## Effects of the 2002 Farm Act on U.S. Agriculture

The 2002 Farm Act introduced a number of new commodity program provisions in addition to continuing many programs that existed under prior legislation. Assessing the impacts of the new legislation on agricultural commodity markets involves the interaction of various types of programs that may have direct and indirect influences on production. Marketing loans, for example, which existed under the 1996 Farm Act, are based on current production and market prices and directly affect production decisions of farmers, particularly when prices are relatively low.

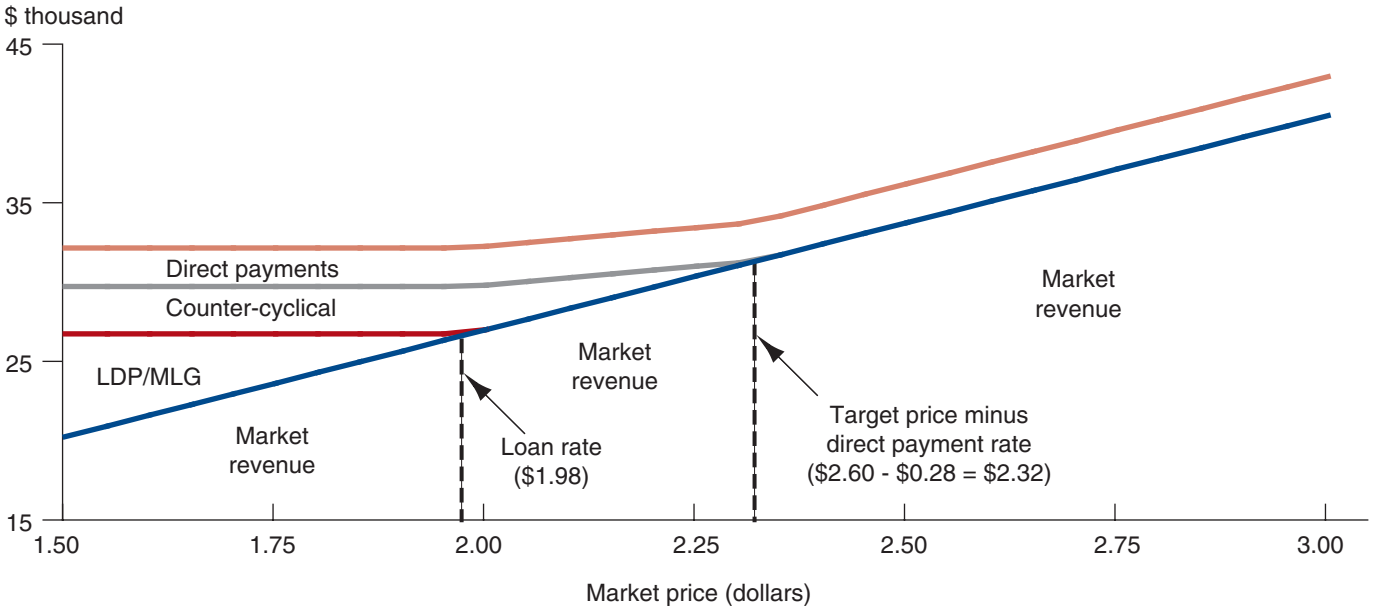
On the other hand, less direct market impacts may result from other commodity programs. Some of the challenges in assessing impacts of the new legislation relate to whether various types of income-support programs that provide program benefits that are decoupled from producers' current levels of production may, nonetheless, provide indirect incentives that influence production decisions and overall output. In particular, qualitative arguments suggest that counter-cyclical payments, direct payments, and acreage base and payment yield updating provisions of the 2002 Farm Act could have some influence on production. These impacts are likely to be relatively small, although further research is needed to provide measures of those effects.

This section provides a discussion of an initial assessment of the effects of the 2002 Farm Act on agricultural commodity markets. The discussion is presented in three parts. First, we analyze the income-support mechanisms of the new law through an illustration of revenue sources for a program crop on a farm to show the roles of the different provisions. Second, we present a qualitative discussion of potential sources of effects of counter-cyclical payments, direct payments, and base acreage and yield updating provisions of the 2002 Farm Act. Third, we discuss results of a quantitative, sectorwide analysis of effects of the 2002 Farm Act, based on model simulations of key provisions of the new law compared with a continuation of the 1996 Farm Act.

