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Instability and Risk in U.S. Agriculture

Barry K. Goodwin

The U.S. government has been extensively involved in providing income support and risk management policies for U.S. farmers over the last 65 years. Risk management policies have included crop insurance, disaster relief, and in recent years, revenue insurance. Recent policy changes signaled an intention on the part of policy makers, at least in principle, to move U.S. agriculture toward the free market. Low commodity prices and localized droughts, however, have brought about renewed calls for direct income assistance. In this paper, we discuss the role of the government in providing policies to address income shortfalls and risk in agriculture. Problems and inconsistencies with policies are identified and discussed. Implications for international markets are also highlighted.

Key Words: agriculture, crop insurance, government policy, risk management

Cultivators of the earth are the most valuable citizens. . . . Agriculture is our wisest pursuit because it will in the end contribute most to real wealth, good morals, and happiness.

— Thomas Jefferson, 1785 and 1787

Adapt or die, resist and perish, . . . agriculture is now a big business. Too many people are trying to stay in agriculture that would do better some place else.

— Future Secretary of Agriculture Earl Butz, 1954

Agriculture holds a special place in the hearts and minds of most U.S. citizens. The plight of the U.S. farmer in times of drought and low farm prices evokes sympathy as well as strong calls for action. The desire to “help” the family farmer is pervasive throughout our society—from “Farm Aid” type events, to *New York Times* page editorials, to Congressional rhetoric. Events such as those realized over the preceding crop year (localized droughts and low price conditions) especially heighten calls for action. Whether such feelings are derived from an intangible Jeffersonian ideal of the nobility of small farmers or rather reflect the political realities associated with a close political balance in Congress and impending election year politics is

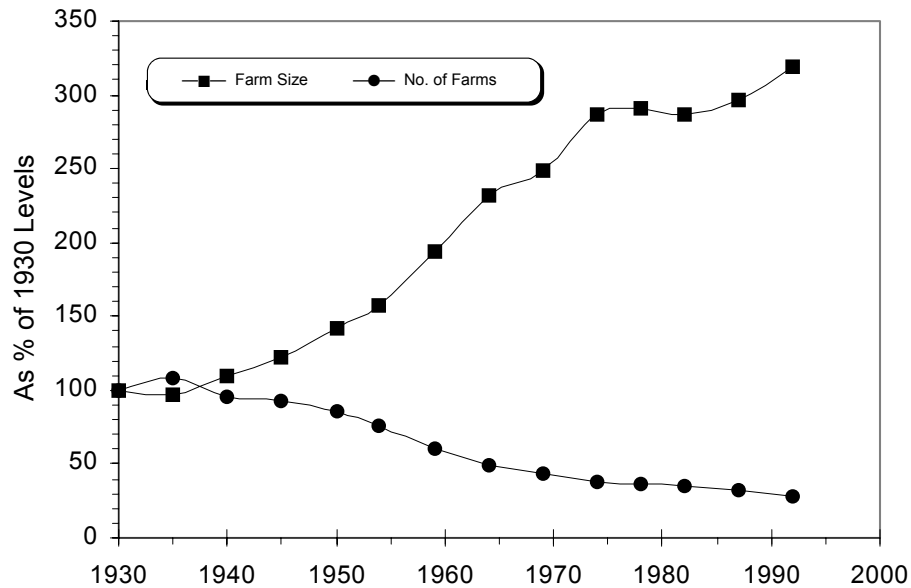
Barry K. Goodwin is a professor in the Department of Agricultural and Resource Economics, North Carolina State University. This paper was presented at the National Symposium on the Future of American Agriculture, August 25–27, 1999, Athens, Georgia. The helpful comments of an anonymous reviewer are gratefully acknowledged.

unclear. However, several important points relevant to the future of U.S. agriculture as well as a number of inconsistencies associated with the rhetoric and actions on the policy front emerge from a consideration of historical farm legislation and recent events in U.S. agriculture.

Conventional wisdom maintains that agriculture, as a rule, is subject to greater risk and uncertainty than other sectors of the economy. Therefore, proponents argue, agriculture is more in need (i.e., more *deserving*) of government support than other sectors of the economy. This presumption reflects the fact that agriculture is subject to unpredictable, random shocks caused by weather events, pest damages, and other natural disasters such as fire. The relative frequency of such events as widespread droughts and flooding is believed to generate significant yield instability. In addition, generally inelastic demand conditions for agricultural products, when combined with randomly fluctuating supply conditions, lead to price movements that are perceived to be more volatile for farm products than those commonly experienced in other sectors of the economy.

Most farms are usually considered to be small business enterprises with small asset bases. This belief persists despite a general trend toward larger farms over the last 50 years. Large fixed costs are associated with agriculture in developed economies because of the capital-intensive and land-intensive nature of agricultural production. As a result, agricultural producers are also often believed to be more highly leveraged against their relatively small asset bases than is the case for small nonagricultural businesses. In fact, the average debt-to-asset ratio in the U.S. agricultural sector is less than 0.2, which is very low relative to what is realized by many nonagricultural businesses (Goodwin and Smith, 1995). A combination of small asset bases, high leverage ratios, and highly variable prices and production could certainly create financial problems for farms. It is important to also note, however, that many businesses in other sectors of the economy operate under these same adverse conditions. Further, other nonagricultural businesses may face potentially ruinous shifts in prices, often as a result of intense competition and volatile demand conditions.

