Chapter 1

Farm Program Effects on Agricultural Production: Coupled and Decoupled Programs

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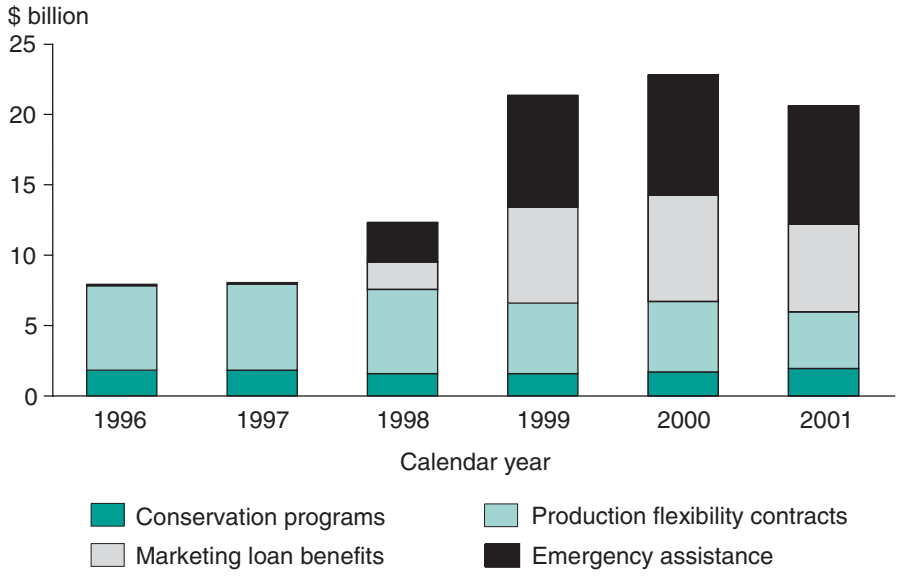
Direct government payments to the U.S. agricultural sector and other farm program benefits boosted farm income in 1999-2001, particularly during 1999-2001 when direct government payments exceeded $20 billion annually (fig. 1-1). More than a third of these direct payments were disbursed as emergency assistance, which augmented direct government payments from existing farm commodity programs, such as production flexibility contract (PFC) payments and marketing loan benefits (loan deficiency payments and marketing loan gains), as well as payments from conservation programs. Besides these direct government payments, other support to the sector included crop insurance premium subsidies and price supports for selected commodities, such as dairy, sugar, and tobacco.

This chapter describes and compares how different types of farm programs can create economic incentives that may affect production decisions. We focus on production incentives and supply response because, in general, additional outcomes (including prices, domestic use, and exports) reflect changes in the market equilibrium following the change in production.

Figure 1-1
Direct government payments



Source: Economic Research Service, USDA.

U.S. Farm Programs: Different Links to Production and Prices

Different types of government payments and other farm program benefits influence agricultural markets in different ways. A billion dollars in loan deficiency payments, for example, will affect production decisions and market outcomes differently than $1 billion in PFC payments. This variation in effects among different programs largely reflects how closely program benefits are linked with farmers' behavior and market outcomes.

Farm programs are coupled if there is a direct link between the determination of the program benefit and the farmer's production and market conditions (such as prices). In turn, the benefits of coupled programs affect per-unit net returns associated with specific production choices. That is, coupled programs may increase farmers' profit from growing crops such as corn or soybeans. As a result, these programs have the greatest potential to affect agricultural production and agricultural markets.

In contrast, decoupled payments are fixed income transfers that do not depend on the farmer's production choices, output levels, or market conditions. Decoupled program benefits do not subsidize production activities, inputs, or practices. These income transfers do not change per-unit net returns, so they have no direct effect on production decisions for specific commodities.

However, because decoupled payments raise the overall income and economic well-being of farm households, indirect influences on agricultural production can occur through wealth and other effects. Overall, effects of decoupled payments on production are likely to be small in aggregate because of the many different uses of the payments. This is particularly true when one considers the farm household, rather than only the farm operation, as the decisionmaking entity. A household has a wide array of consumption, savings, nonagricultural and agricultural investment, and off-farm and onfarm labor allocations that may adjust in response to decoupled payments.

