# How Decoupled Is U.S. Agricultural Support for Major Crops?

#### C. EDWIN YOUNG AND PAUL C. WESTCOTT

As we look toward the future of World Trade Organization (WTO) negotiations, it is useful to look at the direct and indirect impacts of U.S. farm programs on agricultural production and trade. U.S. agricultural support, as reported to the WTO, exceeded \$58 billion in 1997. Most of the support was reported in the green box as "minimally trade distorting," while about \$6.2 billion was reported in the amber box as potentially "trade distorting."1 However, amber box program expenditures greatly expanded in 1998 and 1999 due in part to generally lower commodity prices. With increased farm program expenditures, the market impacts of major programs need to be evaluated relative to potential production and trade distortions as background for WTO negotiations.

This paper examines the links from four U.S. agricultural programs to agricultural production and trade. Programs discussed are production flexibility contracts, crop insurance, marketing loans, and disaster assistance. To the extent that programs expand domestic production, the impacts can be partially transmitted to world markets through increased exports and lower prices.

With the elimination of deficiency payments and the introduction of production flexibility contract payments in the 1996 Farm Act, commodity-specific links between income support payments and production were largely eliminated (Young and Westcott). Production flexibility contract payments are not related to current production and prices. Nonetheless, these payments raise farmers' wealth, which may subsequently impact agricultural investment decisions. The 1996 Act retained the nonrecourse loan program with marketing loan provisions. When expected market prices are below marketing assistance loan rates, the commodity loan program has the potential to influence production decisions by guaranteeing a per-unit revenue floor to producers at the commodity's loan rate. The 1994 Federal Crop Insurance Reform Act provided a major overhaul of the U.S. crop insurance program by increasing subsidies and by introducing low-cost catastrophic coverage. Crop and revenue insurance are delivered through private insurance companies with the USDA's Risk Management Agency subsidizing insurance premiums and administrative costs. These subsidies have increased the use of crop insurance programs in the United States and therefore may have added to annual cropland plantings by reducing financial risks associated with crop production. Agricultural appropriations acts for fiscal years 1999 and 2000 included emergency and market loss assistance to U.S. agriculture, potentially creating long run market distortions if perceived by farmers as signaling a continuation of such programs.

#### How Programs Affect Production and Trade

This analysis focuses on incentives created by agricultural programs to alter production decisions. Subsequent impacts on trade from these programs derive from market adjustments to production impacts. The 1994 Uruguay Round Agreement on Agriculture (URAA) placed limits on domestic agricultural programs that require individual

C. Edwin Young and Paul C. Westcott are agricultural economists, Economic Research Service, United States Department of Agriculture.

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<sup>&</sup>lt;sup>1</sup> Green box expenditures totaled \$51.2 billion, with the majority of the expenditures for domestic food aid (\$36 billion), general services (\$6.8 billion), and decoupled income support (\$6.3 billion). Amber box expenditures totaled \$6.2 billion, of which \$5.8 billion was for dairy, sugar, and peanut market price support. Crop insurance is classified as a commodity nonspecific amber box expenditure, but commodity nonspecific expenditures are reported as zero since, in total, they do not meet the deminimus criteria. Expenditures of \$0.8 billion were excluded from the AMS based on the deminimus criteria.

countries to take into account the effects of their domestic policies on the international marketplace. The WTO is not concerned with the rationale or justification for different programs, but with the impact of the programs on trade.

Some farm programs mostly influence aggregate land use, with less effect on the mix of crops planted. Commodity nonspecific transfers, for example, can increase the overall level of agricultural production by increasing the wealth of farmers and thereby increasing agricultural investments. This increase in wealth shifts out the production possibilities frontier for all production, raising use of land and other inputs. Greater wealth does not affect the relative marginal returns from producing alternative crops, allowing market signals in general to allocate the additional acreage. Penalties associated with risk may be perceived differently by people who have different levels of wealth and, therefore, farmers' responses to risk may vary with their wealth levels.