Observers often lament the fact that the number of farms has declined substantially over the last 50 years. Indeed, the number of U.S. farms has decreased from approximately 6.5 million in 1935 to about 2 million today [U.S. Department of Agriculture/Economic Research Service (USDA/ERS), 1997]. Over this same period, the amount of land in cultivation has remained fairly constant at about 1 billion acres. The implication is that farms have become increasingly larger. Figure 1 illustrates this tendency. The average size of U.S. farms has increased from about 150 acres to nearly 500 acres. The largest share of U.S. agricultural production comes from large farms. In 1940, 11.6% of U.S. farms accounted for 50% of food and fiber production. By 1992, this proportion had dropped such that only 3.2% of farms accounted for 50% of production (USDA/ERS, 1997). A number of observers have noted these changes with some degree of alarm. Berry, in a July 1999 *New York Times* editorial, wrote:



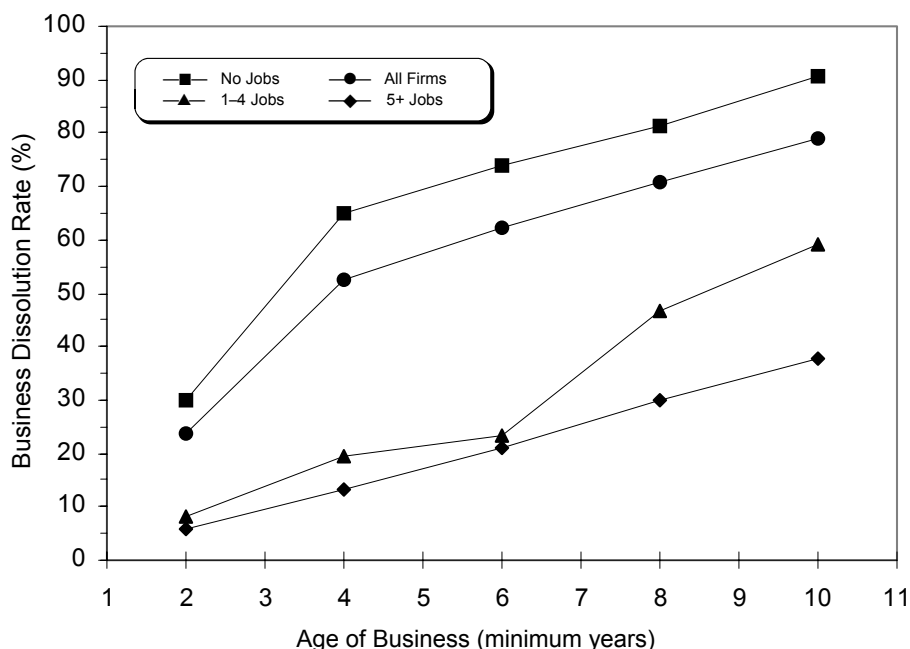
Source: USDA/Economic Research Service (1999).

Figure 1. Average farm size and numbers, 1930–92

We have lost farmers in staggering numbers, mainly because of economic adversity. For generations we have given nothing to farm-raised children but reasons to leave home. Our farm communities have disintegrated everywhere ... our failed small farms have been replaced by chemical-dependent monocultures and animal factories, which have become major sources of pollution. Our dependence on immigrant labor and imported foods is increasing. Our farm policy, like our energy policy, is simply to use up all we have.

There may be some merit in such romantic notions of agriculture. One must also recognize, however, that the enormous productivity gains associated with agriculture over the last 100 years have come about in part through economies of scale and the adoption of new techniques of production. As economics professors often remind their students, the advent of tractors and mechanized techniques of production, while benefiting society enormously, most certainly had negative economic consequences for muleskinners and plow drivers. The important issue underlying much of agricultural policy involves the extent to which economically advantageous structural changes in agriculture may actually be damaging to the interests and welfare of society as a whole, or to specific sectors of society (i.e., interest groups).

While it is true that the number of U.S. farms has steadily declined over the last several years, the common perception that the financial risk borne by agricultural producers is higher than that realized by nonagricultural business may not be fully supported by empirical fact (Pasour, 1990). Figure 2 illustrates business dissolution



Source: U.S. Small Business Administration (1996).

Figure 2. Business dissolution rates

rates, collected from the U.S. Small Business Administration (US-SBA, 1996). For all U.S. firms, the 10-year business dissolution rate is 79%, a figure that likely exceeds the farm dissolution rate. For small firms that create no new jobs, the 10-year dissolution rate exceeds 90%.

The extent to which business dissolution corresponds to financial failure is unclear since dissolution includes all businesses that disappear for any reason—including failure, owner retirement, owner health, or the desire to enter a more profitable endeavor. The US-SBA estimates that 15% of business dissolutions represent actual financial failures, which implies a significant failure rate for U.S. businesses. In 1995, the US-SBA estimated that 71,194 U.S. businesses failed. Failure of small businesses is a simple fact of modern market economies. We should note, however, that government actions which are intended to support producer incomes and prices are simply not as common in the business community at large as they are in the case of agriculture.¹

¹ This is not to imply that agriculture is the only sector of the economy that is successful in securing government support. Many industries have had similar success. Most will remember the U.S. government bailout of Chrysler and the recent U.S. Treasury-engineered Long-Term Capital Management hedge fund rescue. Other sectors have also been successful in obtaining support. For example, in the first week of August 1999, the U.S. House of Representatives gave final congressional approval to federal guarantees of \$1.5 billion in loans for steel, oil, and natural gas companies, aiming to help industries that were suffering because of low prices.