U.S. agricultural commodity policy has been moving toward increasing market orientation with the introduction of programs that have reduced the degree of coupling of benefits to production (see box, "U.S. Agricultural Policy Evolution Toward Greater Market Orientation"). This trend reflects, in part, the related policy goals of reducing market distortions and fulfilling commitments to international trade agreements.

U.S. Agricultural Policy Evolution Toward Greater Market Orientation

Beginning in the mid-1980s and continuing through the 1990s, a series of important changes in U.S. farm commodity programs moved agriculture from the highly managed sector of the early 1980s toward one with greater market orientation, particularly with regard to programs affecting farmers' production decisions (Young and Westcott; Orden, Paarlberg and Roe; Westcott, Young, and Price).

Following the experience with high commodity loan rates of the early 1980s that supported market prices and led to large stocks of grains, farm legislation in 1985 lowered commodity loan rates for wheat, feed grains, soybeans, upland cotton, and rice. Additionally, the 1985 Act introduced marketing loans for rice and upland cotton, which effectively moved the loan program for those crops from providing price support to providing income support without supporting market prices (Westcott and Price). Target prices used for income-supporting deficiency payments also were reduced and program yields for these payments were frozen. Still, plantings of program crops remained constrained for program participants by provisions which combined to encourage farmers to plant the same program crops over time.

Farm legislation in 1990 furthered the move toward market orientation in supply response by introducing planting flexibility on a part of farmers' base acres. Producers could respond to market signals in planting choices on "normal flex acres," which represented 15 percent of a farmer's base acres. These acres were not eligible for income support payments and planting alternative crops on this land did not penalize the farmer through a loss of historical program base. Additional planting flexibility was permitted on "optional flex acres" (another 10 percent of base acres), although deficiency payments were forgone on any of this land that was planted to another crop. A further market-oriented change under this legislation was the extension of marketing loans to oilseeds in 1991 and to wheat and feed grains in 1993, moving loan programs for these crops to ones providing direct income support rather than price support.

The 1996 Farm Act fundamentally redesigned income support for major crops with the termination of acreage reduction programs and target-price-based deficiency payments and the introduction of decoupled production flexibility contract (PFC) payments, with almost total planting flexibility. Base acres for program crops, which had been a constraining aspect of annual supply management programs, were eliminated and replaced with PFC acreage that was used as the basis for making PFC payments. With only a few limitations, planting of most alternative crops was permitted on a farmer's entire acreage base. These policy changes provided greater freedom for farmers to make production decisions based on market signals.

During the latter years covered by the 1996 act, a series of supplemental emergency assistance packages provided market loss assistance (MLA) payments to farmers. As for PFC payments, most MLA payments were distributed to farmers based on enrolled PFC acreage and did not depend on current production.

The 2002 Farm Act extended many of the types of programs of the 1996 Farm Act and the ad hoc emergency spending bills of 1998-2001. Marketing assistance loans were continued, decoupled direct payments replaced PFC payments, and counter-cyclical payments were intended to institutionalize market loss assistance payments. Importantly, the 2002 act also retained nearly full planting flexibility without base acre constraints to allow farmers to continue to respond to market signals in their production choices. The legislation also allowed farmers to update base acres used for direct payments and counter-cyclical payments to reflect 1998-2001 plantings, although only 39 percent of base acres were updated.

Coupled Programs Affect Aggregate Land Use and Crop Mix

Coupled programs that are closely linked to the farmer's production of specific crops affect total land use and also distort the mix of crops planted. Program benefits that are linked to production of specific crops increase expected returns to those commodities. That is, an increase in production receives additional program benefits, which provide incentives to expand output. As a result, production decisions for those commodities are based on expected returns from both the marketplace and government payments. Cross-commodity effects may also occur because changes in expected returns for one crop affect relative net returns among cropping alternatives. Some farmers would likely respond to a coupled payment by increasing total planted area and/or shifting the mix of crops toward those with higher coupled payments.