Other programs are linked more closely to production of specific crops and thus distort the mix of crops planted in addition to total land use. Direct coupling occurs when program benefits are linked to the production of specific crops, so that those benefits increase the expected marginal returns to the commodity. Production decisions are based on the level of government payments in addition to expected returns from the marketplace. Cross-commodity effects can also result, because changes in expected returns for one commodity affect relative net returns as well, thereby influencing decisions to produce other crops. For farmers with land constraints, a coupled subsidy would likely alter the mix of crops planted, switching toward the subsidized (or more highly subsidized) crops. However, since some farmers would be able to expand land use, aggregate acreage could increase with the mix of crops shifting toward those with higher relative subsidies.

In addition to the effects of current payments, agricultural production can also be affected by programs that influence expectations. Programs that reduce risk, for example, modify the lower end of the distribution of expected returns and can lead to production distortions (Hennessy). Expectations about the nature of future programs may also affect current production decisions. For example, if farmers expect future payments to be based on current plantings, they may keep current plantings of those crops high.

#### **Production Flexibility Contract Payments**

The 1996 U.S. Farm Act fundamentally changed agriculture income support programs by replacing the target price/deficiency payment program with a new program of production flexibility contract (PFC) payments that are generally not related to current farm-level production or market prices. Total outlays for the payments were capped at slightly over \$36 billion for seven years, 1996–2002. To be eligible to receive payments, farmers entered into production flexibility contracts, requiring compliance with conservation, wetland, and planting flexibility provisions, as well as keeping the land in agricultural uses (which includes idling). Land eligible for PFCs included acreage enrolled in annual farm programs for any year from 1991 through 1995. Payments under these contracts are based on enrolled acreage and generally are not related to current plantings.

In its WTO notifications, the United States reports PFC payments as decoupled green box payments. Whether or not these payments are totally decoupled has been questioned (Tielu and Roberts, Hennessy). These authors argue that PFC payments are at least partially coupled since they increase farm operator wealth, which has several potential effects on production. First, lenders are more willing to make loans to farmers with higher guaranteed incomes because of a lower risk of default. This increase in loan availability may facilitate additional agricultural production. Second, with increased income from PFC payments, farmers can more easily invest in their farm operation. For example, increased income may facilitate additional agricultural investments by farmers who are constrained by debt or limited liquidity. The resulting increased investment in farm operations contributes to higher agricultural production in the long run. Another potential effect of PFC payments on production is that a guaranteed income stream may make farmers more willing to undertake riskier crops or strategies which have the possibility of higher returns. An increase in wealth resulting from PFC payments can change farmers' views of the penalties associated with risk levels of wealth changes. Farmers' responses to risk, therefore, might be very different at higher levels of wealth. Such a change in risk attitude can affect the mix of crops produced.

Initially, a decoupled payment affects farmers in the same way as a lump sum payment.

Profits rise, but since per-unit production costs do not change, output is not affected. The potential for PFC payments to distort the production decision depends largely on the strength of the wealth effects. Chavas and Holt developed an acreage response model for 1954 to 1985 that includes a wealth measure, proprietor equity in agriculture multiplied by the percentage of farm acreage planted to the crops. They derived wealth effect elasticities of 0.087 for U.S. corn acreage and 0.270 for U.S. soybean acreage. The corn wealth elasticity (0.087)and corresponding acreage impact may be too low in the current policy environment, since corn supply response was constrained by farm programs during part of the estimation period used by Chavas and Holt. The soybean wealth elasticity (0.270) would be less affected by past programs and therefore may be representative of wealth effects more generally under current law.

Assuming wealth effect elasticities for each of the seven U.S. crops covered by PFCs fall within the range provided by these corn and soybean estimates and assuming that farmers' wealth increases by the full value of PFC payments implies a possible aggregate acreage impact of 180,000 to 570,000 acres annually. The increased acreage will be allocated across crops by market returns. Increased investment in other, nonland factors of production could further raise production. However, lower prices that result from the increased production would lead to some moderation of production impacts and potential trade distortions.