Popular wisdom also maintains that farm households tend to have smaller incomes and net asset holdings than nonfarm households. This perception is also open to question. According to the 1994 USDA Farm Cost and Returns Survey, the average income of U.S. farm households was approximately equal to the average U.S. household income (at about \$43,000 per year) (USDA/ERS, 1997). In addition, the net worth of farm households significantly exceeds that of nonfarm households. In 1993, the typical U.S. farm had \$334,900 in net assets, as compared to \$99,800 for the average U.S. household. While noting this advantage, we should also point out that this is not surprising in that farming is a highly capital-intensive enterprise which requires substantial farm assets in order to generate income equivalent to nonfarm households.

The current policy environment has been strongly influenced by important changes in farm policy over the last few years. The 1996 Federal Agriculture Improvement and Reform (FAIR) Act included significant changes to U.S. agricultural policy. Prior to this Act, a range of deficiency payment and price support programs protected farmers from price and income shortfalls. The Act, at least in principle, signaled the creation of a new policy environment under which farmers would be subject to the forces of the free market.

Specifically, the FAIR Act stipulated the removal of deficiency payments. Over a seven-year transition period, farmers were to receive annual income support payments (known as production flexibility contract payments) that were not to be tied to crops or production levels. Eligibility for the payments is based upon participation in government farm programs over the preceding five-year period. In that policy benefits were no longer tied to production of specific crops, producers were allowed complete flexibility in choosing which crops to grow and how much to produce. This increased planting flexibility resulted in substantial shifts in production patterns. For example, between 1995/96 and 1998/99, cotton acreage fell 27% while corn and soybean acreage grew 27% and 15%, respectively. A key implication of the 1996 FAIR Act was that farmers were to be exposed, at least to a much greater degree, to market forces.

The 1998–99 experience has brought agricultural instability and risk to center stage (once again). The current situation has been called a “Paradox of Plenty” (Simon, 1999). In spite of localized areas of severe drought, particularly along the Atlantic coast, crop conditions were favorable in many areas and the forecasts call for large crops and above-average yields in major growing areas. Growing conditions were quite strong in the major midwestern growing regions, though the effects of significant drought conditions along the Atlantic coast states did occur. Grain and oilseed stocks are also quite high, owing to stagnant demand conditions in international markets over the last three years. Large stocks, combined with strong production forecasts, have led to very low prices. Corn prices recently reached their lowest point since 1986. Likewise, soybean prices reached their lowest point since 1972, and cotton prices recently hit a 25-year low. Hog prices reached record lows last December. Much of the current year’s problems are related to weakened

international demands for U.S. farm products, largely in Asia, where demand was stifled by the financial crisis.

As we will discuss in detail below, the U.S. is supposedly in a move toward the free market with diminished government support. Despite this claim, it is estimated that U.S. taxpayers will pay a record \$14.4 billion in direct aid to growers this year (Simon, 1999). As Neil Harl, a noted economist, has stated, "... that's a lot of money for a sector that is supposed to be deregulated" (quoted in Simon, 1999).²

In short, although prices are currently very low, popular conceptions about the economic disadvantages faced by agriculture may not be fully supported by a cursory examination of the data. Risk and instability due to the random nature of production in agriculture is certainly a fact that cannot be debated. The extent to which this instability places farming at a severe economic disadvantage is an important question which merits consideration. One must also ask why agriculture is afforded such extensive protection. We will consider such questions in the discussions which follow.

The next section briefly reviews the specific policy actions undertaken by the government in recent years to support agriculture. As we note, the actions are often contradictory and sometimes have offsetting effects. We then briefly discuss the post-FAIR Act policy events that have shaped the current agricultural policy environment, followed by a section addressing the fundamental reasons for government intervention in agriculture. We then provide a brief review of issues related to the measurement of risk and actuarial problems faced by risk management programs. Sections focusing on environmental concerns and international market issues, respectively, are then presented. In the final section, we consider the future of agricultural policies in the U.S. and offer some concluding remarks.

Risk Management Policies

Historically, policy makers have justified a wide range of government programs providing farmers with income transfers, stable prices, and stable incomes on the basis of the instability of agricultural incomes and prices. Most programs have been directed at supporting producers' incomes and prices. Two specific types of programs—crop and revenue insurance and disaster relief—have been targeted toward protecting producers against the risk of reduced yields and/or incomes. These programs have played an increasingly important role in U.S. domestic agricultural policy. Although current policy discussions and rhetoric leave the future role of the government in agriculture somewhat unclear, it is obvious that insurance and disaster relief programs have taken on a more prominent role following the 1996 FAIR Act, which in theory was supposed to initiate a transition to the free market with little or no government intervention in agriculture.

² Harl also noted that "... the only thing worse for a farmer than bad weather is good weather."

In 1938, legislative efforts to protect producers against yield risks resulted in the Crop Insurance Act. The 1938 Act protected producers against yield losses from any (multiple) risk. The program was briefly discontinued between 1943 and 1945, but has generally maintained many of its original features over the last 60 years. Under the program, producers are able to insure a proportion (currently between 50–80%) of their expected yield at a predetermined price. The insurance is purchased through private companies, although the insurance is reinsured through the federal government under terms which limit the exposure to risk for individual companies. The program also reimburses individual companies for their administrative operating costs. Premiums for individual farmers are heavily subsidized. These subsidies were generally around 25% of the total premium for coverage above the catastrophic level, though recent legislative changes raised the premium subsidy levels by an additional 25%.³

In addition to this standard multiple peril crop insurance (MPCI), a number of new crop insurance and revenue insurance plans have recently been introduced. The Group Risk Plan (GRP) provides insurance based on the experience of a large area (a county) rather than on an individual producer's yields. Such an approach has advantages in alleviating the problems associated with moral hazard. Moral hazard occurs if a farmer alters his/her production practices after buying insurance in order to influence the likelihood of collecting indemnities. Because GRP insurance is based upon a large area's experience, any individual producer is likely to be too small to affect the overall area yield.