Two economic studies analyzing coupled programs (crop insurance and marketing loans) demonstrate how their benefits directly augment market returns and thereby influence planting decisions. Crop insurance changes the distribution of expected income when yields are low. U.S. subsidies for crop insurance premiums are proportional to the premium. Since premiums are higher for crops that are riskier to insure, premium subsidies are higher for those crops, which encourages production of riskier crops and production in riskier regions. Young, Vandeveer, and Schnepf report that government crop insurance subsidies of about $1.5 billion a year would add about 960,000 acres (about 0.4 percent) to annual production of eight major field crops, with plantings of wheat and cotton expanding the most.

Marketing loans provide another type of coupled benefit by raising farmers' revenues for current production when market prices are low. When commodity prices are below commodity loan rates, program benefits augment market receipts and, thus, create an incentive to produce specific crops. Annual effects of marketing loans reported by Westcott and Price vary by year, depending on the absolute and relative magnitudes of the expected crop-specific marketing loan benefits. With marketing loan benefits ranging from around $5 billion to over $8 billion in 1999-2001, total acreage planted to eight major field crops was increased by an estimated 2 to 4 million acres (less than 2 percent) annually in those years. Acreage effects for individual crops reflect year-specific expected relative benefits among cropping alternatives each year. In some situations, marketing loan benefits can result in larger effects on individual crops than in aggregate.

The moderate effects of these coupled programs (less than 2 percent increases in acres) partly reflect an inelastic acreage response in the farm sector, where overall crop plantings change proportionally less than the economic incentives provided by prices and net returns. Despite recent increases in the responsiveness of plantings to price changes, facilitated by nearly full planting flexibility (Lin et al.), overall supply responsiveness remains inelastic.

Decoupled Payments Raise Household Well-Being, Potentially Production

Benefits of decoupled programs do not depend on current production or market prices. Production decisions for specific crops are not directly affected by these transfer payments because net returns per unit of production are not changed. Nonetheless, decoupled payments may have indirect effects on agricultural production and markets through:

- changes in producers' wealth, leading to higher farm investment and changing risk attitudes,
- effects on slowing or accelerating farm consolidation,
- expectations about future program eligibility and payment basis that influence current production decisions, and
- repeated ad hoc programs that change producer expectations over time.

The direct effect of decoupled payments is to raise the overall income and economic well-being of farm households. A farm household can decide to use these transfers in the farm operation or for nonfarm alternatives such as consumption, savings, and nonagricultural investments. Household work choices, both off-farm and onfarm, may also change. These resource allocation decisions of the household are important for determining the potential indirect effects of decoupled payments on production decisions.

Any indirect effects of decoupled payments on production would be more general than the commodity-specific effects of coupled programs, affecting total land use or overall productivity gains, for example. The choice to grow more of any crop would reflect expected market returns across competing uses rather than the decoupled payment (see box, "Production Flexibility Contract Acreage and 2001 Plantings"). As with coupled programs, lower prices resulting from any production increases can moderate subsequent production effects and other market impacts.

Farm programs typically encompass many features that can affect the market, and individual mechanisms can often overlap. Coupled programs can influence production through these same mechanisms (in addition to their more direct effects through raising net returns), and many farm programs have both coupled and decoupled properties.

Wealth Effects on Investment and Risk Attitudes

Mechanisms by which decoupled payments may potentially affect production decisions include: (1) a wealth-facilitated investment effect, reflecting reduced credit constraints and/or reduced costs of capital, and (2) a direct wealth effect that changes risk aversion.

Decoupled payments can affect agricultural production by increasing the wealth of farmers, typically through the capitalization of expected farm program benefits into the value of farmland.

Production Flexibility Contract Acreage and 2001 Plantings

National, State, and county data show many significant differences in 2001 plantings compared to Production Flexibility Contract (PFC) acreage under the 1996 Farm Act, largely due to shifts in acreage allocations as producers used planting flexibility provided in that legislation. These results suggest a lack of a strong link between program acreage and current planting decisions. Instead, production choices reflect the ability of farmers to respond to expected market returns among competing crops (augmented by expected marketing loan benefits when prices are low), as well as to agronomic and rotational considerations.