PFC payments may also distort crop production decisions by requiring land to "remain in agricultural uses." While this requirement permits cropland to be idled, the PFC payments may be sufficient incentive to prevent some land from being converted to nonagricultural uses. Once the decision not to convert is made, the farmer then may decide to produce on that land if expected returns exceed the costs of production. Even if the land is idled, it is available to return to agricultural production if economic conditions warrant.

#### **Crop and Revenue Insurance**

Crop insurance plays a prominent role as part of the farm safety net in U.S. agricultural policy. The 1994 Crop Insurance Reform Act provided low-cost catastrophic coverage and instituted procedures to restrict enactment of disaster assistance. Crop insurance is provided through private insurance companies with the USDA's Risk Management Agency providing direction to the insurance companies, subsidizing premiums, partially reimbursing the costs of selling and servicing policies, and underwriting risk protection. The United States classifies crop insurance as a commodity nonspecific amber box program in its WTO notification, since the program does not meet all of the WTO green box criteria.

Insurance changes the distribution of expected revenues by reducing the financial risk associated with crop production variability. Government crop insurance subsidies are likely to alter producer behavior for a number of reasons (Schnepf and Heifner). Subsidies to insurance premiums represent a positive expected benefit and are likely to encourage greater participation in insurance programs. The increase in expected returns per acre resulting from subsidized insurance provides an incentive to marginally expand area in crop production.

Second, subsidies are calculated as a percentage of the total premium, which varies across crops and farms to reflect different risks of loss associated with each crop and each insurable acre. As a result, premium subsidies are higher for production of riskier crops and for production on riskier land. This subsidy structure favors production on acreage with higher yield variability and thus may encourage production on land that might not otherwise occur.

Third, Federal subsidies to private insurance companies for administration and delivery expenses likely increase insurance availability in remote areas.

Young et al. recently conducted a preliminary assessment of the extent of market distortions attributable to Federal crop insurance subsidies. This study proposes a methodology in which county-level, crop-specific subsidies on premiums, indemnities, and liabilities are converted to regional commodityspecific price wedges and incorporated into net returns measures used for production decisions. In this framework, the availability of subsidized crop insurance affects farmers' current crop production decisions by creating a direct incentive to expand production. Acreage and production impacts of crop insurance subsidies were analyzed on a crop specific and regional basis using a multi-year, simulation model (POLYSYS-ERS) that accounts for intra- and interregional acreage shifts and cross-commodity price effects. Their results represent average annual long-run effects with crop insurance fully operational, allowing for market impacts to stabilize.

Results suggest that crop insurance subsidies generate small shifts in aggregate plantings. For eight major field crops, annual federal crop insurance subsidies averaged \$1.4 billion during 1995–98. Assuming a continuation of this subsidy level, aggregate acreage in the long run was estimated to increase annually by approximately 600,000 acres (0.2%).<sup>2</sup> Interestingly, this estimated crop insurance impact exceeds the PFC impact estimated in the previous section even with a lower subsidy level, because crop insurance program benefits are more directly coupled to the production decision.

The insurance subsidies tend to move acreage more toward riskier crops and regions. Production is increased for six of the eight major crops. Nationally, wheat and cotton acreage show the largest percentage gains due to crop insurance subsidies. Since subsidies as a percentage of crop value for rice and soybeans are lower relative to those for other crops, rice and soybean acreage decline slightly. Stronger effects emerge at the regional level as planted acreage shifts away from the Southeast and Far West and toward the Plains States. The largest price impacts occur for cotton (down 2%) and wheat (down 1%). Price impacts for the other commodities are 0.3% or less. An additional important result is that cross-price and multiyear, price-feedback effects in the model simulations tend to dampen the initial own-price, subsidy effect, giving acreage shifts that are smaller than estimates which ignore those effects.

