billion, compared to the Census' $6.6 billion received by *operators*.

Another source of the difference in payments between what is known to be paid out and what is reported as received is likely related to the practice among many cooperatives of receiving the payments on behalf of the recipients. The cooperatives then disburse the payments directly to farmers along with other market payments for the sale of their product, and farmers can not always easily decipher from their statements whether the source of payments is the market or the government.[10] So, while we can account for most of the differences between the *Census of Agriculture* data and the administrative data largely through definitional differences, the census data are widely available and often form the consensus view of how payments are distributed.

3.1.3. Farm Costs and Returns Survey and Agricultural Resource Management Survey

[10] This explains why the largest payment recipients in the EWG data base are cooperatives.

With the establishment of the annual Farm Costs and Returns Survey (FCRS) in 1984 and the Agricultural Resource Management Survey (ARMS) in 1996, economists had ready access to comprehensive individual farm and household data (USDA, 2006a). In the early 1980s, the U.S. farm sector was experiencing and recovering from a financial crisis, which was especially evident in the balance sheet of farm businesses and was dominating policy discussions at every level. This environment provided the impetus for agency administrators to combine survey funds from farm expenditure and costs of production surveys to develop a more comprehensive general farm survey, the Farm Costs and Returns Survey (FCRS).

The first report based on the FCRS addressed the farm financial crisis at the time, focusing on the income and balance sheet of farm businesses (USDA, 1985). This was followed soon after by articles on the role of government payments, from a business perspective (Baum and Johnson) and from the farm household perspective (Ahearn, Strickland, and Johnson). In 1994, the 15th annual family farm report, requested in the 1977 and the 1985 farm acts, was the first based on FCRS data; subsequent reports have continued to rely on FCRS and, more recently, ARMS.[11] Since its beginnings, the ARMS data have supported a wide variety of policy-relevant analyses, and continue to be the most comprehensive source of economic data for USDA and university researchers today. The FCRS-ARMS data have allowed ERS to establish basic facts about how many farms receive payments, and other information, such as how payments vary by size of farm, and the financial position of farm households that receive payments relative to other farm households and the average U.S. household. Before the existence of those data, USDA commonly reported the aggregate amount of payments farmers received.

[11] The latest family farm report is Hoppe and Banker.

For example, using current data from the sector-level estimates, we know that government payments were 16 percent of net farm income and 5 percent of gross farm income in 2004 (USDA, 2006). Using the ARMS data, we know the type of distributional data shown in table 2. For example, in 2004, approximately 39 percent of family farms received a commodity or conservation payment from the government, averaging $12,435 per farm. Of those that participated in government programs, their average household income was $88,194 and their average net worth was $882,186. On average, farm households that participated in government programs had higher incomes and greater net worth than other farm households and the general U.S. population. Of course, similar data can be reported for farm households or farm businesses by any classification scheme, such as by farm size or commodity specialization.

3.2. Commodity Programs and the Role of Economic Statistics

The collapse of commodity prices after the end of World War I led to a period of sustained political debate about governmental action. The terms of debate involved the fundamentals of how the U.S. agricultural economy functioned and were also highly quantitative, setting the stage for the use of economic statistics in policy design. A Congressionally-mandated Commission of Agricultural Inquiry (U.S. Congress, 1921) gave high priority to improved statistics and economic intelligence in the U.S. Department of Agriculture (USDA), and implementation followed with the creation in 1922 of the Bureau of Agricultural Economics (BAE), the forerunner to the current Economic Research Service (ERS). In Congressional legislation of 1924-28, calls were made for equality for agriculture.[12] These calls for equality were defined as prices that

[12] The reason for multi-year debate was that the legislation in some years failed to obtain a majority vote in Congress, and in years when it did, the legislation was vetoed by the President.

"would bear the same relation to the general price level as the price of the commodity supported had borne to the general price level just prior to the war" (Benedict, p. 212).

USDA's statistical data provided both the rationale for and the quantification of these first ventures into commodity support policy design. The plan eventually incorporated into the first major farm legislation, the 1933 Act, was a so-called "voluntary domestic allotment" plan. This plan provided for commodity prices that would bring pre-war (i.e., initially defined as 1909-1914[13]) purchasing power. At the same time, economists both in government and outside questioned the theoretical and practical aspects of Congress's approach, and their work contributed to the foundations for the systematic development of U.S. farm economic statistics that later occurred. The major roles economic statistics have played in agricultural policies include:

3.2.1 Price Parity

Price parity, world prices, and costs of production have provided the basis for farm programs over time through various mechanisms. Beginning with the 1933 Act, the concept of price parity was used as a tool in commodity policy for many decades, and its calculation underwent a major revision in 1948. In 1949, the Brannan Plan recommended that the parity price method be replaced by other methods, but this recommendation was not adopted in the forthcoming 1949 legislation. The current significance of the parity-basis to major support programs in the 1949 act is that this law is the last permanent farm act. If agreement cannot be reach on any new temporary farm act (Farm Bill) by the time the current act is set to expire, agricultural policies will revert to those established with the 1938 and the1949 permanent legislation, including parity-

[13] For tobacco, the base period was 1919-1929.

based policies. The Food and Agriculture Act of 1965 divorced most price supports from parity, and instead set prices in relation to world prices (Effland).

3.2.2. Income Parity

In the Soil Conservation and Domestic Allotment Act of 1936, Congress declared its purpose as the reestablishment of "the ratio between the purchasing power of the net income per person on farms and the income per person not on farms that prevailed during the five-year period August 1909-July 1914" (USDA, 1944, p. 1).[14] The lack of income parity between the farm and nonfarm population was a central component of the "farm problem" as defined at that time. Although the income parity concept was introduced as a goal, per person farm incomes relative to nonfarm incomes were never directly used as a trigger for implementing particular policy provisions. This may be related to difficulty in measuring and comparing incomes, or perhaps it relates to the incompleteness of income as a measure of welfare. On the other hand, it may be due to the perceived difficulty in implementing a program based on income parity.