PFC payments under the 1996 Farm Act were allocated on a commodity basis, but were linked to historically based contract acreage that reflected past commodity program enrollment rather than being linked to current production. PFC payments were made for seven program crops: wheat, corn, sorghum, barley, oats, rice, and upland cotton. PFCs also gave producers nearly complete planting flexibility in their production decisions without loss of program acreage or program benefits. For example, land that had been enrolled in the wheat deficiency payments program for any of the crop years 1991-95 could be entered into a 7-year production flexibility contract with the government in 1996. PFC payments on this contract acreage were considered to be for wheat. The land was required to remain in an agricultural use and there were restrictions on planting most fruits and vegetables, but planting flexibility allowed producers to shift to other crops or leave the land idle.

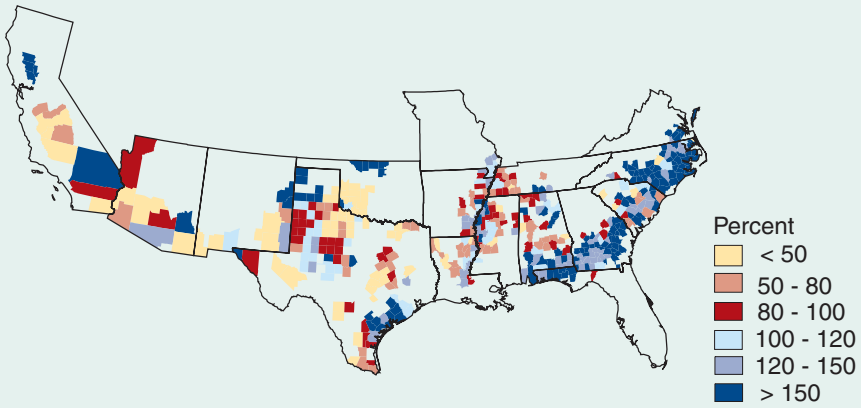
Nationally, 2001 plantings to the seven PFC program crops represented about 82 percent of total PFC acreage. On a crop-specific basis, shares ranged from a low of 45 percent of barley PFC acreage planted to barley to a high of about 96 percent of upland cotton PFC acreage planted to upland cotton. U.S. wheat plantings in 2001 represented about 76 percent of the level of wheat PFC acreage, and corn plantings represented about 93 percent of corn PFC acreage.

Looking more closely at data for upland cotton, the crop with 2001 national plantings relatively the closest to its crop-specific PFC acreage, significant variation in this share is shown by state-level and county-level data (box fig. 1). At the state level, upland cotton plantings were more than 20 percent below cotton PFC acreage in Arizona, New Mexico, California, and Oklahoma, but were more than 20 percent higher than cotton PFC acreage in Florida, Georgia, North Carolina, South Carolina, Virginia, and Kansas. Further disaggregation to the county level also indicates an absence of a strong link between cotton PFC acreage and 2001 upland cotton plantings (see cotton map). For example, cotton acres greatly expanded above historically based cotton PFC acreage in the Southeastern states of North Carolina, South Carolina, and Georgia as farmers used planting flexibility provided under the 1996 farm act, with no constraints related to PFC acreage or annual acreage reduction programs.

Similarly, variation in plantings relative to crop-specific PFC acreage is shown for wheat at the state level and the county level (box fig. 2). Of the 42 States with NASS-reported production data, 32 have wheat plantings more than 20 percent lower or 20 percent higher than the State-level wheat PFC acreage. County-level wheat plantings in 2001 also show no strong link to wheat PFC acreage (see wheat map), again reflecting the use of planting flexibility with no supply management program constraints, such as acreage reduction programs.

Box figure 1

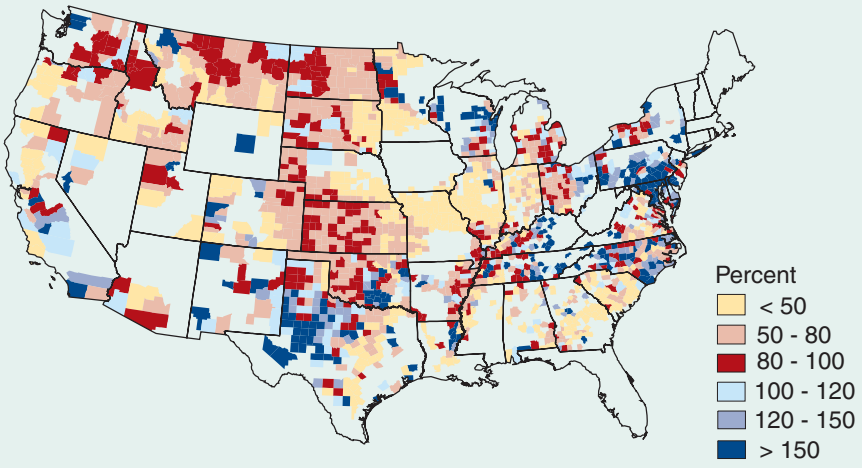
Cotton production flexibility contract acreage planted to cotton varied widely