Consequently, crop insurance subsidies are estimated to have a small impact on U.S. exports and trade, reflecting market impacts of production changes. The largest relative distortions for U.S. exports occur for cotton. Wheat, corn, and barley exports increase moderately, while rice exports decline. Thus, with the exception of cotton, the current crop insurance program does not appear to distort U.S. exports significantly.

## **Marketing Loans**

Commodity loan programs in the United States are one of the primary domestic support programs and have been in existence since the 1930s. Over the past fifteen years, loan programs for major field crops have moved from price support programs to marketing loan programs which provide income support but no longer support market prices. While costs of marketing loan programs through 1997 were generally quite small, lower commodity prices in the last few years have resulted in significant program costs. Total marketing loan benefits rose from less than \$200 million for 1997 crops to more than \$3.8 billion for 1998 and could exceed \$7 billion for 1999 crops. For WTO purposes, marketing loan costs are reported as amber box.

Producers can benefit from the marketing loan program in two different ways. First is through the loan program. Farmers place their crop under the commodity loan program by pledging and storing some of their production as collateral for the loan, receiving a per-unit loan rate for the crop. Loans may be repaid at the loan repayment rate, which is based on local, posted county prices for wheat, feed grains, and oilseeds and the prevailing world market price for rice and upland cotton. When the loan repayment rate is below the loan rate, therefore, marketing loans allow repayment of the commodity loan at less than the loan rate, with the difference representing a cost to the government and a program benefit to producers.

Alternatively, farmers may choose to receive marketing loan benefits through direct loan deficiency payments (LDPs) when loan repayment rates are lower than commodity loan rates. In this case the farmer forgoes the possibility of placing the crop under loan. The LDP rate is the amount by which the loan rate exceeds the posted county price or the prevailing world market price and, thus, is equivalent to the marketing loan gain that could alternatively be obtained for crops under loan.

<sup>&</sup>lt;sup>2</sup> Keeton, Skees, and Long argue that since many of the production effects of crop insurance come from farm-level incentives, aggregation of crop insurance impacts into a national modeling framework may underestimate production distortions. However, as one reviewer of this article points out, the Young et al. methodology treats the insurance subsidy as a certainty equivalent. Many farmers are reluctant to purchase subsidized crop insurance because of the low probability of a payout, suggesting that a certainty equivalent framework may overestimate production effects.

Assuming that the sales price for the crop is equal to the posted county price, the marketing loan program provides producers with an effective per-unit revenue floor at the loan rate. However, the marketing loan program does not establish a floor for market prices.

A recent study (Westcott and Price) analyzed how the marketing loan program can lead to market distortions. The study uses the USDA's 1999 baseline and simulations of an econometric model for the U.S. agricultural sector (FAPSIM), focusing on the marketing loan program for soybeans. From a scenario with soybean price expectations 40 to 50¢ below the soybean loan rate in 1999 and 2000, soybean marketing loans were estimated to add 1.1 to 1.2 million acres to soybean plantings in those years. Higher net returns for soybeans drew some of this increase in soybean plantings from competing crops (cross commodity effects), particularly corn, sorghum, and upland cotton. However, total planted acreage increased 100,000 to 200,000 acres. Importantly, acreage distortions were largely confined to those years when prices were below the loan rate for soybeans, years when marketing loan benefits augmented market returns and distorted production incentives. Only small effects on plantings in subsequent years occurred when prices rose above loan rates and marketing loan benefits were no longer present.

