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RISK ANALYSIS FOR AGRICULTURAL PRODUCTION FIRMS: CONCEPTS, INFORMATION REQUIREMENTS AND POLICY ISSUES

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INCOME INSURANCE FOR COMMODITY PRODUCERS

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In the 1981 Farm Bill, Congress directed the Secretary of Agriculture to establish a task force to investigate the concept of income insurance in order to determine its feasibility as a substitute for existing commodity support programs. The escalating cost of these traditional programs and concern over their apparently diminishing effectiveness has sparked interest in the income insurance idea.

Proponents of income insurance have argued that it may be used to accomplish the same objectives addressed by existing programs but at a lower cost to the federal government and with reduced government involvement in the day-to-day decisions of commodity producers. Under income insurance, a producer would receive payment if income fell below the stipulated insured level, whether the shortfall were caused by low prices, low yields, or both. In contrast, current support programs provide protection against declines in yield (through crop insurance) and price (through the loan rate and deficiency payments) without explicit coordination to meet an income goal. Thus, income insurance would directly address the issue of farm income maintenance and stabilization.

In considering the feasibility of an income insurance plan as a substitute for existing programs, a number of operational as well as political issues must be addressed. The purpose of this paper is to review the relevant considerations, based on work done for the Income Insurance Task Force and on subsequent analysis. First, the concept of income insurance in the context of agriculture is considered to determine how it differs from commercially provided insurance programs. Next, alternative designs for an income insurance program are presented and evaluated. Finally, general observations on the feasibility of insurance as a substitute for existing programs are offered.

Income Insurance in the Context of Agriculture

Protection against various types of agricultural production losses (e.g., hail, drought) are available through the crop insurance system. These risks are insurable because they are independently and randomly distributed through time and over space among all potentially insurable parties. Insurers pool these risks and thus are able to predict aggregate losses with greater certainty than is possible for any one individual. The insured pay relatively small premiums to receive protection against unlikely but potentially large losses. Under these conditions, actuarially sound premiums may be determined

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which allow the insuring company to offset the costs of having the program available.

Such independence among losses does not characterize the income derived from most agricultural commodity production. Income risk arises also out of the possibility of price declines, which are usually correlated among producers of the same commodity and in some instances across commodities. Moreover, losses may be related over time through the influence of carryover stocks, as in the case of storable commodities. Given these dependencies, an insuring agency could likely experience unsustainable losses in one or over a sequence of growing seasons. Not surprisingly, the single attempt by a private insurer to offer such coverage failed, and no attempt has been made since to resurrect the program (Gardner and Kramer, p. 17).

Further difficulties may result when the insuring agency does not possess complete information about the risks faced by an individual, complicating the determination of actuarially sound premiums. Two types of information deficiency are particularly relevant in this context. Adverse selection occurs when an insurer lacks information about the characteristics of the insured which influence the probability of a loss. Moral hazard arises when the insurer is not aware of the actions of the insured party, thereby allowing the possibility that the insured can influence the probability of a loss after the insurance premium has been paid.

Both types of problems have plagued the administration of crop insurance in the United States. Income insurance adds the additional requirement that insurers be aware of the marketing opportunities of each producer, implying extensive price data needs, in addition to that already collected about conditions which affect physical production. Problems with crop insurance have arisen because of the use of geographic or regional averages in determining rates for individual producers who may be above or below average and thus have a lesser or greater incentive to participate. In response, an individual yield coverage (IYC) option has been instituted. An individual farmer can use historical data to verify that his normal yield exceeds the yield assigned to his risk area and thus that his premium relative to the area average should be reduced. Consequently, individually tailored coverage would seem essential to the operation of any type of income insurance program.

The conditions for the provision of income insurance to commodity producers differ markedly from those typically associated with the indemnification of insurable risks. The private sector, under these circumstances, is unlikely to offer income insurance by itself. Federal government participation as a data gatherer, monitor, and re-insurer would seem to be required in any income insurance program. The experience of crop insurance might prove instructive in formulating such a plan.