Source: ERS, based on 2001 county-level data from NASS and FSA.
Data not available for all counties.

Box figure 2

Wheat production flexibility contract acreage planted to wheat varied widely



Source: ERS, based on 2001 county-level data from NASS and FSA.
Data not available for all counties.

Greater cash flow provided by decoupled payments and higher wealth may also facilitate more production through increases in agricultural investment if farmers otherwise face credit constraints or limited liquidity. Some of the payments are likely to go to consumption, savings, and nonagricultural investments, with the largest share typically going to consumption. But, agricultural investment could also rise. For credit-constrained farmers, lenders may be more willing to make loans to farmers with higher guaranteed incomes, higher farm equity, and lower risk of default. Great loan availability facilitates more production by allowing these farmers to more easily invest in profitable opportunities on their farm. Although Collender and Morehart (chapter 5) did not find evidence of significant credit constraints among program participants in the aggregate, they did indicate

that some farmers are likely credit constrained and would alter their production with decoupled payments.

For some farmers, increased liquidity provided by decoupled payments may also reduce the need for loans to cover short-term operating costs or longer term farm-related investments.[4] While there are opportunity costs when self-financing the farm operation, they would be lower than expenses for commercial loans. In these situations, the lower cost of capital could increase the size of the farm operation or raise investment in the farm, either of which could increase farm output.

If changes in wealth due to decoupled payments influence producers' perception of or attitudes toward risk, they may take on more risk in their agricultural and nonagricultural portfolios. Such farmers may choose to adjust their overall production and/or may switch to riskier crops with higher average (but more variable) expected returns. Chavas and Holt (1990) found evidence of declining absolute risk aversion with higher wealth, implied by positive wealth effects on the plantings of corn and soybeans.[5] Makki, Somwaru, and Vandeveer (chapter 4) discuss in more detail the potential for risk-related production impacts of PFC payments, arguing that these effects are likely modest.

Farm Consolidation Effects

Consolidation in the agricultural sector has been a long-term trend, partly reflecting increased productivity. How decoupled payments may affect this ongoing trend is uncertain, but important.

Two competing arguments concern the potential effects of decoupled payments on consolidation. On the one hand, decoupled payments could slow sector consolidation if the payments allow marginally viable, smaller farms to remain in business longer. Such farms may be able to cover short-term variable expenses associated with the yearly decision to produce, but may not be able to cover longrun economic costs, remaining in the sector because of rising land values. Decoupled payments could help these farms by relieving a credit constraint or by providing lower cost funds.[6] In general, these farms tend to be less efficient. So, keeping them in operation would likely lower aggregate production if the land would have been used by more efficient, larger producers with higher yields.

In contrast, decoupled payments could accelerate sector consolidation if larger operations use the payments to buy smaller operations or to rent more acreage. This would occur especially if these large operations were previously credit constrained or if the lower opportunity cost of using these funds (relative to the costs of commercial loans) were sufficient to motivate expansion.[7] Any resulting increase in consolidation would be expected to raise aggregate production because larger operations typically are more efficient due to better management and other economies of size. Larger operations tend to more readily adopt new technology and use production practices that raise yields (Caswell et al.). Additional effects may reflect increased production incentives due to lower costs per unit of output. Caswell et al. report that larger farms tend to have higher application rates

[4] Again, use of the payments in the farm operation would be competing with alternative uses by the farm household, including consumption and nonagricultural investments.