Trade distorting effects of soybean marketing loans in the simulations result from the effects on planted acreage. U.S. exports for soybeans, soybean meal, and soybean oil rose by 1 to 2%. Cotton exports declined by 1 to 2%, while corn and sorghum exports declined by less than 1%. As with the acreage effects, impacts on U.S. exports were primarily in the two years in the scenarios when marketing loan benefits existed, with limited effects in subsequent years.<sup>3</sup>

As noted in the study, the full effects of marketing loans are somewhat underrepresented in these results because of modeling simplifications assumed. Other impacts would reflect additional marketing loan benefits due to the seasonal movement of prices within a crop year and the reduction of downside income risk because the program truncates the distribution of expected revenues at the loan rate. Further, the magnitudes of the estimated impacts were specific to the situation that was analyzed, with results dependent on the size of the marketing loan benefits in the scenario. In higher price situations, impacts of marketing loans on markets would be smaller. Conversely, in lower price situations, impacts would increase.

#### **Disaster Assistance**

Ad hoc disaster programs have had a prominent role in U.S. agriculture. Crop insurance reform legislation in 1994 included language intended to eliminate ad hoc disaster assistance, in part because such payments were viewed as displacing some use of insurance programs. However, more recently, emergency spending legislation enacted in 1998 and 1999 included disaster assistance for crop losses as well as direct "market loss assistance" payments to the sector.

Most disaster payments are typically made *ex post*, occurring after production decisions have been made. They thus can be argued to not distort production and, as such, are permitted under the WTO to be reported in the green box, subject to specified criteria. On the other hand, if producers have expectations of future assistance based on past government actions, then production decisions may be influenced. In discussing financial aid to the farm sector, Barry commented that "it is hard not to plan on government assistance when it comes so easily."

If disaster assistance is expected with some probability when prices or production fall to low levels, such expectations modify the bottom of the revenue distribution. The resulting increase in expected producer returns may lead to higher production than would otherwise occur. In so doing, these programs encourage producers to keep riskier land in production.

The more that disaster aid is viewed as being effectively coupled to specific production activities, the greater the degree that expected future benefits can influence production choices. Disaster assistance that addresses crop-specific production problems, for example, can be viewed as similar to coupled crop insurance and is likely to lead to

<sup>&</sup>lt;sup>3</sup> This result differs from effects of a price-supporting loan program as existed prior to the marketing loans being introduced. For such a program, stock accumulation by the government through loan defaults in lower-priced years leads to release of government stocks at a later time, thus extending market impacts, including exports effects, over a longer time period. However, multi-year, cumulative impacts under a price-supporting loan program are largely offsetting.

expanded production of those crops. In contrast, less specific and less coupled disaster assistance payments would impact aggregate production more generally.

### Implications

Each of the four U.S. domestic agricultural support programs discussed in this article increases U.S. production somewhat by affecting planting decisions, in the aggregate and/or for specific crops. As such, each program has some market distorting effects on U.S. exports and global trade. Production distortions of these programs may overlap somewhat, reflecting the potential for some substitution between the programs, such as expectations of disaster assistance displacing use of crop insurance. Additionally, increased production due to these programs will tend to reduce prices, which with the planting flexibility provided by the 1996 Farm Act will result in partly offsetting reductions in production as producers respond to the lower prices. Thus, while exports remain marginally higher as a result of these programs, net impacts appear to be small.

Crop insurance and marketing loans create direct incentives to expand production of specific commodities by increasing expected returns per unit of production. Crop insurance changes the distribution of expected income at low yields, with subsidies that encourage production of riskier crops and production in riskier regions. Marketing loans truncate the distribution of expected perunit revenues, with program benefits creating an underlying distortion to produce specific crops when prices are near or below loan rates.

If ad hoc disaster assistance is not expected by the recipients at planting time and occurs after production decisions are made, disaster assistance may have little or no impact on current production. However, if producers of specific crops or in specific regions expect periodic disaster assistance based on past payments, these expectations can influence production.

In contrast, production flexibility contract payments seem to be the least coupled of the programs discussed. These payments create a small incentive to increase aggregate production, with the mix of crops planted based on market signals. Among the four programs, PFCs may have the smallest effect on markets per dollar because they are less directly coupled to the production decision.

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