### Illustration of Income-Support Provisions

To illustrate some of the properties of income-support provisions of the new legislation, we analyze an example of corn market revenues and program payments for 2002 program provisions (figs. 4 and 5). Revenue calculations are for a farm with 100 acres of corn, 100 acres of corn base, and corn yields of 135 bushels an acre, with a program-payment yield of 103 bushels an acre used for direct payments and an updated payment yield for CCPs of 120 bushels an acre. In this example, it is assumed that the farmer has chosen to plant the same crop as the acreage base on the 100 acres.

Figure 4
**Corn revenues under the 2002 Farm Act**




Note: Assumes 100 acres of corn, 100 acres of corn base, 135 bushels/acre yield, 103 bushels/acre direct payment yield, and 120 bushels/acre counter-cyclical payment yield.

### *Basic Case*

The portions of figure 4 labeled "Market revenue" represent receipts from the marketplace, which increase as market prices rise.

The triangle labeled "LDP/MLG" represents marketing loan benefits in the form of loan deficiency payments (LDPs) and/or marketing loan gains (MLGs) that supplement market revenues at market prices below the loan rate ($1.98 for corn). As prices fall below the loan rate, marketing loan benefits rise and fully offset declines in market revenues since these program benefits are available for all production of loan eligible commodities.

The area of figure 4 labeled "Counter-cyclical" represents the counter-cyclical payments under the 2002 Farm Act. Counter-cyclical payments are linked to market prices, with payments provided when prices are below the target price minus the direct payment rate ($2.60 minus $0.28, or $2.32, for corn). Payments increase as prices decline below $2.32 until they reach the loan rate ($1.98 for corn). For prices below the loan rate, counter-cyclical payments are at their maximum and do not change. Counter-cyclical payments do not fully offset reductions in market revenues as prices fall from $2.32 to $1.98 because payments are made on 85 percent of the fixed acreage base and are paid on CCP payment yields rather than actual yields, and thus do not change with the farm's production.

The area of figure 4 labeled "Direct payments" are fixed payments of $0.28 a bushel for corn, paid on 85 percent of the acreage base and a payment yield. These payments do not change with market prices or the farm's production.

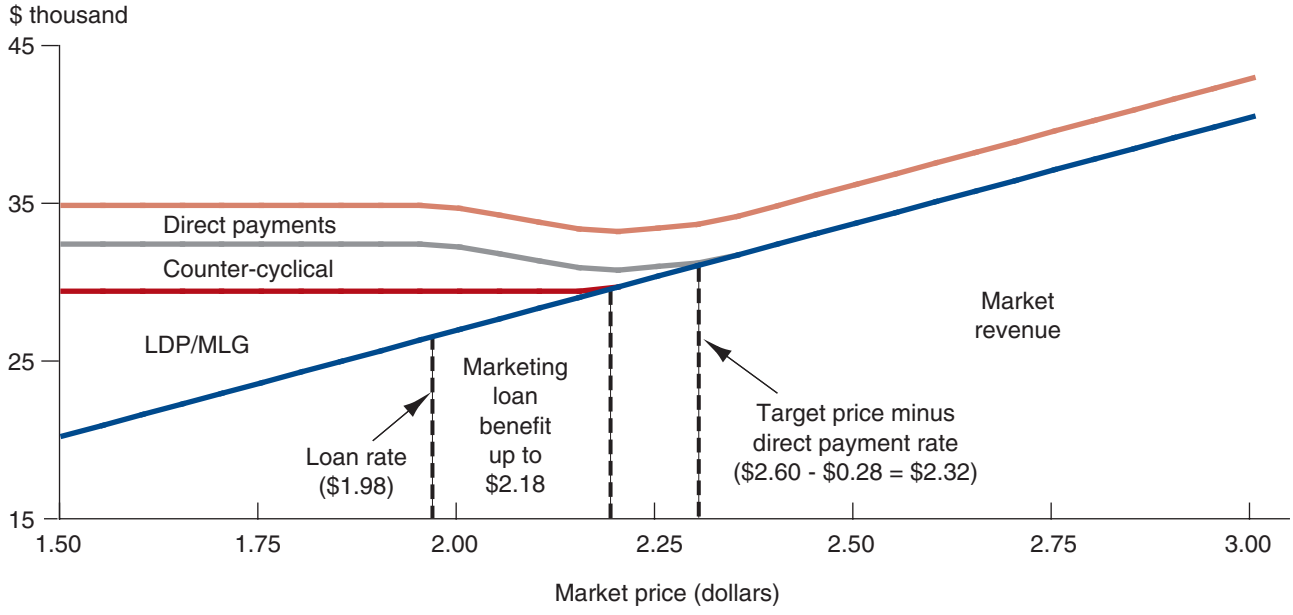
### *Marketing Loan Benefits and Counter-Cyclical Payments*