There are five revenue insurance products currently available, though several others are under development. The most prominent revenue insurance plan is the Crop Revenue Coverage (CRC) plan. CRC pays farmers indemnities on yield shortfalls at the harvest-time price.⁴ CRC will also pay indemnities if prices fall such that revenues are beneath a level guaranteed by the plan. Thus, indemnities may be triggered by any combination of low prices and/or low yields.

An alternative revenue insurance plan is called Revenue Assurance (RA). RA was initially introduced for Iowa corn and soybeans, though it has been expanded in recent years. RA insures a proportion of expected revenue, such that indemnities can be triggered by any yield or price shortfall that results in revenues below the guaranteed level. RA offers premium discounts if multiple crops are insured and if multiple farm units are insured.

A third form of insurance is known as Income Protection (IP). IP had its beginnings in a provision of the 1994 Crop Insurance Reform Act that mandated development of a cost-of-production form of insurance. As is true of RA, IP insures

³ In 1998, subsidies were nearly \$945 million, and accounted for over 50% of total crop insurance premiums (USDA/Risk Management Agency, 1999). Indemnities were nearly \$1.9 billion in 1998.

⁴ A limitation of standard MPCI coverage is that indemnities are paid according to some planting-time expected price. In the event of widespread yield losses, harvest prices are likely to be greater (due to negative yield/price correlation). This implies that indemnity payments were not sufficient to replace the insured bushels. CRC had its beginnings in an optional rider that paid indemnities at harvest-time prices.

a proportion of expected revenue, and indemnities can be triggered by any yield or price shortfall that results in revenues below the guaranteed level.

A revenue version of the GRP program has also been recently introduced. This program guarantees revenues on the basis of a county's yield performance. Finally, a new form of revenue insurance that uses Schedule F tax return information as a basis for determining a revenue guarantee has recently been introduced. Participation in the new revenue insurance plans has been quite strong, especially in the case of CRC. For example, revenue insurance accounted for 38% of all Iowa crop insurance contracts sold in 1997.

In addition to multiple peril crop and revenue insurance, legislative efforts to protect producers against financial losses due to crop and price shortfalls have included ad hoc disaster payments. Government provisions for disaster relief have been in existence since the 19th century, with most disaster payments being provided for the reconstruction of public facilities following natural disasters. In 1949, Congress established the Farmers' Home Administration emergency disaster loan program. The program offered low-interest loans to producers who suffered significant yield losses. Agricultural disaster payments were initially established in the 1970s. Producers who suffered catastrophic losses (typically yields below 50–60% of normal) were reimbursed for a portion of their losses through disaster payments by the government.

As a general rule, crop insurance programs have been characterized by low participation rates and high actuarial losses. When premium subsidies are included, the typical farmer received \$2.04 for each dollar paid into the program between 1985 and 1993. Over this period, nearly \$9 billion was distributed in the form of ad hoc disaster relief payments and an additional \$11 billion was delivered to producers through defaults on Farmers' Home Administration emergency loans. For all three programs, the sum of taxpayer outlays over this period exceeded \$25 billion (Goodwin and Smith, 1995).

A paradox is inherent in these programs. Legislators complained about low participation rates in the insurance program and the concomitant high losses resulting from the program's poor actuarial performance. At the same time, incentives to participate in the insurance program, especially by *low-risk producers*, were significantly diminished by continual disaster relief. Disaster relief became so frequent through the 70s, 80s, and 90s that producers (justifiably) came to count on it. This is especially true of low-risk producers, who typically would realize that if they suffered yield losses, losses were likely to be widespread and thus disaster payments would most certainly be distributed. The virtually certain disaster relief payments became a form of free insurance, and thus incentives for lower-risk producers to pay even the subsidized insurance premiums for multiple peril insurance were greatly diminished.

The poor performance of the insurance program led many critics (for example, the U.S. General Accounting Office, 1992) to suggest that insurance rates should be increased. Such a policy change may, in fact, have the potential for actually worsening the performance of the program. As we discuss below, the presence of adverse

selection in the insurance pool may result in rate increases driving out lower-risk individuals, leaving a smaller and riskier insurance pool.

Policy makers recognized the paradox implicit in ad hoc disaster relief and, on October 3, 1994, passed the Crop Insurance Reform Act. The intent of the Act was to reduce taxpayer outlays on agricultural disaster assistance programs while guaranteeing farmers consistent and reliable access to government support when they experienced poor crops. The Act introduced a new form of catastrophic coverage that was made mandatory for participation in any other farm programs.⁵ The catastrophic insurance contract provided 50% yield coverage at 55% of the forecasted price. The insurance is provided at a very nominal cost (\$60 per contract in most cases).