[5] Chavas and Holt (1990) derived wealth effect elasticities of 0.087 for U.S. corn plantings and 0.27 for U.S. soybean plantings. Because much farmland is leased, many payments go directly or indirectly to nonoperator landlords rather than to farm operators; those payments would not be expected to have production effects. The Chavas and Holt model estimates reflect the implicit portion of payments captured by operators. In 1954 to 1985 (the estimation period used by Chavas and Holt), an average of about 37 percent of total farmland was leased, based on ERS calculations using Census data. This compares with about 41 percent of total farmland being leased in 1997, based on the same data source. Thus, any upward bias in the Chavas and Holt elasticities would be minimal because the increase in the share of farmland leased since their estimation period has not been very large.

[6] Credit constraints for small farms may not be significant in the aggregate because of off-farm income that is typical for these households.

[7] As earlier, use of the payments in the farm operation would be competing with alternative uses by the farm household, including consumption and nonagricultural investments.

for a number of inputs, consistent with their lower production costs resulting from higher efficiency.

Net effects on consolidation from these competing arguments are uncertain, but are not likely to be large (Yee et al., 2004). Relief of credit constraints is probably not a major factor. Although there are likely to be some credit-constrained U.S. farms, a number of empirical tests show no evidence of significant credit constraints in the sector in the aggregate (Collender and Morehart), suggesting minimal effects from the marginal change in credit constraints. Also, a large share of PFC acres is rented, about 60 percent in 1996 (USDA, 2003). As a result, a portion of program benefits are passed through to nonoperator landlords, limiting their effects on consolidation (see discussion of pass-through of PFC payments to landlords in Roberts, chapter 6).

Any effects on agricultural output that could result from a change in consolidation trends would apply only to land that moved into a larger operation through sale or rent or to land that was held back from sale on smaller operations. Additionally, the payments may simply shift the timing of land transfers with any resulting production effects being only temporary. Thus, any effects of decoupled payments on consolidation are likely to alter trends already underway only marginally, with little effect on aggregate yields and production.

Benefit Eligibility and Payment Basis

Some farm programs provide benefits that are not linked to current production decisions, input use, or market prices but are weakly coupled to production decisions through land use constraints. For example, PFCs under the 1996 Farm Act required land to remain in agricultural uses as a condition of eligibility for PFC payments.[8] Although this requirement permitted the land to be idled, such program provisions can affect overall crop production by providing incentives to prevent some land from leaving the sector. Once the decision is made to keep the land in agriculture and not to convert it to a permanent nonagricultural use, the farmer then may decide to produce on that land if expected revenues exceed production costs. Even if the land is permitted to be idled, it is more readily available to return to agricultural production if economic conditions warrant. Similarly, restrictions on the plantings of most fruits and vegetables on base acres under planting flexibility provisions could influence production if the land would otherwise have been planted to those crops.

The basis for the distribution of farm program benefits may also affect producers' expectations of how future benefits will be disbursed. Payments linked to past production may lead to expectations that future benefits will be linked to current production. Such expectations would affect expected net returns for program crops and could thereby affect current production decisions. For example, farmers may not fully use planting flexibility to move away from historically planted and supported crops if they expect future farm programs to permit an updating of their base acreage, which forms the foundation for many payments. Instead, farmers would have incentives to build and maintain a planting history for program crops,

[8] This requirement was continued under the 2002 Farm Act as a condition for receipt of direct payments and counter-cyclical payments.

perhaps limiting their response to current market signals. Similarly, use of nonland inputs that affect current yields may be influenced if farmers expect that future farm legislation will permit an updating of payment yields. Such updates may also reduce incentives to grow different varieties of program crops that have marketable characteristics but lower yields.

Overall effects of such expectations are likely to be small due to the uncertainty that future farm legislation would permit updating base acreage and program yields, the uncertainty of the provisions of any such legislation, as well as the discounting of benefits payable in the future. Nonetheless, if farmers expect to be able to update their farm-level program parameters, the economic efficiency of production could be reduced if producers do not fully respond to market signals. The importance and potential effects of these policy expectations also depend on expected market prices, which would affect the expected value of future program benefits. If expected market prices are low, the value of future benefits would be relatively high, so building or maintaining base acreage or program yields would be of value. However, if expected market prices are higher, future program benefits would be lower and the associated value of base acreage and program yields would be smaller.