Figure 5 extends the analysis of figure 4 to illustrate that counter-cyclical payments are likely to overlap with counter-cyclical aspects of marketing loan benefits in certain price ranges. In figure 4, marketing loan benefits are assumed only for season average prices below the loan rate. However, marketing loans have enabled farmers to attain per unit revenues that, on average, exceed commodity loan rates when prices are relatively low. Many farmers use a two-step marketing procedure in which they receive program benefits when prices are seasonally low (and marketing loan benefits high) and then sell the crop later in the marketing year when prices have risen (Westcott and Price).

Figure 5 includes a representative level of $0.20 a bushel for corn for the expected above-loan-rate revenue facilitated by marketing loans when prices

Figure 5

**Corn revenues under the 2002 Farm Act, with above-loan-rate marketing loan benefit**




Note: Assumes 100 acres of corn, 100 acres of corn base, 135 bushels/acre yield, 103 bushels/acre direct payment yield, and 120 bushels/acre counter-cyclical payment yield. Assumes per unit revenue facilitated by marketing loans exceeds loan rate by an average of 20 cents/bushel.

are low, based on the experience of recent years.[8] With this expectation, average per unit market receipts and marketing loan benefits are kept from falling below $2.18. As a result, expected counter-cyclical payments overlap with counter-cyclical aspects of marketing loan benefits in the price range from $1.98 to $2.18, in effect providing two counter-cyclical benefits to farmers. As season average prices fall in this price range, both counter-cyclical payments and marketing loan benefits rise, causing total revenues to increase.

### *Producer Incentive Prices for Planting Decisions*

In the corn farm examples presented in figures 4 and 5, the farmer is assumed to plant the same crop as the acreage base for illustration purposes. Of the different government payments, marketing loans have the greatest direct effect on production decisions of farmers because these program benefits are fully coupled to farmers' current production. When prices are relatively low, marketing loan benefits supplement returns from the marketplace for all units of production, thus raising the producer incentive price underlying planting decisions.

In contrast, direct payments and counter-cyclical payments for corn, in this example, are essentially decoupled from current production because they are paid to the farmer regardless of whether corn (the base acreage crop) is planted. When the farmer is making planting decisions, the marginal revenue of additional production is not affected by these program benefits because those payments are paid on a portion of historical acreage and historically based program yields. Thus, the producer incentive price for output at the margin is unaffected by these payments, equaling the market price (if prices are higher than levels where marketing loan benefits exist) or the market price augmented by the marketing loan benefit when prices are relatively low.

Nonetheless, although counter-cyclical payments and direct payments do not directly alter producer incentive prices, less direct impacts on commodity markets may result from these programs, as discussed in the next section.

## Counter-Cyclical Payments, Direct Payments, and Base Acreage and Payment Yield Updating Provisions

Counter-cyclical payments, direct payments, and provisions of the 2002 Farm Act that permit the updating of base acreage and payment yields may affect the agricultural sector, even though benefits of these provisions are not linked to current production of farmers. This section provides a qualitative discussion of some of these potential influences. There is no available research that provides quantitative measures of the potential impacts so these effects are not included in the estimated impacts of the new legislation later in this report. However, these influences are likely to be relatively small, particularly compared with price- and production-linked coupled programs such as marketing loans.