Perhaps of greater importance were changes regarding the provision of ad hoc disaster relief mandated under the Crop Insurance Reform Act. Prior to the Act, expenditures on ad hoc disaster relief were not counted as a part of the budget approved by Congress, and thus were not subject to the same fiscal disciplines as on-budget items. Under the Reform Act, expenditures on disaster relief would be placed on budget unless majorities above 60% prevailed in both houses of Congress. The clear intent of the bill, at least to this observer, was to replace the ad hoc and highly politicized disaster relief measures with yield risk protection provided through catastrophic insurance. The Act was intended to provide some fiscal discipline that would restrict Congress from providing ad hoc disaster payments without making budget cuts in other areas. The Act has certainly proven to be effective—at least during years of plentiful crop yields. The real issue, however, is the extent to which this fiscal discipline would remain in place when, as is inevitable in agriculture, farm incomes realized pressures due to low prices or yields. Policy events in 1998 and 1999 demonstrated the limited extent to which policy makers were committed to reform of ad hoc disaster assistance and farm transfer payments.

The Post-FAIR Act Policy Environment

In the fall of 1998, low prices and yield shortfalls led Congress to pass a \$6 billion “rescue” package. This measure was, at the time, touted as an extraordinary “one-time” fix for producers. A realistic (and perhaps cynical) observer might draw some correlation between election year politics and the rescue package. In any case, the payouts were large, and again led many policy observers to question the effectiveness of insurance and the fortitude of Congress to depend upon voluntary insurance programs as a vehicle for risk management rather than ad hoc payouts whenever economic conditions are poor. Political discussions frequently reflected the plight of the U.S. farmer. Consider, for example, President Clinton’s 1999 State of the Union Address, in which he stated:

⁵The law has been revised to relax the mandatory nature of catastrophic insurance, though producers have typically been required to waive access to disaster relief if they decline coverage.

As this Congress knows very well, dropping prices and the loss of foreign markets have devastated too many family farmers. Last year, Congress provided substantial assistance to help stave off a disaster in American agriculture, and I am ready to work with lawmakers of both parties to create a farm safety net that will include crop insurance reform and farm income assistance.

As we mentioned above, the pressures of low prices and localized yield shortfalls were again realized in 1999. Impassioned speeches describing the desperate plight of U.S. farmers characterized very recent debates over the need for another rescue package. In the end, a record high of \$22.5 billion dollars in direct farm payments has been forecast for 1999. Government payments in 1999 will account for 12% of cash receipts and 39% of net cash income to farms. Direct government payments for major field crops in 1999 included increased payments under the production flexibility contracts (\$5.1 billion), emergency assistance under separate legislative packages signed by President Clinton in October 1998 (\$2.8 billion of an overall \$6 billion package) and October 1999 (\$5.9 billion of an overall \$8.4 billion package), and \$6.6 billion in payments under the loan deficiency payment (LDP) program. As a result of these large transfers, 1999 farm income will be at the near record level of \$192 billion (USDA/ERS, 1999).

The political debate over farm program payments and relief measures took on characteristics of a bidding war between the two political parties, with each party attempting to garner political support from farm interest groups. A lack of leadership in supporting the policy reforms initiated by the 1996 FAIR Act, and an obvious unwillingness to oppose farm transfer payments, was central to these policy events. Likewise, a close political balance in Congress contributed to these policy actions.

An important factor included in the 1996 FAIR Act has had a significant influence on policy events over the preceding two years—the provision of loan deficiency payments (LDPs). This policy instrument was intended to provide producers with a mechanism to allow them to market their crop throughout the crop year. The 1996 FAIR Act included nonrecourse loans giving farmers the option of taking loans and then repaying through delivery of the crop at the loan rate. In some cases, farmers only need to repay as much as they can sell their crop for on the market, and thus are able to keep any excess from what they borrowed.

The LDP program provides a direct price support mechanism that pays producers the difference between posted county prices and the county's loan rate on a date chosen by the producer (so long as the producer retains ownership of the commodity). Prior to the past two years, market prices were above loan rates, and thus the programs did not have major influences. Prices for many commodities, corn and soybeans in particular, have recently fallen to levels considerably beneath the loan rate, triggering significant LDP payments. As noted above, the LDP program has triggered large payments to producers because of very low prices.

In general, Congress has mandated a wide range of policies intended to protect domestic agricultural producers from yield and price risks. Much of the risk protection afforded to producers has taken the form of crop insurance and disaster

relief payments. Despite recent policies that were intended to bring ad hoc disaster payments under fiscal discipline, recent events have resulted in record disaster relief payouts. These “one-time” fixes appear to be subject to recur, at least as long as prices are depressed. A strong farm lobby and a close balance between parties in both sides of the Congress would seem to play an important role in these events. Both parties have a strong desire to secure leadership roles, and thus are particularly sensitive to the plight of the politically powerful farm lobby.

Why Is the Government Involved in Agriculture?

As we have noted above, despite popular wisdom to the contrary, it is not necessarily clear that the risks inherent in agriculture exceed what is commonly realized elsewhere in the economy. At least on the surface, farms do not appear to suffer failure rates that significantly exceed those realized in the nonagricultural economy—and yet, recognition of the plight of farmers and the “need” to do something about it runs deep in our society. In light of this fact, one must ask what is special about agriculture that evokes such strong emotions, even from the nonfarm, non-political sectors of society.

In addressing this point, one must acknowledge that, from the time of Jefferson and even before, farming has occupied a special place in society. It is certainly true that the food and fiber products provided by the agricultural sector are necessarily essential for our existence. Thus, a “national-defense” argument is sometimes made in justifying protection for agriculture. Though such a view is usually difficult to justify on economic grounds, reliance upon foreign suppliers for essential products is often held to be a threat to our national welfare (see, for example, the preceding quote by Berry). This view may also reflect a mercantilist perspective which maintains that wealth produced by agriculture is in some way superior to wealth obtained from alternative resource uses.