Participation by the federal government raises additional questions about the implementation and administration of an income insurance program. While the federal government might choose to underwrite and deliver insurance on its own, joint participation by private insurers and government might be more feasible and one for which precedent exists. The Congressional directive specified that the role of private markets in the provision of income insurance be investigated. The Task Force suggested means by which its participation could be maximized, but it appeared clear that the program would not work without some degree of federal government involvement. Specifically, the government would be expected to participate as a re-insurer to private firms and as a data gatherer, at least initially, for the reasons outlined earlier. The federal government might also subsidize premiums to encourage sales. Given this joint participation, both private agencies and the federal government would be expected to cooperate in determining rates and setting coverage levels.

Alternative Designs for Income Insurance

Income insurance differs from the programs currently available to commodity producers in that income is explicitly identified as the target variable. However, several alternative designs for the delivery of income insurance can be identified. First, income may be insured directly, so that indemnification would be made anytime receipts fell below a designated level. This design would not distinguish between the source of the deficit in yield declines, price declines, or both. Second, yield and income insurance could be combined. A producer would receive payment if yield were below the guarantee level. If actual yield multiplied by the appropriate market price plus yield payments were below the guaranteed level of income, an insurance payment would also be made to cover the difference. Third, yield insurance could be coupled with price coverage. Any payment resulting from yield shortfalls would be made. Then, price declines below a guaranteed level would be compensated on all of the crop actually marketed or on the guaranteed yield.

To this point, no explicit definition for insurable income has been offered. The Task Force emphasized that income insurance should not represent a guarantee of profit for a producer but a protection against relatively large falls in operating revenue. In this respect, the income goal could be defined as a guarantee of something less than 100 percent of gross revenue derived from the sale of a given commodity. The level of guarantee could be applied to a historical standard or perhaps cost of production. For producers who derive the bulk of their income from the marketing of an insured commodity, the program could provide substantial protection against catastrophic income declines. In this context, insurance is not intended to cope with variation in off-farm income.

Each of these alternatives can be designed so as to guarantee a minimum income goal is met or exceeded when indemnification is made.

However, unless care is taken, a production disincentive may exist for some forms of combined yield and price insurance. This difficulty arises when the price guarantee on yield deficiencies (comparable to the current election price under crop insurance) exceeds the price guarantee for price insurance and the market price falls below both price guarantees. In this instance, the producer could gain higher revenue by inducing a production shortfall. Such a disincentive does not exist with either direct revenue or combined yield and revenue insurance because payments are adjusted to attain the overall guaranteed revenue goal.

Premiums required for a designated level of income coverage (determined as a percentage of historical income, say) were compared across the three design alternatives. The lowest premiums are associated with direct revenue insurance because its design allows for the possibility that low yields may be offset by high prices, and vice versa, so obviating the need for income insurance payments. The other two alternatives both use yield incurance as a basis to which either a price or a revenue endorsement is added. Given a minimum revenue goal, the yield and revenue design requires lower premiums than the yield and price alternative, which treats price and yield changes as independent events in determining whether an insurance payment will be made.

To see how the various alternatives operate, consider an example in which the income guarantee is set at two-thirds of historical average per acre revenue from the harvest and sale of a particular commodity. If average yield per acre is 100 bushels and average market price has been $3.00 per bushel, the guarantee level would be $200 per acre. Now suppose that in one year yield falls to 50 bushels per acre and market price rises to $4.00 per bushel. Under direct revenue insurance, no payment would be made since market receipts just reach the guarantee level. Under the yield and revenue alternative, the producer would be eligible for a payment on the 10 bushel yield shortfall, but since marketing returns were equal to $200, no further insurance payment would be made, and unless yield payments are witheld total revenue would exceed the minimum. With yield and price insurance, 82 percent of yield and of average price must be guaranteed to ensure the $200 level goal is always attained. So, in this case, the producer would receive a payment on the yield loss (32 bu x $2.56/bu = $82) but none on the price guarantee, for a total revenue of $282.

The foregoing example illustrates possible outcomes when yield and price for an individual producer are negatively correlated. Clearly, if this is not the case, the cost of insurance may be quite different. Regardless, though, of the yield/price relationship, the relative ranking of the premium costs among design alternatives would not change. The example demonstrates that allowing yield and price movements to offset each other, as with direct revenue insurance, results in lower payouts and thus lower premiums than the other two alternatives. Building revenue onto yield insurance is apparently more costly as long as yield payments are made without regard for the possibility that the income guarantee level may be exceeded solely because of insurance payments.

