Influences of Decoupled Farm Programs on Agricultural Production

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Introduction

Direct government payments to the U.S. agricultural sector and other farm program benefits have significantly boosted farm income during the past several years. Direct government payments exceeded $20 billion annually in 1999 through 2001 (figure 1). More than a third of these direct payments were disbursed as emergency assistance. These payments augmented direct payments from existing farm commodity programs, such as production flexibility contract payments and marketing loan benefits (loan deficiency payments and marketing loan gains), as well as payments from conservation programs such as the Conservation Reserve Program. Besides direct payments, other support to the sector includes crop insurance premium subsidies and price supports for selected commodities (dairy, peanuts, sugar, and tobacco).

Figure 1
Direct government payments

$ billion

- Emergency assistance
- LDPs and marketing loan gains
- Production flexibility contracts
- CRP and other

Calendar year
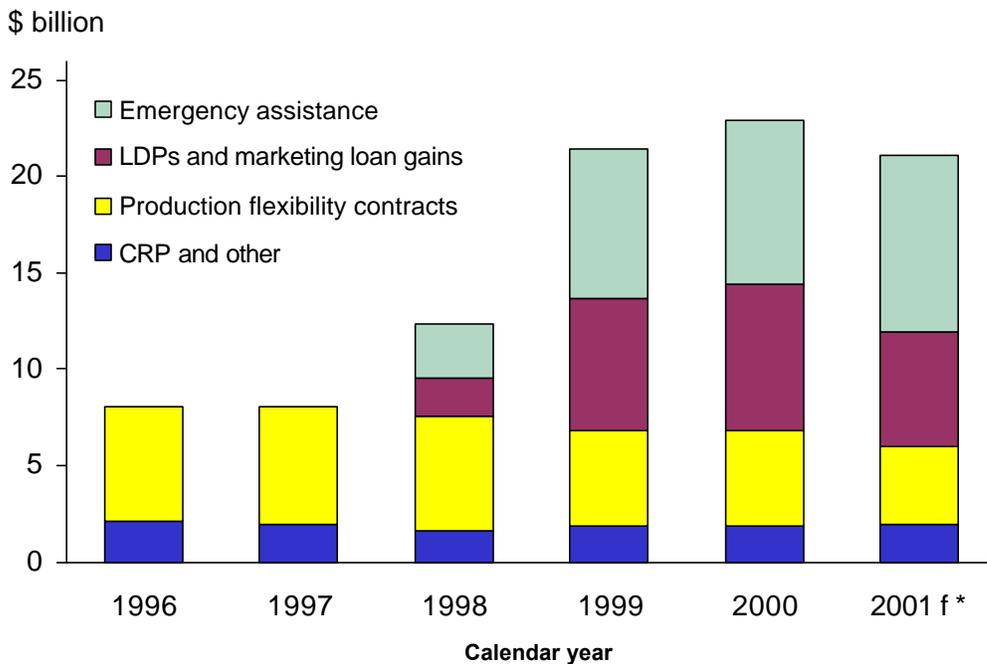
* January 2002 forecast.
Source: Economic Research Service, USDA.

Different types of government payments and other farm program benefits influence agricultural markets in different ways. A billion dollars of loan deficiency payments, for example, will affect production decisions and market outcomes differently than $1 billion of production flexibility contract payments. Variation in effects across different types of farm programs largely reflects the degree of dependence of the program benefit on farmers' behavior and market outcomes and, in turn, the nature of the linkages from the benefit back to production choices.

Farm programs are thought of as being coupled if there is a strong or 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 net returns associated with specific production choices. As a result, these programs have the greatest potential to affect agricultural production and agricultural markets.

In contrast, farm programs are thought of as being decoupled if program benefits do not depend on the farmer's production or market conditions. Effects of these programs on agricultural markets tend to be smaller, less direct, and more general (less commodity specific) because, although these program benefits raise total revenues, they do not change per-unit net returns of production alternatives.