Economic explanations of the fundamental reasons for the protection of agriculture have emerged in the political economy literature in recent years. Becker’s (1983) seminal work revealed that political support was sensitive to factors related to the costs and efficiency of generating political influence. Less concentrated “pressure groups” cannot focus support, and thus are less successful in securing government assistance. In general, pressure groups provide incentives in the form of campaign contributions or votes to politicians who, in turn, supply policy-generated income transfers to ensure the continued political support of their constituency. In the political economy framework, political considerations lead to a demand for support while the costs of providing such support constrain the supply side.

Gardner (1987) examined the fundamental determinants underlying U.S. farm commodity programs. His work revealed that farm programs are mechanisms for redistributing economic welfare from taxpayers to agricultural producers. Gardner found that government support for individual commodities was related to the costs of generating political pressure. In particular, support was shown to be sensitive to

the size of the producer group and the geographic dispersion of production, with more concentrated groups garnering more support.

These concepts are easily extended to a wider consideration of agriculture's role in the economy. For many commodities (e.g., tobacco), the geographic concentration of producers creates strong incentives for representatives to garner support. The number of agricultural producers relative to consumers of agricultural products or taxpayers is small. Hence, small taxes or distortions that are borne by consumers or taxpayers translate into large benefits for individual producers. Consequently, agricultural protection is a relatively efficient way for elected representatives from agricultural regions to secure support for their constituents.

As we have noted above, such support is not unique to agriculture. Empirical evidence has shown that the benefits of U.S. crop insurance and ad hoc disaster relief payments are geographically concentrated. In particular, Hoffman, Campbell, and Cook (1994) showed that, when districts are ranked according to their level of disaster and insurance support over the 1985–93 period, the top 10 U.S. Congressional districts accounted for over 46% of total taxpayer outlays. Further, the top five districts accounted for about 67% of all wheat outlays, 86% of cotton outlays, 41% of corn outlays, and 97% of peanut outlays. It is also relevant to note that the very large payments realized in 1998 and 1999 were geographically concentrated and were directed toward certain crops. In particular, 1998 and 1999 payments were concentrated on crops and areas having a large proportion of producers who signed production flexibility contracts, which served as the delivery mechanism for much of the disaster assistance.

Another persuasive argument has been used to justify government involvement in risk management programs, especially in the case of crop insurance. This argument maintains that a market failure exists that prohibits the development of private risk-management tools. A primary function of private insurance markets is to spread the risks of individual losses over an entire pool of risk-averse agents. If such risks are systemic, such that agents suffer losses together, then diversification may be impossible. Crop risk is different from the sorts of risks that are commonly faced by private insurers in that the risks of low yields are systemic because of significant spatial correlation in weather events (and thus yields), making the likelihood of losses highly correlated across individual policies.

The extremely large level of liability associated with, say the entire U.S. corn crop, makes the level of potential payouts too large for a single commercial enterprise to assume.⁶ Thus, it is argued that the government must underwrite and reinsure the policies. Although a large degree of the risks underlying U.S. crop production are certainly systemic, this does not necessarily imply that these risks are not diversifiable and that private reinsurance alternatives are infeasible. A very large and deep international reinsurance market that may provide ample opportunities for diversification and reinsurance exists. The fundamental problem is that the costs of

⁶ This point is lucidly made by Miranda and Glauber (1997).

providing such reinsurance coverage may exceed producers' willingness to pay for insurance. We may also note that, although multiple peril insurance is provided by the government, private specific-peril insurance (e.g., hail and fire) has been in existence for many years.

Goodwin and Smith (1995) review the market failure argument and note that the presence of extensive private reinsurance markets would seem to suggest that evidence favoring a market failure is weak. They also note that government involvement in providing risk management mechanisms may be justified on economic grounds if the government is, in some way, more efficient at providing such mechanisms. For example, if economies of scale or scope allow the government to offer fair crop insurance at a price that is lower than what could be accomplished by a private insurer, it may be more efficient for the government to provide the insurance. Again, evidence suggesting efficiency advantages for the government is difficult to find and, in fact, the popular wisdom regarding the efficiency of bureaucracies would seem to suggest the opposite.

In terms of managing price risk, we can note that extensive private mechanisms are available to producers. Options markets provide an explicit insurance policy for price. When combined with crop insurance, a producer may be able to achieve a considerable degree of revenue protection. Futures markets provide extensive mechanisms that permit producers to hedge price uncertainty. The recent trend toward providing government-backed revenue insurance contracts would seem to involve duplicating much of what is already available for risk management in private futures and options markets. It must, of course, be acknowledged that adoption of these risk management mechanisms by individual farmers may be constrained by the fact that contract designations may not match an individual's needs. In addition, futures markets may be underdeveloped or even nonexistent for many of the minor crops that are important for many producers.

Risk and the Problems of Risk Measurement

The generic term "agricultural risk" is usually taken to imply conditions associated with uncertain and frequent movements in prices and/or incomes. To the extent that policy makers want to rely upon voluntary, insurance-based programs to assist producers with risk management, precise measures of risk are needed. There are, however, a number of actuarial difficulties associated with measurement of all-peril types of risk, such as those needed in order to rate crop and revenue insurance products.