There were two early sources of statistics on the income of farmers. The first statistical series compared the disposable personal income per capita for farm residents to that of nonfarm residents for 1910-1943 (USDA, 1944). In the early 1960s, the consensus judgment about these statistics is reflected in the following: "There have been substantial advances in recent years in quality and quantity of data available to make farm-nonfarm income comparisons. However, it appears that the present data fall short of our needs" (Hathaway, p. 375). The major factor in leading Hathaway to this

[14] The term "parity" was used in the Agricultural Adjustment Act of 1938 to refer to both the price parity of the 1933 Act and the purchasing power, i.e., income, parity of the 1936 Act (Rasmussen and Baker, p. 10).

conclusion was not the quality of the income data, but rather he questioned the income concept as a measure of relative welfare because of the large net worth of farm persons relative to nonfarm persons, which was not considered in an income comparison.[15] The second historical series on the incomes of farm households begins with 1960. The approach of this series was to build on the widely used sector-level estimate of net farm income and the information on off-farm income available occasionally from the Census of Agriculture. Both of these historical series were constructed estimates, based on a variety of primary data sources and were later discontinued. The disposable personal income series was last published for the year 1983 (USDA, 1984) and the second series on total household income of farm operators was last published for the year 1985 (USDA, 1986).[16]

The historical series described above were discontinued because of their perceived inadequacies and the development of an improved alternative. The new alternative series was developed based solely on primary survey data from USDA's FCRS (now ARMS). An estimate was first made with 1984 data (Ahearn), but later refined with the 1988 data in a variety of ways, including recognizing that not all farms are family farms and that not all farm business income went to the farm operator

[15] ERS continues to emphasize the inadequacy of income as a welfare measure because of the significantly greater net worth of farm households compared to nonfarm households (El-Osta, Mishra, and Morehart). This is even truer for the approximately one-third of farm households that participate in commodity programs. See, for example, Jones, El-Osta, and Green (2006), who note that in 2003 only 5% of U.S. farm households had both income and wealth levels that were less than the U.S. median household income and wealth levels. They also note that farm households with low income and wealth levels were less likely to receive government payments.

[16] Beginning with the data year 1984, the series was reconstructed back to 1960 so that the income concept of this series more closely matched the income concept used in the government statistics for all U.S. households provided by the U.S. Bureau of the Census (Ahearn).

household (Ahearn, Perry, and El-Osta).[17] This series is the current statistical series on farm operator household income and is compared to the incomes of the average U.S. household and published annually in various research reports. In 1993, the Secretary of Agriculture required that the farm household income series be published as a regular statistical series of USDA and released along with sector-level farm income estimates (USDA, 1994).

The longest-running series that compares incomes of farm and nonfarm people, 1910-1983, shows that income of farm people lagged those of nonfarm people by a significant amount in the early years (figure 3a). Over time, this gap was narrowing. The current series described above shows that not only has the gap narrowed between the average incomes of farm and U.S. households, but that the income of the average farm household exceeds that of the average U.S. household (figure 3b). Gardner (1992) argues that agricultural economists have largely abandoned the traditional "farm-problem" model as a result of these and related statistical comparisons (e.g., poverty status, returns to investment). In spite of these statistics being widely accessible and an early goal of agricultural policies to have income parity between farm and nonfarm populations being achieved, significant subsidies continue to be transferred from nonfarm to farm people through agricultural programs. This suggests that other goals might now motivate policies.

3.2.3. Costs of Production

In the 1977 Food and Agricultural Act, target prices were adjusted by an index based on production costs for corn, wheat, cotton, and rice (McElroy). This was not the

[17] The improvement from 1984 to 1988 had a minor effect on the average income estimates for all U.S. farm households, but was more conceptually correct and had a larger statistical effect on income estimates for some farm household classes.

first time, however, that costs of production were considered as policy instruments. In the late 1920s, legislation based on cost of production statistics was rejected. Although the BAE had a program of developing cost of production statistics for major commodities, the Secretary of Agriculture argued against policies relying on cost of production estimates because he recognized the difficulty in computing cost of production estimates that would be representative of all areas of the country (Rasmussen and Baker, p. 2). In the 1985 Food Security Act, costs of production were also used to set support levels for peanuts and sugar.

3.2.4. Commodity Supply Information

During the period 1985 to 1995, USDA, in its administration of farm programs, and Congress, in its legislation, moved decisively away from the tools of supply management. These tools, principal policy management instruments used from 1933 through the early 1980s, consisted of production controls and government-controlled commodity storage. Both kinds of tools were intensively used for purposes of increasing and stabilizing the prices received by farmers for their products. In the mid-1980s almost 80 million acres (about 20 percent of all US cropland) was idled under government programs.

Yet by the mid-1990s, USDA had sold off almost all of its stocks of the main commodities and had stopped acquiring commodities to support prices even when market prices were low. Further, in the 1996 Farm Act Congress did not re-authorize the annual acreage idling programs, and mandated that the Secretary of Agriculture not use acreage restrictions as a policy tool. What caused this total turnaround? The key fact is that representatives of the farmer beneficiaries of the programs came to believe that supply

management was counterproductive (Gardner 2002). Government purchases of commodities when prices were low created surplus supplies that overhung the market for years afterwards and on net, the stabilization efforts did nothing for or perhaps even harmed farmers' interests, it came to be believed. In addition, idling acreage created opportunities for competing producers in foreign countries like Brazil to expand their output, and so had too little price-increasing effect to compensate for the income lost from idled acreage. (For further discussion of these changes of view, see Gardner, 2002, Ch. 7.)

It is apparent that the accumulation of information, as opposed to a shift in political power between parties or interest groups or a change in preferences or values of the groups, underlies the policy shift. The sources of the new information that made a difference are less clear. The main possible sources are: statistical data, analytical work with those data, or informal (anecdotal) information accumulated by the interested parties from their own experience. While the interest-group representatives who testified before Congress on supply management often spoke of government stocks overhanging the markets or loss of our production to foreign producers as matters they directly observed, this cannot be the full story. These phenomena cannot be directly observed. What the interested citizenry and policymakers saw were the data on public and private commodity stocks, crop acreages, USDA program parameters and enrollment. So, although the precise mechanism is not observable, it is hard to avoid concluding that this is a case where economic statistics played a major role in the direction of policy decisions.