The focus of this paper is how farm programs that are not directly linked to production decisions of farmers can, nonetheless, create economic incentives that have indirect influences on those production decisions. We focus on potential production impacts because, in general, other market impacts of government payments largely reflect the degree to which program-related

economic incentives alter agricultural production decisions. That is, subsequent effects on prices, domestic use, and exports reflect market adjustments to those changes in production. To provide a reference point for discussing decoupled programs, we start with a short overview of how coupled programs affect agricultural markets. We then discuss various mechanisms through which agricultural programs that are more decoupled can have market effects.

Coupled Programs Affect Aggregate Land Use and Crop Mix

In general, 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 directly linked (coupled) to production of specific crops increase expected returns to those commodities. As a result, production decisions for those commodities are based on expected returns from both the marketplace and the government payments. Additionally, cross commodity effects may occur because changes in expected returns for one crop affect relative net returns, thereby potentially influencing production decisions for other crops. Thus, cross commodity impacts on production reflect the effects of the crop-specific program benefits on relative net returns among competing crops.

Farmers with land constraints would likely respond to a coupled payment by altering the mix of crops planted, switching toward crops with higher benefits resulting from the payments. Farmers who can expand land use would likely increase total planted area and also shift the mix of crops toward those with relatively higher benefits of the coupled payments. In the aggregate, total land use is expanded and the crop mix is altered.[1]

To illustrate these effects, results are summarized here of two studies that provide economic frameworks for analysis of coupled programs (crop insurance and marketing loans) and empirical examples of how their benefits directly augment market returns and thereby influence planting decisions.

Crop insurance changes the distribution of expected income at low yields. Crop insurance premium subsidies are proportional to the premium. Thus, since premiums are higher for riskier crops to insure against losses, crop insurance premium subsidies are higher for those crops. As a result, this premium subsidy structure encourages production of riskier crops and production in riskier regions. Young, Vandeveer, and Schnepf report that government crop insurance subsidies 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 truncate the distribution of expected per-unit revenues for low market price outcomes. When commodity prices are below commodity loan rates, program benefits augment market receipts and thus create an incentive to produce specific crops. Annual impacts 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 the last several years, total acreage planted to eight major field crops was estimated to have been increased by 2 to 4 million acres annually in 1999 through 2001. Within the aggregate increases in plantings, acreage impacts for individual crops reflect year-specific expected relative benefits among cropping alternatives.

Decoupled Programs Influence Aggregate Land Use and Productivity

Benefits of decoupled programs do not depend on current production or market outcomes. In turn, production decisions are not directly affected by decoupled payments because per-unit net returns do not change. Nonetheless, these payments can still affect production, although impacts are less direct than those of coupled payments. In general, because decoupled payments typically are not crop specific, influences tend to be more at the aggregate level, such as on total land use or on overall productivity gains. Compared to coupled, crop-specific payments, decoupled payments typically have less effect on the mix of crops planted. That is, an aggregate decoupled subsidy increases aggregate resource use and production, but the allocation of the resulting increase in acreage to different crops will reflect expected market returns across competing uses rather than the decoupled subsidy. Additionally, lower prices that result from any production increases can moderate the initial production effects and other market impacts.

Avenues for Effects of Decoupled Programs

There are many avenues through which decoupled payments may influence agricultural production and markets. Four mechanisms are discussed in the remainder of this paper, including effects through producers' wealth and investment, effects through sector consolidation, effects through program eligibility and payment basis considerations, and effects through ad hoc programs and changes in producer expectations over time.

While these mechanisms of influence for decoupled payments are discussed separately in this paper, farm programs typically encompass multiple features that have potential market impacts, with individual mechanisms often overlapping. Additionally, although these mechanisms are discussed here in the context of decoupled programs, coupled programs may also influence

production through these mechanisms, in addition to the more direct effects that coupled programs have through their augmentation of returns from the marketplace. Also, many farm programs are only partly decoupled, having both coupled and decoupled properties. Further, for some programs, the degree of being coupled or decoupled may change over time, particularly if the program alters farmers' expectations of future program benefits.