Repeated Ad Hoc Programs Can Change Producer Expectations

Programs whose payments are announced and distributed after production decisions have been made (such as unanticipated ad hoc emergency assistance) can be argued to not distort production and thus may initially be decoupled. However, continued use of these programs when prices or production are low may change farmers' perceptions of the programs' design. These payments change producers' realized revenues and repeated payments may alter the distribution of future expected revenues by raising expectations that such payments will recur in similar market situations.[9] In so doing, farmers may perceive such programs as less ad hoc and more coupled to market conditions.[10]

As a consequence, these payments reduce potential downside revenue risks, which may affect production decisions for risk-averse producers, as expected payments become part of their risk management portfolio. The revenue stabilization consideration for risk-averse producers would supplement the typical profit maximization incentive underlying planting decisions. Thus, if risk-averse producers have probabilistic expectations of future assistance based on past government actions, particularly if there is a connection (or perception of a connection) between the probability of such payments and market conditions (low prices or production), then production choices may be influenced.

Programs that reduce the risk of low revenue outcomes when prices or production fall to low levels can lead to production effects by raising the lowest levels of expected revenues, thereby reducing financial risk associated with those market situations. The more these ad hoc benefits are viewed as linked to specific production activities, the greater their potential influence on production choices for those activities, as the expectation of

[9] For example, with emergency assistance packages enacted in the United States six times in 1998 to 2001, farmers may now expect this type of government assistance to be more likely when prices or production are low.

[10] See page 4 of USDA (2003) for an illustration of how the degree of coupling of farm programs changes, reflecting the links of the benefits to production and prices.

benefits becomes part of the farm household's risk management portfolio.[11] Expected assistance that addresses crop-specific production problems, such as droughts or floods, can be viewed as similar to fully subsidized crop insurance, affecting planting decisions by reducing risk, and potentially leading to increased production of those crops by risk-averse producers. In contrast, expectations of less specific assistance would likely affect aggregate production through a more general reduction of overall revenue risks.

Conclusions

Different types of farm programs influence agricultural markets in different ways. Decoupled farm programs provide income transfers that raise the overall income and economic well-being of farm households. Decoupled payments do not have direct effects on production decisions or agricultural output because they do not change returns to production. However, decoupled programs can have indirect effects on farm production decisions and aggregate output. This contrasts with coupled farm programs, such as crop insurance and marketing loans, which create direct incentives to expand farm output of specific commodities by increasing expected returns per unit of production, in addition to their potential indirect effects.

Indirect influences of decoupled payments on production may result from the effects of increased wealth on risk attitudes or investment, farm consolidation, and expectations about program eligibility and payment basis, and repeated use of ad hoc programs. Despite a variety of potential indirect effects of decoupled programs on farmers' decisions, production effects are likely smaller than direct effects of price- and production-linked coupled programs such as marketing loans. This is particularly true when one considers the payments within a household framework, and that consumption, savings, nonagricultural and agricultural investment, and off-farm and on-farm labor allocations may adjust to changes in income and wealth. Further, overall planting effects of coupled programs are typically not very large compared with total acreage because of the inelasticity of supply response in the U.S. farm sector.

Thus, although no program appears to be completely without potential effects on agricultural production,[12] effects of decoupled programs are likely to be small. Further research is needed, however, to measure such effects empirically. A useful framework for such analysis is presented in OECD (2001), which discusses effects on agricultural policies of programs with different degrees of coupling to production decisions.

To the extent that agricultural production is affected by decoupled payments, this supply response has additional market effects on prices, domestic use, and exports. For example, any increase in production resulting from programs would tend to lower market prices. These price declines, along with planting flexibility provided by the 1996 and 2002 Farm Acts, can moderate subsequent production effects.

[11] Note that the likelihood of ad hoc assistance is quite variable as it is subject to political and budgetary concerns. Farm households are likely to have better risk management instruments.

[12] A report by the Organization for Economic Cooperation and Development discusses the theoretical effects of decoupling and reaches a similar conclusion that "it seems difficult to contend that any policy measure can be entirely production or trade neutral."