3.3. Data Critical for Risk Management and Conservation Program Implementation

Many current farm programs have substantial demands for detailed data in order to implement the programs and carry out the intent of policymakers. In some cases, there is a need for farm-level data, often collected over several years, in order to effectively implement farm policy. In terms of current policies, this is especially true for crop insurance, disaster aid, and conservation programs. In each case, the programs have extensive data needs which may place significant demands on program administrators and may even shape the policies that are feasible to implement. For example, many crop insurance programs were designed in accordance with the data that happen to be available rather than what would seem more natural—the design of data collection efforts to support desired policies.

The importance of data for the implementation of policy is especially significant in the case of ad-hoc disaster relief and crop insurance. In both cases, policies are intended to provide immediate (or at least timely) assistance to agricultural producers who have suffered production shortfalls brought about by the randomness of agricultural production and markets. Disaster assistance and insurance programs come in many different forms and thus differ substantially in terms of their data needs. However, all such programs share a common need for timely information regarding the current state of a particular agricultural sector, crop, or economy, such that the extent of a disaster or production shortfall can be estimated and disaster assistance can be appropriately defined.

In the discussion that follows, we outline the disaster assistance process and the mechanisms used to convey such assistance to agricultural interests. We also discuss the data needs of policymakers and program administrators. As we emphasize, crop insurance and disaster assistance are, *by their very nature,* very dependent upon reliable

data about *individual* yields and prices. The structure and function of these programs is largely shaped by the data that are available to policymakers. For example, the construction of crop insurance programs, which currently cover almost $50 billion worth of U.S. agricultural crops in a typical year, is usually driven by the amount of data that is available to define contracts, assign rates, and determine indemnifiable events. Policymakers seek to define the terms of a particular insurance program in a way that offers meaningful coverage to producers while protecting the interests of taxpayers against overpayment, fraud, and abuse. To do so requires careful and comprehensive understanding of the risks associated with the events being insured against. This, in turn, usually requires historical data which can be used to measure risks.

Goodwin and Smith (1996) and Kramer (1983) provide detailed discussions describing the early histories of disaster relief and crop insurance programs. Early insurance programs were introduced by private firms and proved to be rather short-lived in that they suffered from significant losses. Congressional attention was drawn to crop losses as far back as 1922 when the USDA published extensive information about crop losses from drought, disease, pests, and frost. Congressional interest in a crop insurance program remained strong over the next several years, with individual congressmen and senators focusing on localized losses in their own districts. In 1936, a research project evaluating the viability of crop insurance was initiated at the USDA using data on wheat and cotton yields collected by the Agricultural Adjustment Administration. USDA analysts concluded that, on the basis of these data, crop yield data could provide the basis for actuarially fair crop insurance. With the strong endorsement of agricultural

commodity groups and farm organizations, the 1938 Agricultural Adjustment Act included specific provisions for individual yield, multiple peril crop insurance.

Data concerns were pertinent to the early history of the federal crop insurance program. In particular, the program was administered by local committees of the Agricultural Adjustment Administration (AAA). The hazards associated with such a design are obvious—neighbors were charged with setting rates and assessing losses. Rates were established using county-wide average yields—a practice that has persisted in many situations to this day.

Disaster relief policies are, by their very nature, more difficult to describe and define and thus vary in terms of their data requirements. These programs are typically of an ad-hoc nature—meaning that the design and mechanisms of the programs (and their data needs) may adjust from situation to situation. Congress established a formal disaster relief program in 1949 through the Farmers' Home Administration. Disaster payments were also introduced in legislation in the early 1970s. Disaster payments were typically paid on the basis of base acreage (i.e., acres eligible for program participation) and county-average yields.

3.3.1. The Agricultural Disaster Relief Process

Disaster assistance has been seen as a responsibility of the federal government over most of the history of the U.S. The Congressional Act of 1803, which addressed fire losses in Portsmouth, New Hampshire, was one of the first legislative moves to provide disaster assistance. There are currently four major types of agricultural disaster declarations. These include a Presidential major disaster declaration, a USDA Secretarial disaster designation, a physical loss notification by the Farm Service Agency (FSA)

Administrator and, the declaration of a plant or animal quarantine. The first three types of disaster declarations are authorized by 7-CFR-1945. The fourth type of disaster declaration, which pertains to the provision of assistance to producers affected by animal and plant quarantines, was established by Section 5201 of the Agricultural Assistance Act of 2003.[18]

A Presidential declaration of disaster must be initiated by a request from one or more governors of the affected states. Presidential declarations are typically reserved for major events involving widespread losses to the economic infrastructure, such as hurricanes, floods, and earthquakes. Disaster relief measures which are triggered by Presidential declarations are exercised through the Federal Emergency Management Agency (FEMA). FEMA activities pertaining to agriculture are typically exercised in coordination with the FSA or other agencies of the USDA.

Secretarial declarations are of greatest relevance to agricultural disasters. An FSA Administrator's physical loss notification applies only to physical losses and must be requested by a state FSA director. A quarantine disaster designation is also triggered by a request to the FSA Administrator by a state FSA director. In the case of Secretarial disaster declarations, specific guidelines for what qualifies as a disaster and the process for disaster relief are in place. Specifically, a disaster must involve at least a 30% drop in yields for at least one crop in a county and must be due to a natural event. The process is initiated by a request of a local county official to the governor's office. This request must be made within three months of the disaster. The county FSA offices are then charged with collecting the relevant data needed to document the extent of the disaster and to

[18] The agricultural disaster relief process is described in detail in a January 2004 FSA fact sheet entitled "Emergency Disaster Designations and Declaration Process." Much of our discussion of the disaster assistance process is derived from this fact sheet.

determine whether the disaster declaration requirements are fulfilled. This documentation of the disaster is presented in the form of a "Disaster Assessment Report." The need for timely, local data is obvious in the preparation of such a report. Upon review and approval by the state FSA office, this report is submitted to the FSA Administrator's office which then determines eligibility for disaster relief and formulates a disaster relief package, which is then advanced to the secretary for approval or disapproval. It should be noted that crop producers are not the only beneficiaries of ad-hoc disaster relief programs. Livestock producers may also receive payments when losses to feed crops occur.