Wealth and Investment Effects

There are three ways for payments to affect production through farmers' wealth—a direct wealth effect, a wealth-facilitated increased investment effect, and a secondary wealth effect resulting from the increase in investment.

Direct Wealth Effect. Decoupled payments can increase the overall level of agricultural production through their direct effects on the wealth of farmers. Increases in wealth reflect gains in farm sector equity that result from the capitalization of expected future farm program benefits into the value of farmland. Land value impacts of future government programs and potential production effects differ depending on whether the unrealized expected payments are viewed as short-term, one-time benefits or whether they are viewed as more-permanent, longer run benefits. For example, an unrealized one-time government payment of $1 billion due in a year would be capitalized into current land prices with an after-tax, present value of $613 million (assuming an average marginal income tax rate of 35 percent and a 6 percent discount rate).[2] But an expectation of a longer-run, permanent stream of government payments of $1 billion annually would be capitalized into land prices with a $10.8 billion after-tax, present value.

Chavas and Holt developed an acreage response model that includes a wealth measure (farm equity), and derived U.S. wealth effect elasticities of 0.087 for corn and 0.27 for soybeans. Using these estimates, wealth effects on production through increased land use would be a one-year impact of less than 60,000 acres of additional plantings for the one-time $1 billion payment, and would be 0.3 to 1.0 million acres annually for permanent government payments of $1 billion a year.

Greater wealth does not affect the relative returns between alternative crops. Thus, in general, the allocation of any increase in acreage among competing uses would be determined by market signals. However, some change in cropping patterns can result if changes in wealth influence farmers' perception of, attitudes towards, and responses to potential financial risks associated with production alternatives. For example, if payments raise producers' wealth and lower their risk aversion (as indicated by the Chavas and Holt results), they may take on more risk in their production choices. This may entail a choice to increase overall production and may also change the mix of production, perhaps switching to riskier crops with higher mean (but more variable) expected returns.

Investment and Secondary Wealth Effects. Increased cash flow provided by decoupled payments and higher wealth through capitalization of future benefits into land values may also facilitate additional production through increases in agricultural investment if farmers otherwise face binding debt constraints or limited liquidity. Lenders may be more willing to make loans to farmers with higher guaranteed incomes and lower risk of default. Greater loan availability facilitates additional agricultural production by allowing farmers to more easily invest in their farm operation.

For some farmers, increased liquidity provided by decoupled payments also may displace the need for obtaining loans for short-term operating costs or for longer-term farm-related investments. While there would be opportunity costs associated with self-financing and using these funds in the farm operation, those opportunity costs would be lower than commercial loan expenses. This lower cost of capital could lead to an increase in the overall size of the current operation and could raise the level of investment in the farm, both of which would increase farm output. Some production impacts occur immediately and other impacts are longer term, reflecting multi-year gains from increased investment in the farming operation. Some effects of increased investment may be yield enhancing and increase output directly, while others may increase production incentives by lowering unit production costs and thereby increase output more indirectly. Further, such investments raise farm sector equity and wealth, thereby providing an additional, secondary avenue to wealth effects on production.

Wealth and Investment Effects of Production Flexibility Contract Payments. Production flexibility contract (PFC) payments paid to U.S. farmers in 1996-2002 under provisions of the 1996 farm act totaled nearly $36 billion. These payments were based on historical acreage rather than current production and did not depend on market conditions. They did not introduce distortions, such as per-unit revenue truncation or relative commodity price distortions, and were thus nearly fully decoupled from crop-specific production decisions of farmers. However, these payments could have had effects on production through the wealth and investment mechanisms discussed earlier in this section.

The 7-year PFC payments fall in between the two extremes of one-time payments and permanent payments discussed earlier, being multi-year, but finite-horizon, non-permanent payments.