On the basis of premium costs alone, the direct revenue alternative would seem to be the preferred design for an income insurance program. However, as the Task Force noted, with crop insurance already in place for a number of commodities, it might be advantageous to use it as a basis on which to build a more comprehensive program. Preliminary calculations of the actual monetary value of required premiums for Illinois corn farms show that, on a per acre basis, insurance costs would represent the third largest single expense to producers after interest and building and machinery costs (Offutt and Lins). The absolute size of the premium, though, will depend on the correlation between yield and price for an individual producer.

Feasibility of Income Insurance as a Substitute for Existing Programs

The feasibility of income insurance as a substitute for existing commodity programs depends on the economic and political impacts of its adoption. Exchanging the current alignment of programs for any alternative can be expected to meet with resistance from those who enjoy benefits from the status quo arrangement. However, income insurance would represent a substantial departure from existing programs in that it explicitly identifies income from commodity production and marketing as its target. Thus, its adoption would force the issue of whether commodity programs are intended to stabilize income around market-determined trends or to maintain income at a level not necessarily related to market conditions. In this respect, the performance of income insurance depends on the prevailing market conditions in which it will operate.

Suppose the income guarantee is defined as a percentage of historical average income. If revenue is declining over time, insurance would guarantee a smaller and smaller absolute income level. In this case, it might be expected that pressure for additional income support would be intensified, forcing a modification or ultimately an abandonment of the insurance format. On the other hand, if incomes are buoyant, income insurance would function as a backstop against transitory and not structural declines. Recently, there has been speculation that increased price elasticity of demand for U.S. agricultural output (attributable to the increased importance of exports) implies that current commodity programs, which seek to increase income by restricting production, are in fact counterproductive (Schuh). Allowing market price to fall, in the absence of loan rates, would actually increase producers' revenues. In this case, income insurance would not impede the increased sales and thus the increased revenues that would accrue to producers, since insurance would not compensate for price declines that are offset by increased sales.

In any event, the substitution of income insurance for existing programs would likely result in substantial adjustment in the agricultural sector. Allowing market forces to prevail would probably result in prices which are both lower and more variable. Producers who depend on the current programs to stay in operation would likely be forced

out of the sector. Such an exodus might alleviate the apparent over-production problem which periodically seems to characterize American agriculture and might ultimately act to raise market prices.

Income insurance as discussed here makes no provision for the administration of supply controls. However, the allocation of responsibility for directing any acreage reduction program is crucial. That is, by restricting production and holding up prices, the insuring agency could help protect itself against insurable losses in income from commodity production. Allowing the private sector alone to make these decisions would fly in the face of the precedent set by fifty years of national farm programs. On the otherhand, if these controls were mandated by the federal government, the incentive would still exist for private insurers to lobby strongly for their implementation. Congress, or the Secretary of Agriculture, would be put in the position of weighing the benefits of increased production in national and international terms against the interests of the private insurance sector. It is difficult to predict what balance might be achieved.

Conclusions

In the absence of relevant experience, resolution of many of the operational issues associated with income insurance is difficult. Recognizing this, the Task Force recommended that a pilot program be instituted for a commodity not currently the beneficiary of government support. Switching to income insurance in the absence of this additional information would seem imprudent at best. However, with deliberations over the content of the 1985 Farm Bill soon to be underway, it is doubtful whether such a provision will be included. The addition of further federally-funded programs for agriculture would not seem politically attractive at this time. Moreover, because income insurance represents a substantial departure from the form of the programs which have evolved over the past fifty years, its endorsement by any in the agricultural sector seems unlikely. The major obstacle is the removal of existing support programs, something not even the traditionally market-oriented American Farm Bureau Federation could agree to at its annual convention.

Nonetheless, the concept of income insurance would seem to have substantial appeal as a new direction in commodity programs, should such a step ever be taken. If income maintenance and/or stabilization is ultimately the goal of commodity programs, then there seems to be some logic in a program designed to address the problem directly. Recent dissatisfaction with the manner in which the existing programs affect market prices, particularly in the international arena, could be assuaged with such an approach. However, any program which uses income levels as a base for determining payments runs the risk of appearing to be an income transfer to commodity producers, a position they have traditionally sought to avoid. Indirect income transfer through higher prices has been more palatable. Furthermore, income insurance would require producers to contribute directly towards their own support, and while this might result in less reliance on the federal treasury, its appeal for producers is limited.

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