The Disaster Assessment Report submitted to the Secretary must contain specific data regarding the disaster. These data must include: (1) the five-year average production history for the crops and farms described in the report, (2) the average farm price for the affected crops over the preceding three years, and (3) the dates and causes of crop or livestock losses. In addition, information documenting the process at local and state FSA levels must also be submitted. In the event that sufficient data are unavailable to document the disaster, the disaster declaration may be deferred to await future data.

Perhaps the most common event underlying Secretarial disaster declarations is drought. Drought and other production conditions are monitored on a weekly basis throughout the growing season through the "Crop Progress and Condition" reports. These reports are generated by a group of reporters consisting of extension agents and local FSA staff and are typically submitted through a website, making the data available in a timely manner.

Disaster relief measures are also supported by data collected through remote sensing methods, including through the use of NOAA satellites. One such measure is the "Normalized Difference Vegetation Index" or NDVI. These indexes are generated on a biweekly basis and are used to determine the progress of vegetative development through chlorophyll content.

Recent developments in the livestock and plant industries have given rise to new concerns regarding methods for tracking animal and plant health concerns. Recent concerns regarding bovine spongiform encephalopathy (BSE or "mad cow disease"), Asiatic citrus canker, soybean rust, and the avian influenza A (H5N1) virus are examples of the threats to animal and plant health that have raised concerns. Legislative actions to address these concerns have included quarantines, the closure of borders to imports of suspect products, and extensive inspection programs. For example, Florida has had an active grove inspections program to identify and quarantine areas infected with Asiatic citrus canker and to provide policymakers and regulators with data on the movement of the disease. Similar concerns have been used to argue in favor of an animal identification program that would allow improved traceability and monitoring of BSE threats.

It is clear that policymakers, ranging from local FSA officers to the Secretary of Agriculture's office have a real-time need for accurate data on crop yields and growing conditions. Advances in remote sensing and other technologies have shifted much of the focus in data collection activities away from surveys and other laborious techniques for collecting data. Legislation outlines specific procedures, including data demands, that must be followed in order for disasters to be declared and payments or emergency loans approved.

3.3.2. Crop Insurance Programs

The U.S. has also maintained an extensive crop insurance program since the 1930s. In recent years, legislative changes through the 1994 Federal Crop Insurance Reform Act and the 2000 Agricultural Risk Protection Act (ARPA) have expanded the depth, scope, and range of crop insurance programs. Premium subsidies have been used to encourage participation and by 2005, 245 million acres were insured with a total liability of over $44 billion (USDA-RMA, 2006). In addition, a number of new insurance products have been developed to provide price risk coverage to livestock producers.

The demands for data by RMA program administrators are extensive. Crop insurance programs, though marketed and serviced through private insurance providers, are reinsured and regulated by the federal government. Producers are charged premiums for coverage that, according to legislative mandates, must result in the program performing at actuarially-sound levels. These premiums are subsidized by taxpayers. However, the underlying premium rates are expected to be actuarially sound.

Crop insurance programs offer protection against yield shortfalls that result from nearly any cause (with exceptions being made for deliberate losses or losses resulting from a failure to follow proper production practices). Two key parameters of the insurance programs are dependent upon historical production data. The first is the premium rate, representing a measure of the risk associated with production. Current rating procedures involve using historical patterns of loss to assign a rate that, on average, should result in indemnities being equal to premiums. These data are collected at the county level and every producer in a county with the same average yield pays an identical

price for their insurance. Premium rates are adjusted inversely according to average yields at the individual farm unit level, such that farms with lower average yields pay higher premium rates. A second important parameter is the average yield itself, which in addition to being used to adjust premium rates is used to also establish a level of protection.

The need to measure risks, determine premium rates, and assign levels of protection *at the farm unit level* imposes significant data demands. Current procedures use a 4-10 year yield history at the individual farm level. Many issues underlie the use of individual yields, which are often absent for any individual producer. For example, producers unable to produce at least 4 verifiable years of yields are assigned a proportion of the county average yield.

The Risk Management Agency (RMA), USDA's very extensive data management system is known as the "Data Acceptance System" (Appendix III, M-13). Millions of policy records are collected at the sub-unit level and entered into the system each year by the insurance providers. This extensive data management system is also used to provide research to policymakers regarding operational issues and proposed changes to the program. For example, any changes in rating methods will always be evaluated using the M-13 data.

Changes brought about to crop insurance programs by the 2000 ARPA legislation raised additional data needs. The legislation provided significant incentives for the development of new insurance plans and products. Any proposal for new plans or changes to existing plans must undergo a structured review process and must obtain final approval by the Federal Crop Insurance Corporation (FCIC) Board of Directors in order

to be implemented. An important part of this approval process involves the use of data-driven methods to establish the actuarial validity of the proposal. Here again, data demands by the private developers and by those tasked with reviewing the insurance submission are substantial.

It is important to consider exactly how insurance programs depend upon data. In order to be actuarially sound, an insurance program must have an accurate measure of risk and an adequate means of measuring the value of the asset being insured. Actuarial practices typically depend upon *historical data* to derive such measures. Indeed, the types of programs that are offered are generally constrained by the data that are available to policymakers and to those tasked with constructing and rating the contracts. An example helps to illustrate this point. When a "whole-farm" insurance coverage program was proposed it was recognized that it would pose significant actuarial challenges. In the end, coverage levels and rates were based upon the Schedule F of farm income return records. An array of concerns, many pertaining to distinctions between economic and accounting data, have been raised about this program—known as Adjusted Gross Revenue coverage.

The loss adjustment process also places substantial data demands on the crop insurance program. Yields must be accurately measured at harvest to determine if an insurable loss has occurred and, if so, the extent of the loss. Loss-adjusters are employed by insurance providers to visit those farms reporting losses and to assess the degree of loss. Quality losses are also relevant since indemnities are often paid on the basis of quality shortcomings.