Direct wealth effects of these payments on acreage would change each year reflecting the capitalized value of the remaining unrealized future PFC payments. Impacts would be largest for 1997 when there were 5 remaining annual payments yet to be received. The after-tax, capitalized present value of those 5 remaining payments would be $13.4 billion, with possible acreage impacts ranging from 0.4 to 1.2 million acres, using the aforementioned Chavas and Holt elasticities of acreage response to wealth. Subsequent year impacts would be smaller as the remaining outstanding PFC payments declined. By 2001, with only the 2002 PFC payment yet to be received, the after-tax, present value of that payment would have added about $2.4 billion to land values, with a corresponding wealth effect on acreage of 70,000 to 225,000 acres.

Westcott and Young report acreage impacts of PFC payments due to increased agricultural investment and associated secondary wealth effects. The magnitude of these effects depends on (1) the increase in investment in the farm enterprise and the corresponding change in agricultural wealth, and (2) the strength of the agricultural wealth effect on output. Using the Chavas and Holt wealth elasticities again, impacts on aggregate plantings are relatively small, with high-end estimates reported that range from 225,000 to 725,000 acres. The largest of these estimates still represents a small portion of total U.S. cropland (less than 0.3 percent). To the extent that additional investment would also raise yields, the upper bound estimate for production impacts of these investment and secondary wealth effects could be somewhat larger. Also, while these production impacts are smaller than the early-year, direct wealth effect impacts of PFC payments, the investment and secondary wealth impacts are more long lasting since increases in investment raise farm sector equity and wealth more permanently, while the capitalization of the finite-horizon, remaining future PFC payments into land values and wealth declines each year and ends once the last year's payments have been received.

Sector Consolidation Effects

Decoupled payments can affect agricultural production through their influences on consolidation

in the sector. Consolidation in the agricultural sector has been a long-term trend, reflecting

increased productivity in the sector as well as movement to the nonfarm economy.   How

decoupled payments may affect this ongoing trend is of importance. Although the annual

decline in farm numbers slowed to 0.1 percent in 1993-1999, farm numbers decreased an average

of 0.8 percent from 1999 to 2001, with the reduction during this 2-year period mostly in small

farms with annual sales under $10,000 (USDA, NASS).

Two competing arguments are discussed here regarding the potential effects of decoupled

payments on consolidation. On the one hand, decoupled payments could slow sector

consolidation somewhat if the payments keep marginally viable, smaller farms in business longer

than otherwise. Such farms may be able to cover short-term variable expenses associated with

the yearly decision to produce, but these farms may not be able to cover longer-run total

economic costs, remaining in the sector only because of equity gains related to capitalization of

farm program benefits into rising land values. In general, these farms tend to be less efficient

production operations, so at the margin, keeping them in the sector would be expected to lower

aggregate production if the land alternatively would be used by more-efficient, larger producers

with higher yields.

On the other hand, decoupled payments could accelerate sector consolidation if larger operations

use the payments to purchase smaller operations or to rent more acreage. This 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

impacts may reflect increased production incentives due to reductions in unit production costs.

Caswell, et al. also reported that larger-sized farms tend to have higher per-acre application rates

for a number of inputs, which would be an expected economic response to lower unit production

costs resulting from higher efficiency.

Empirically, government payments go disproportionately to larger operations relative to the

number of farms (Hoppe) because most payments are based on acreage and/or production.

Decoupled payments would have a similar size-class distribution, because they typically reflect

historical acreage and/or production. Thus, increased consolidation in the sector is likely to be

the larger effect of decoupled payments.

However, output-enhancing impacts of increased consolidation would apply only to land that

moved into a larger operation through sale or rent. Further, some consolidation might have

occurred anyway even without the decoupled payments, and some may have otherwise occurred

at a later date. Thus, consolidation that occurs as a result of decoupled payments probably just

marginally accelerates trends that are already ongoing in the sector, with only small effects on

aggregate yields and production.

Benefit Eligibility and Payment Basis Effects

Some farm programs (such as production flexibility contracts) provide benefits that are not

linked to current production decisions or market prices but are weakly coupled to production

decisions through land use constraints that require land to remain in agricultural uses as a

condition of eligibility for the benefits. Although these program requirements may permit the

land to be idled, such programs can affect overall crop production by providing sufficient 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.