Consider, for example, a standard multiple peril crop insurance contract. In order to determine an actuarially fair insurance premium rate, a precise measure of the likelihood of yield losses is needed. This, in turn, requires a measure of the probability distribution of crop yields for an individual producer. Crop insurance programs have historically been hindered by a paucity of available yield data. Current rating procedures consider the mean of an individual farmer's preceding 4–10 years of crop

yields when assigning a premium rate.⁷ Farms that lack available yield data are given a heavily discounted proportion of the county's average yields. With the new flexibility afforded to producers under the FAIR Act, the lack of yield histories has become an important factor influencing crop insurance participation patterns. A producer who may have a very strong record in growing corn may be heavily penalized in the level of coverage available and the corresponding premium rate when shifting to soybeans.

Current crop insurance rating procedures essentially treat all producers within a county that have similar average yields the same, regardless of the variability of their yields. Ker and Goodwin (1999) provide a detailed review of the statistical problems associated with current rating practices. The poor actuarial performance of crop insurance programs which we have noted suggests that current rating procedures may not accurately reflect the actual likelihood of crop losses. Inaccurate premium rates in insurance markets will generally result in two problems which may have significant negative influences on the performance of an insurance program—*adverse selection* and *moral hazard*.

Adverse selection arises if premium rates are inaccurate and insurance purchasers know more about their likelihood of loss than do insurance providers. This typically happens if insurance is priced according to some *average* risk of loss. If the true risks are heterogeneous across the insurance pool, high-risk agents will tend to be undercharged for coverage while low-risk agents are overcharged. This will tend to skew participation rates in favor of the higher-risk agents. Because high-risk agents are undercharged, payouts are likely to exceed premiums collected, and thus the insurance program performs poorly. Efforts to improve the performance of the program by increasing premium rates may actually worsen the performance of the program since low-risk agents will drop coverage at a faster rate than high-risk agents, resulting in a smaller, riskier insurance pool. Goodwin (1993) illustrated this effect using Iowa corn insurance participation patterns.

A related problem associated with the difficulty in measuring risks involves *moral hazard*. Moral hazard occurs if agents alter their production practices after purchasing insurance in order to increase their likelihood of collecting indemnities. Moral hazard is basically a monitoring and risk measurement problem since, if agents' actions can be accurately discerned, premium rates can be adjusted accordingly. Significant evidence of moral hazard in the U.S. crop insurance program was presented by Smith and Goodwin (1996). Smith and Goodwin showed that Kansas wheat farmers who purchased insurance spent, on average, \$4.23 per acre less on agricultural chemicals and fertilizer than did noninsuring agents.

The rather poor actuarial performance of the U.S. crop insurance program would provide at least anecdotal evidence suggesting the presence of adverse selection and moral hazard. In particular, loss ratios indicating positive expected payouts are frequently observed. In addition, as we noted above, the continual provision of ad

⁷ Higher means correspond to lower rates according to current rating practices. For a detailed discussion of the limitations of such an approach to risk measurement, see Goodwin (1994).

hoc disaster relief has served as a form of free insurance which has discouraged participation, especially among lower-risk farmers. In light of this fact, one may want to question whether the federal crop insurance program is better viewed as a mechanism for conveying income subsidies to farmers than as an “insurance” program.⁸

Environmental Policy Concerns

Over the last 25 years, an increasingly important dimension of policy has emerged—environmental concerns. Although the link may not seem obvious at first glance, policies intended to assist producers in managing risk are intimately tied to recent environmental issues. Risk management programs influence producers’ decisions about what crop to produce and how much to grow. To the extent that different crops and different regions have different environmental consequences, policy may have important secondary environmental consequences. If the existence of risk management policies induces production in regions or on land that would not otherwise be in use (i.e., the extensive margin), environmental externalities may result. Fragile and highly erodible land often produces highly variable crop yields. If insurance and disaster relief programs provide greater incentives to produce on highly erodible land, the programs may actually have negative environmental consequences. Goodwin, Smith, and Hammond (1999) found that U.S. farm programs over the 1982–92 period appeared to increase soil erosion by encouraging production of more erosive crops (such as cotton) and by encouraging production in erodible areas that might not otherwise be cultivated without risk management policies.

It is also important to note that a number of recent agricultural policies have directly targeted environmental issues. Perhaps most prominent is the U.S. Conservation Reserve Program (CRP), which provides producers with incentives to remove highly erodible land from production. A number of other programs include provisions for wetlands preservation and resource conservation. Of course, these programs would seem to be somewhat contradictory to programs that encourage production in erodible areas along the extensive margin. Goodwin, Smith, and Hammond (1999) found that, although the CRP program brought about important reductions in soil erosion between 1982 and 1992, much of this reduction was offset by the effects of other government programs intended to support producer incomes and help manage risk.

A positive environmental externality associated with risk management programs should also be pointed out. As we noted above, moral hazard has been observed to lead producers to use less variable inputs in production. In particular, lower levels of chemical and fertilizer use are associated with insurance purchases. Thus, it is

⁸ As Goodwin and Smith (1995) point out, positive expected payouts and other characteristics of the insurance program may suggest that standard theoretical models of risk-averse producers’ decisions under risk may be inappropriate for considering the insurance program.

likely that risk management programs have had environmental benefits by reducing runoff of agricultural chemicals and fertilizers.