In short, the construction and evaluation of crop insurance programs is a data-driven process. Rate and levels of protection generally must be established using *individual* historical data. The data needs are extensive in light of the necessity of measuring yield characteristics at the individual farm unit level. Crop insurance programs are constantly developing and legislative regulations require that data-based evaluations be used to monitor and analyze any program changes.

3.3.3. Conservation Policies

Another important need for data by policymakers lies behind the wide range of conservation programs which have characterized U.S. farm programs in recent years. In particular, a wide variety of conservation measures exist in current U.S. farm policy and many of these measures have explicit eligibility criteria which, in turn, require detailed data regarding land quality and conservation practices. Surveys of the quality of soil and other natural resources have been conducted over the last century. In modern times, such surveys have played an important role in targeting conservation programs toward areas with the greatest need or most significant benefit from conservation.

The 2002 Farm Bill included a significant conservation title, with substantial resources being directed toward a number of conservation programs. This included the Conservation Security Program as well as extensions to a number of programs already in existence, including the Conservation Reserve Program (CRP), the Environmental Quality Incentives Program (EQIP), and a variety of wetlands and grasslands conservation measures. The CSP and EQIP programs are mainly directed toward encouraging the adoption of conservation measures on working crop and animal operations. These programs require adoption of various conservation measures which

must be certified through interviews. In addition, the degree of benefits available to producers under the CSP program depends on measures of soil condition.

Data requirements for implementation of the CRP program have been substantial, since eligibility is limited to those lands that are the most environmentally vulnerable, such as susceptible to erosion, and the most likely to demonstrate benefits from conservation measures. One factor that will qualify a given tract of land for CRP benefits involves its erodibility, which is measured using the "Erodibility Index" or EI. The EI is calculated on the basis of soil surveys, including the "National Resources Inventory" (discussed below) and is based on the "universal soil loss equation." This equation represents a mathematical relationship between several characteristics of soil—its inherent erodibility, its susceptibility to rain and water erosion, and characteristics of the tract's terrain, including its slope and steepness. A field's cropping history is also relevant to its eligibility for CRP enrollment since cropland must have been planted to an agricultural commodity in 2 of the previous 5 years. Land that meets certain other environmental requirements, such as being marginal pastureland, wetlands, subject to scour erosion, and land that is contained in CRP priority areas, may also be eligible for enrollment.

Finally, the likelihood that a given tract will be accepted into the CRP is determined by its "Environmental Benefits Index (EBI). The EBI is a measure of the perceived on-farm and off-farm benefits that would result from enrollment in the CRP. Land offered for enrollment into the CRP program is ranked according to its EBI. The EBI considers a range of factors including wildlife habitat benefits, water quality benefits, on-farm benefits from reduced erosion, long-term benefits accruing after the

CRP contract period, air quality benefits from reduced wind erosion, and cost efficiency issues (based on local data on the cash rental market) (U.S. Department of Agriculture, 2006b).

A major source of environmental quality and land use data is the National Resources Inventory (NRI). The NRI is a detailed survey that collects information about land use, land quality, and natural resources on non-Federal lands across the U.S. The NRI surveys were originally administered on a five-year basis, but are now conducted every year. The most recent five-year survey involved data collection from over 800,000 sampling points. The new annual surveys include about 200,000 points each year.

In summary, a wide range of environmental quality measures and soil characteristics are used as important inputs into existing conservation programs. Surveys of soil conditions, land use, and environmental quality indicators play an important role in determining eligibility for conservation program benefits, selecting among eligible applicants, and verifying adherence to the requirements of the programs.

4. Summary and Concluding Remarks

Statistical data, both as stand-alone description and as raw material for analysis of economic issues in U.S. agriculture, have played an important role in the political economy of the U.S. agriculture. Policy developments have generated increasing demands for economic statistics relating to farms, and in turn statistical data have influenced policy developments. As policies have become broader in scope, addressing not only farm commodity markets but also differences among farms and a widening set of activities on farms, policymakers have asked for more detailed information about the financial situation of individual farm businesses and households, sources of risk in farm

returns, and production practices followed that affect the environment. This paper addressed details of interactions between statistics and policy design in key areas: the level and distribution of payments to producers, the use of policy instruments in commodity programs, and the structure of non-commodity programs, i.e., risk management and conservation programs. In each of them it is difficult to imagine how the policies could be designed, implemented, or evaluated effectively in the absence of the relevant data base.

The interactions among statistics, policy design and program implementation has meant a steady increase in business for USDA's statistical agencies, and has resulted in new data series describing the agricultural sector and new detail in cross-sectional data for individual farms. It has also meant an increased research capacity to analyze the effectiveness of programs in achieving their stated goals, such as in the design of "decoupled" payments.[19] This capacity is very complementary with the government-wide effort to incorporate more accountability into the management of government programs. The American Agricultural Economics Association's (AAEA) Economic Statistics Committee has often participated in improving the economic statistics for agriculture by identifying current weaknesses and potential future strategies (Kraenzle). Often times these professional activities have been in cooperation with USDA's statistical agencies.

The data generated constitute an important public good for economists, providing necessary material for a wide range of investigations in agricultural economics, fueling Ph.D. dissertations, journal articles, and analytical monographs by agricultural economists in government, universities, and other institutions. Future data collection

[19] For example, see Goodwin and Mishra.

and analysis challenges in the U.S. will be influenced by the greater industrialization of agricultural production and the demands for greater product traceability and information on production practices. Government-wide, there is currently an interest in relying more on administrative records in order to reduce costs and respondent burden, but as of yet, that has not been a major focus in the development of new economic statistics for agriculture. Increasing globalization will continue to highlight the importance of greater harmonization in comparative international statistics. The IAAE and its members have an important contribution to make in achieving that goal.

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Appendix A

Farm Bill Requests for Special Studies or Reports

1933: Report on: the "processing tax" and the prices paid farmers and the relationship between prices paid to farmers and prices paid by consumers.

1938: Report on: the activities/expenditures of 4 newly established regional research labs focused on new uses and new markets, the "Federal Surplus Commodities Corporation" activities. Provide information on cotton, e.g., supply, plantings for corn, wheat, cotton, or rice.