The basis for the distribution of farm program benefits may also affect producers' expectations of how future benefits will be disbursed. Payments that are linked to past production may lead to expectations that benefits in the future will be linked to then-past, but now-current, production. Such expectations can thereby affect current production decisions. For example, farmers may not fully use planting flexibility to move 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 to use for possible future base acreage updating, thereby constraining their response to 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.

For either case, updating acreage bases or updating payment yields, economic efficiency in production is reduced because producers would not be fully responding to signals from the marketplace, but instead would be responding to market signals augmented by expected benefits of future programs and future program changes.

Ad hoc Programs and Changing Producer Expectations Effects

A program's degree of decoupling can change over time. Some programs may initially be decoupled, but then ultimately influence production decisions by altering producers' expectations and thus become at least partly coupled.

Ad hoc emergency assistance programs that result in payments that are announced and distributed after production decisions have been made may initially be decoupled and can be argued to not distort production. However, these programs change producers' realized revenues and, in doing so, may truncate the distribution of future expected revenues by altering expectations of the likelihood of such payments occurring again in certain market situations. As a consequence, these payments may become less decoupled over time, potentially affecting production decisions. That is, if producers have probabilistic expectations of future assistance based on past government actions, particularly if there is a connection (or perception of a connection) between such payments and market conditions, then production choices may be influenced by the prospect of such payments. For example, with emergency assistance packages enacted in the United States several times over the past few years, farmers may now expect this type of government assistance to be more likely when prices or production are low.

Programs that reduce the risk of low revenue outcomes can lead to production impacts by raising the lowest level of expected returns and thereby reducing financial risk. Expectations of assistance when prices or production fall to low levels increase expected producer returns and may lead to higher production than would otherwise occur. The more that these ad hoc benefits are viewed as linked to specific production activities, the greater their influence on production choices for those activities. Periodic assistance that addresses crop-specific production

problems, for example, can be viewed as similar to fully-subsidized crop insurance, affecting

planting decisions by reducing risk and likely leading to expanded production of those crops. In

contrast, less specific assistance would impact aggregate production more generally.

Conclusions

Coupled farm programs such as crop insurance and marketing loans create direct incentives to

expand farm output of specific commodities by increasing expected returns per unit of

production. In contrast, decoupled programs have indirect influences on production.

Four mechanisms through which decoupled payments may affect production are discussed in this

paper--wealth and investment effects, sector consolidation effects, program eligibility and

payment basis effects, and ad hoc programs and changing producer expectations effects. Farm

programs typically encompass multiple features, with these mechanisms overlapping. Coupled

programs may also influence production through these mechanisms. Many farm programs have

both coupled and decoupled properties, and some programs may change their degree of being

coupled or decoupled over time.

Most decoupled programs create incentives to increase aggregate production, although the mix

of crops planted is based on market signals because decoupled program benefits do not depend

on market conditions or the farmer's production, and per-unit revenues among competing crops

are not changed. There is a need for further research into the effects of decoupled programs.

Nonetheless, most effects of decoupled programs seem to be relatively small. However, no

program appears to be completely decoupled from potential impacts on agricultural production.

To the extent that production is affected by decoupled payments, these agricultural programs have additional market effects on prices, domestic use, and exports. However, increased production resulting from programs will tend to lower market prices, and these price declines, along with planting flexibility provided by the 1996 farm act, can moderate some of the initial increase in production. Nonetheless, the net change is for an increase in production as a result of decoupled payments.

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Disclaimer

The views expressed in this paper are those of the authors and do not necessarily reflect the views of the U.S. Department of Agriculture.

Endnotes

1. Some production impacts may be mitigated by other policies that constrain output, such as acreage reduction programs in the United States prior to 1996 and land set asides in the EU.

2. The 35 percent net average marginal income tax rate is an approximation that assumes average federal rates of 23-24 percent, average state rates near 5 percent, self-employment tax rates of about 10 percent, and an adjustment to reflect tax deductions allowed for investment of part of the government payments.

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