International Market Issues

The U.S. agricultural sector has become increasingly dependent on international markets over the last 25 years. Export sales reached a peak of \$60 billion in 1996 (Simon, 1999). As the farm sector has become increasingly integrated with and dependent upon international markets, the effects of international shocks on market risk have become painfully clear. A large collapse of international markets, triggered in part by appreciation of the U.S. dollar in the early 1980s, contributed to a “farm crisis.” Many farms faced extreme financial hardships during this period, and policy actions such as the Export Enhancement Program (EEP) were introduced to restore export demand for U.S. farm products.

It is certainly true that tighter integration with world markets has the potential to increase price volatility. In fact, in many countries, government intervention in agriculture is primarily intended to stabilize and insulate markets from international shocks. The move to more freely floating exchange rates in the early 1970s also provided the potential for increased volatility of prices due to exchange rate shocks.

As we have already noted, a factor contributing to falling prices over the last three years was the collapse of foreign market demands for U.S. farm products. The Asian financial crisis severely contracted incomes, and thus negatively influenced demands for U.S. farm products in many countries. For example, coarse grain imports in Asia fell by 12% between 1996 and 1998 (USDA/Foreign Agricultural Service, 1999). South Korean grain imports fell by almost 65% in 1998 (Simon, 1999). These markets have recently shown signs of recovery, and observers expect improvements in financial conditions in Asia to lead to a gradual recovery. The extreme financial conditions in Russia also had a damaging, though much less significant, effect on U.S. food exports. Russia’s financial market woes have constrained exports for some time, and prospects for a recovery there are much less certain.

A final issue related to international markets should also be acknowledged. The World Trade Organization (WTO) Uruguay Round Agreement on Agriculture mandated a number of reforms, including reductions in the level of domestic support afforded to agricultural producers. Domestic aggregate support was to decrease by 20% from the base level of support in 1986–88 over a 10-year period. A number of policies, including crop insurance and disaster relief, were considered to be “green-box” policies which were exempt from the reductions.⁹ Direct market support payments based upon administered prices, marketing loans, and loan deficiency payments were not exempt, however, and thus are subject to the negotiated reductions. Until now, the point has been moot, as prices have been high enough to prevent

⁹ Many countries have questioned whether such policies should be considered to be nondistorting. Observers expect the exempt status of these policies to be challenged in the 2000 Seattle Round of the WTO.

triggering the loan deficiency payments. However, high LDPs and the actions of policy makers over the last several months have led many observers to raise concerns regarding the potential for the U.S. to be in violation of the WTO Agreement. The timing of these events is especially sensitive in light of the fact that the upcoming agricultural negotiations for the 2000 WTO Round are scheduled to begin in Seattle in November. The U.S. may find it difficult to argue for trade liberalization and market reforms given record payouts to farmers and the potential for violation of the modest reductions agreed to in the Uruguay Round Agreement.

What Can (Should) Be Done? The Outlook for the Future

The preceding months have shown that policy rhetoric and actions tend to vacillate as the well-being of the agricultural economy changes. Instability is fundamental to agriculture in a market economy, though, as we have noted, it is not altogether clear that the instability endured by agricultural producers significantly exceeds that realized by other small businesses. Further, financial failure is a condition experienced by a large proportion of small businesses and it is unreasonable to expect farming to be any different. Risk, by its very nature, reflects variability. Thus, it is typically the case that "things will get better with time."

Market economics asserts that government intervention in order to preserve and protect specific sectors of the economy usually results in an inefficient use of resources and a loss of economic welfare. Financial failure often reflects a process whereby less efficient firms are overtaken by more efficient firms. Critics often refer to this way of thinking as "Economic Darwinism." The simple fact is, however, that it is usually difficult to justify government intervention in these markets on *economic* grounds.

Assuming that intervention in order to stabilize markets can be justified in some way, we turn to the question of how market stabilization can best be achieved. Policy makers signaled an intention to rely to a much greater extent upon crop and revenue insurance policies to manage risk. A number of new policies, including extensive revenue insurance plans, have been introduced. Participation in such programs is high, though by no means universal. It is apparent, however, that the support afforded to farmers through these policies has not been sufficiently high to discourage other, more direct forms of income assistance. In addition, despite signaled intentions to the contrary, legislators have continued to provide ad hoc disaster assistance.

Some observers suggested that the increased flexibility afforded to producers under the 1996 FAIR Act would result in greatly increased instability in farm prices. For example, Ray et al. (1998) reported that these policy changes would increase wheat price variability by 40% and corn price variability by 82%. The extent to which recent price variability depends upon changes made under the FAIR Act is unclear, though it is important to note that many other events, including the Asian financial crisis and *El Niño* weather influences, are also likely to be relevant.

As we have noted, insurance-based risk management programs face a number of actuarial challenges. Program losses have been high. The information necessary to operate an actuarially sound program at low cost to the taxpayer simply may not be available. This is especially true for the wide range of minor crops, for which the historical production and price data needed for rating insurance contracts are lacking. Research efforts aimed at the development of improved crop insurance programs are extensive, and a number of new products are making their way to the market. As we also noted, extensive private risk-management alternatives are also available. Futures and options markets which exist for many crops offer producers hedging and price insurance mechanisms.

Perhaps the most important question involves the future. The FAIR Act signaled an intention to move U.S. agriculture into the market at a gradual rate. However, recent policy events would seem to indicate that government involvement in U.S. agriculture is likely to remain extensive. Debates over new farm legislation will begin over the next few years. Whether policy makers will continue efforts to make a transition to the market or will, instead, construct a new policy environment that includes extensive support for the farm sector is unclear. To this observer, it seems likely that extensive government support of agriculture will be continued in future farm legislation.

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