1954: Report on: the amount of dairy products used at Veterans hospitals and the amount of dairy products used by the armed forces, the various methods of production control for dairy (milk and butterfat), including programs to be operated and financed by dairymen. Report on the various two-price systems of price support and marketing for rice.

1956: Report on: the scope of the Conservation Reserve Program, the finances of the Commodity Credit Corporation, the price trends for basic forest products such as sawlogs.

1965: Report on: the parity income of farmers, including the development of criteria for measuring parity income of commercial family farmers and the feasibility of adapting such criteria to major types of farms and to selected counties.

1970: Report on: the impacts of federal programs on rural areas.

1973: Report on: the Dairy Import Study to determine the effect upon domestic dairy producers, handlers, and processors and upon consumers of increases in the level of imports, and report recommendations regarding import quotas, the cost of production for major commodities (wheat, feed grains, cotton, and dairy), why so many livestock are injured each year during transport.

1977: Report on: the status of the family farm and State-by-State data on nonfamily farm operations, (the report should also contain information on how the existing programs strengthen the family farm system and an assessment of how laws may encourage the growth of nonfamily farms), the impact on participation in the wheat and other programs and the production of such commodities in carrying out a statutory provision prohibiting the making of payments to certain corporations and other entities under such programs, the impact of extending the prohibition against making commodity program payments to tenants on land owned by corporations and other entities, P.L. 480, how to specify the household resource requirements so that only households in need of food assistance are eligible for food stamps, evaluate the effectiveness of the program in achieving its stated objectives on nutrition and economic status of participating households and its effects on the economy, including farmers and ranchers, and evaluate tax data to make sure that ineligible households were not participating in the food stamp program, the effectiveness of rural development programs, the consequences of extension programs, the effects of changing climate and water shortages on agriculture, the value of collecting organic waste to improve soil quality, and the need of future research facilities.

1981: Established a board on cost of production estimates to report on the adequacy of the parity formulae. Report on a farm income protection insurance program as an acceptable alternative to the commodity price support, income maintenance, and disaster assistance programs. Include the acceptability of the program to farmers.

1985: Report on: whether casein imports tend to interfere with the milk price support program, the current Federal diary price support program and alternatives to the program and the effect of new technologies, the crop insurance program, the feasibility and cost of a program to reduce the risk of foreign exchange fluctuations under export credit promotion programs, the cost effectiveness of making loans and grants for the construction of water and waste disposal facilities in rural areas, the administrative appeals process used

in the farm loan program, a fund to insure institutions of the Farm Credit Administration against losses on loans, farm and home plan in connection with loans, whether funds of the Smith-Lever act are allocated effectively, the detection and management of pesticide resistance, the potential use of modern technology in agricultural programs at the secondary level, how existing agricultural and agriculture-related programs are being administered to enhance and strengthen the family farm system of agriculture in the US, an assessment of how tax, credit and other current Federal income, excise, estate, and other tax laws, and proposed changes in such laws, may affect the structure and organization of, returns to, and investment opportunities by family and nonfamily farm owners and operators, both foreign and domestic, and identification and analysis of new food and agricultural production and processing technological developments, especially in the area of biotechnology, and evaluation of the potential effect of such developments on the economic structure of family farm system, the achievement of Federal agricultural program objectives, the effect of Federal farm programs and policies on family farms and nonfamily farms that derive the majority of their income from nonfarm sources and also those that derive the majority from farm sources, human nutrition research, the importance of calcium and cholesterol on health and nutrition, how to increase agricultural productivity, new technologies should include production on small farms, evaluate the Food Stamp Act, the costs of the state automated data processing for food stamps, the quality control of the food stamp program and determine error-prone geographic areas, the volumes and types of commodities distributed under the Temporary Emergency Food Assistance Act, the effectiveness of the extension service's program of food and nutrition, the grain export quality standards, the product purity and inspection of imported foods, random inspections of potatoes entering northeast ports, the National Commission on Agricultural Policy shall study the structure, procedures, and methods of formulating the agricultural programs including the effectiveness in improving farm income, the manner in which the programs could be improved to retain a family-farm system, and conditions in rural areas, the extent to which aquaculture has access to Federal programs, competition, exotic species introduced as a result of aquaculture, the extent to which futures and options markets can be used by producers to bring price stability and income protection, the use of unleaded fuel in agricultural machinery, and the strategic ethanol reserve.

1990: Report on: the extent to which milk fat is being produced in the US in excess of commercial market needs as a result of any law, the financial impact of the support levels established, including a study of the effect of the support levels on the ability of producers to meet their financial obligations, the preference of producers to increase the efficiency of their farming operation or to assist in meeting conservation requirements for the farm, including the producers preferences for redistributing their crop acreage bases, the fruit and vegetable industry to determine the availability of labor, crop insurance, and technological advances, the ineligibility determinations of the highly erodible land conservation program, the degree of participation in the program established to reduce contamination of surface or ground water, the pesticide registrations and tolerances, the cumulative amount of export assistance provided, the North American Free Trade Agreement, the impact of consignment sales of foreign roses and flowers on domestic sales, the commodity transportation and technology, especially focusing on rail transportation, the impact of animal damage in the aquaculture industry, rural credit cost and availability, the success of programs for socially disadvantaged farmers and ranchers and businesses contracting the return on assets for upland cotton, rice, wheat, corn, oats, barley, sorghum, soybeans, peanuts, sugar from beets, and sugar from cane, the farm value of agricultural products.

1996: Report on: the potential impact of Uruguay Round on prices, income and government purchases, cheese varieties to determine the potential impact on milk prices, dairy producer income, and dairy program costs, of the allocation of additional cheese granted access to the United States as a result of the obligations of the United States as a member of the World Trade Organization, nursery crops in crop insurance, water rights across Federal lands to determine whether Federal water rights should be acquired for environmental protection on National Forest land, the demand for and availability of credit in rural areas for agriculture, housing, and rural development.

2002: Report on: national dairy policy, a comprehensive economic evaluation of the potential direct and indirect effects of the various elements of the national dairy policy, the effects of terminating all Federal programs relating to price support and supply management for milk, the potential impacts of further payment limitations on the receipt of direct payments, counter-cyclical payments, and marketing loan gains

and loan deficiency payments, the economic and social effects on rural communities resulting from the conservation reserve program, the feasibility of instituting a program under which the Secretary would charge and retain a fee to cover the costs incurred in providing persons with commercial services provided outside the United States, the direct and guaranteed loan programs of the Consolidated Farm and Rural Development Act, evaluate nutrient banking for the purpose of enhancing the health and viability of watersheds in areas with large concentrations of animal producing, the feasibility of expanding eligibility for crop insurance, determine how producer income would be affected by updating yield bases, the effects that payments are likely to have, on the economic viability of producers and the farming infrastructure, including a case study for rice producers in Texas, and the feasibility of providing adequate upstream and downstream passage for fish at the Chiloquin Dam on the Sprague River, Oregon.

Figure 1. Total U.S. Direct Government Payments (real 2005 dollars per acre total, 1990-2005)

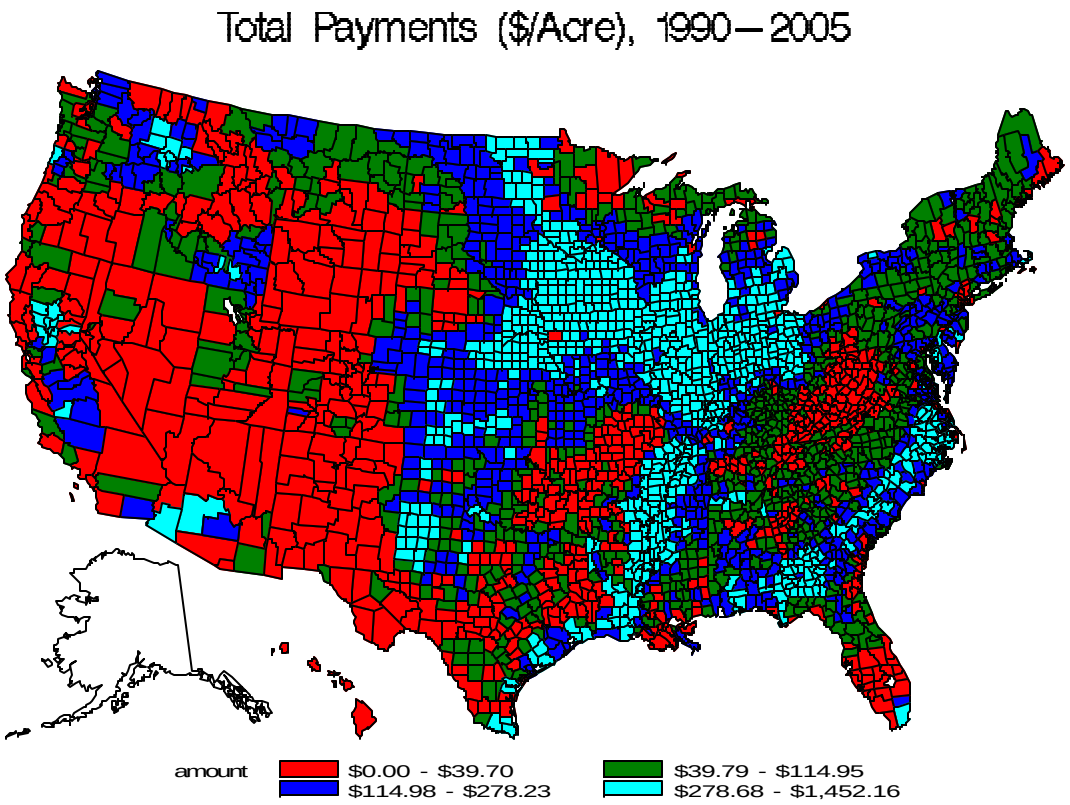
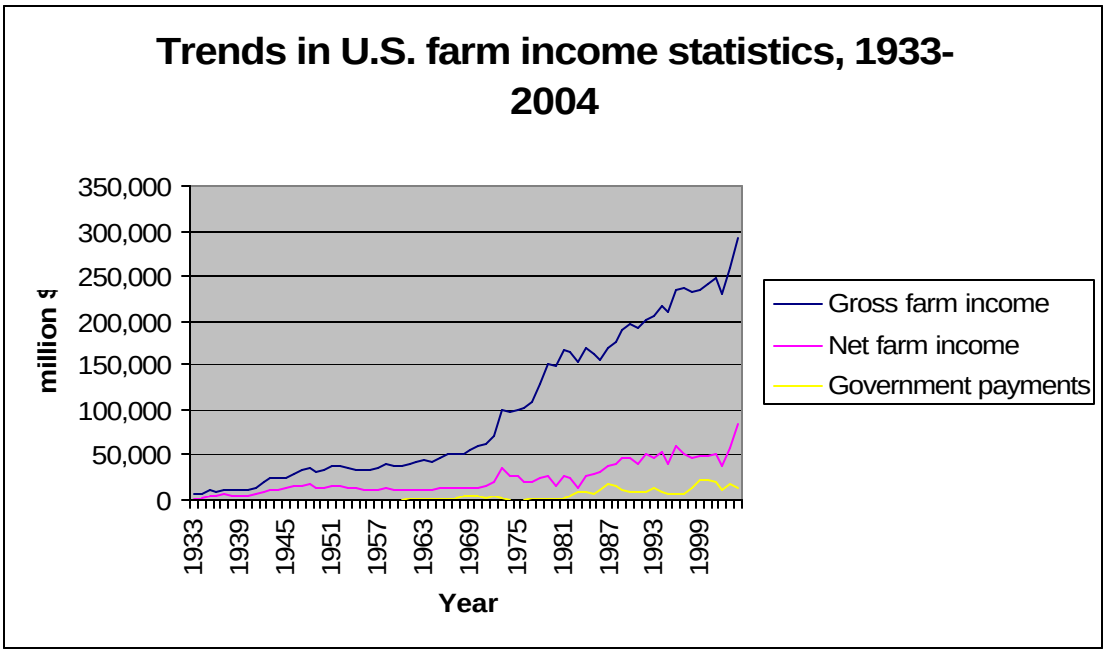


Figure 2.



Source: USDA, 2006c.

Table 1. Government payments by State

State	USDA government payments 2002	Reported Payments Census 2002	Census as % of USDA reported payments
Alabama	263,866	77,930	30%
Arizona	70,211	31,760	45%
Arkansas	453,565	238,577	53%
California	461,539	168,698	37%
Colorado	210,967	125,774	60%
Connecticut	4,885	3,681	75%
Delaware	11,966	8,643	72%
Florida	83,377	21,818	26%
Georgia	658,101	118,535	18%
Idaho	165,334	93,934	57%
Illinois	614,752	412,636	67%
Indiana	334,179	224,701	67%
Iowa	739,521	538,896	73%
Kansas	456,605	328,244	72%
Kentucky	138,218	94,053	68%
Louisiana	254,355	123,599	49%
Maine	13,709	8,664	63%
Maryland	48,676	33,131	68%
Massachusetts	6,040	4,268	71%
Michigan	190,481	144,771	76%
Minnesota	476,745	350,709	74%
Mississippi	251,908	145,508	58%
Missouri	398,354	264,475	66%
Montana	261,975	210,749	80%
Nebraska	539,264	347,517	64%
Nevada	11,287	4,322	38%
New Hampshire	3,854	3,823	99%
New Jersey	6,428	4,441	69%
New Mexico	73,231	50,201	69%
New York	159,238	110,234	69%
North Carolina	278,454	97,696	35%
North Dakota	383,499	293,067	76%
Ohio	280,827	197,425	70%
Oklahoma	317,217	149,942	47%
Oregon	80,489	52,085	65%
Pennsylvania	129,405	85,794	66%
Rhode Island	652	528	81%
South Carolina	65,884	38,384	58%
South Dakota	334,750	215,084	64%
Tennessee	107,772	59,231	55%
Texas	998,543	528,979	53%
Utah	54,141	26,669	49%

Vermont	36,298	24,377	67%
Virginia	181,780	54,677	30%
Washington	215,911	133,763	62%
West Virginia	5,655	5,180	92%
Wisconsin	332,380	247,942	75%
Wyoming	66,262	37,913	57%
United States	11,236,299	6,545,678	58%

Sources: USDA, 2004 and 2006c.

Table 2.—Finances and characteristics of farm operator households by whether or not they participated in government commodity or conservation programs, 2004

Item	Participation status		All
	Not participating	Participating	
Number of farms	1,264,807	796,015	2,060,822
Percent of farms	61.4	38.6	100.0
Total cash farm business income	38,151	163,427	86,540
Livestock income	14,667	59,752	32,081
Crop income	16,282	66,939	35,849
Government payments	0	12,435	4,803
Other farm related income	7,203	24,300	13,807
Total cash expenses	33,609	117,212	65,902
Net cash farm income of business[1/]	4,542	46,214	20,638
Earnings of the household from farming[1/]	3,599	31,046	14,201
Off-farm income, all household members	73,655	57,148	67,279
Average farm operator household income	77,254	88,194	81,480
Share with non-farm earnings			
No non-farm work	26	31	28
Non-farm work	74	69	72
Share with farm loss/profit			
Farm loss	60	28	48
Farm profit	40	72	52
Average farm net worth	451,669	698,005	546,819
Average nonfarm net worth	210,922	184,181	200,593
Average household net worth	662,592	882,186	747,413
Farm business debt-asset ratio			
<0.10	82	65	75
>=0.10	18	35	25
Educational attainment of operator			
High school or less	54	51	53
Some college or more	46	49	47
Age of operator			
less than 55	44	43	44
55 or older	56	57	56
Race of operator			
Nonwhite	9	6	8
White	91	94	92

Source: 2004 USDA Agricultural Resource Management Survey. 1/ Differences between these two estimates results largely from the senior farm operator household not receiving all of the net income of the farm business.

Based on 19,468 observations.

Figure 3a.

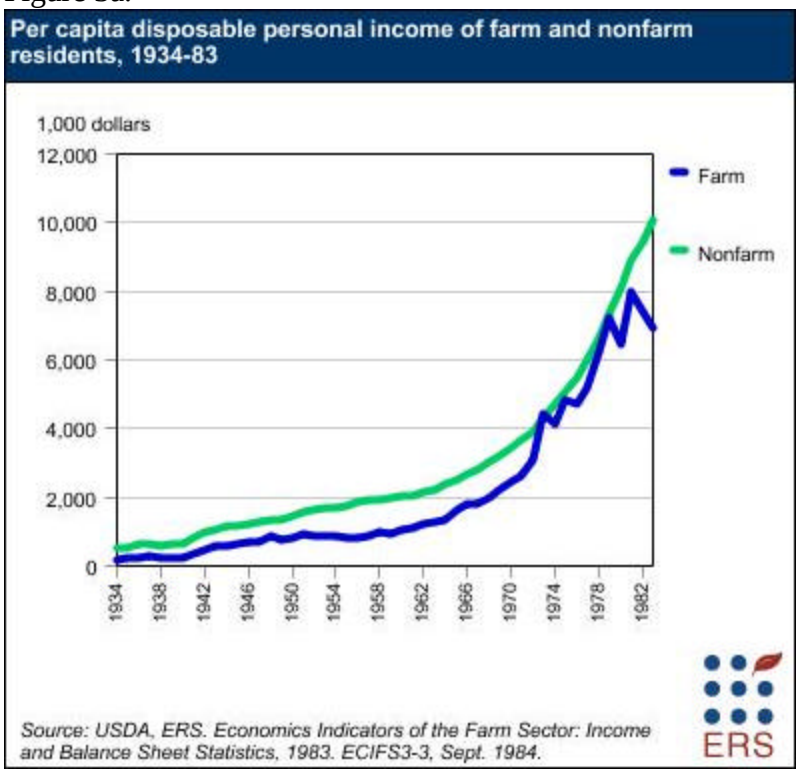


Figure 3b.