### *Counter-Cyclical Payments*

Counter-cyclical payments do not affect producer net returns at the margin but may influence production decisions because their link to market prices may reduce revenue variability and risk.[9]

***Counter-Cyclical Payments Do Not Affect Marginal Revenues.*** Counter-cyclical payments under the 2002 Farm Act are essentially decoupled from an individual farmer's planting decisions since they are paid on a constant, pre-determined quantity for the farm (equal to 85 percent of a fixed acreage base times a fixed CCP payment yield) and they are not affected by a farmer's current production. The expected marginal revenue of a farmer's additional output is the expected market price (augmented by marketing loan benefits when prices are relatively low), so counter-cyclical payments do not affect production directly through expected net returns. Thus, production decisions at the margin are based on market price signals and are not directly influenced by the counter-cyclical payments.

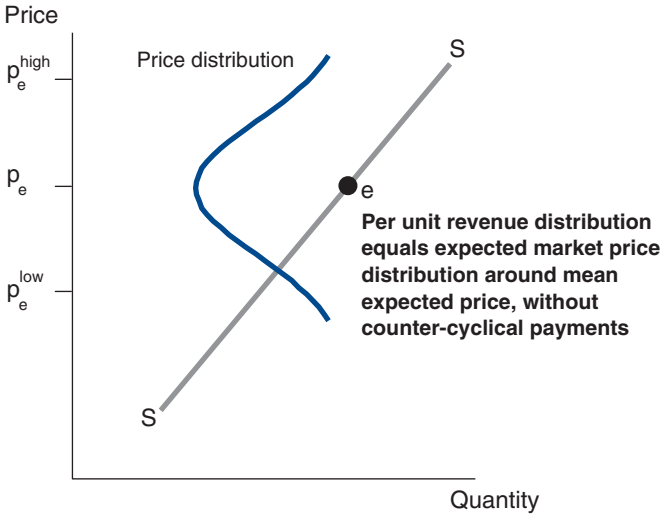
***Revenue Risk Reduction Effects of Counter-Cyclical Payments May Affect Supply Response.*** However, because counter-cyclical payments are linked to market prices, they may influence production decisions indirectly by reducing total and per unit revenue risk associated with price variability in some situations. In the price range from the loan rate up to the target price minus the direct payment rate, changes in producer revenues due to changes in market prices are partly

[8]Realized, average per unit revenue (market revenue plus the average marketing loan benefit per bushel) for corn was $0.22 above the loan rate for the 2000 crop and an estimated $0.20 a bushel above the corn loan rate for the 2001 crop.

[9]Counter-cyclical payments may also affect agricultural production through wealth and investment effects, as discussed for direct payments in the following section.

Figure 6

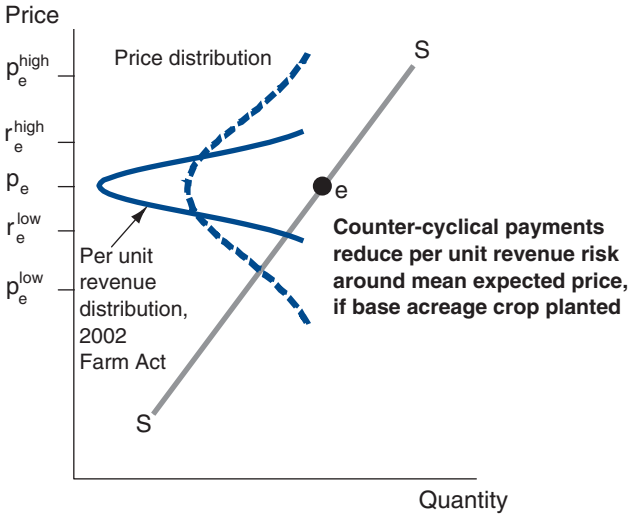
**Supply curve and price (per unit revenue) risk under the 1996 Farm Act (without counter-cyclical payments)**




Note: Price distribution shown is hypothetical.

Figure 7

**Supply curve and reduced per unit revenue risk under the 2002 Farm Act (with counter-cyclical payments)**




Note: Price and per unit revenue distributions shown are hypothetical. They are used here to illustrate concepts related to counter-cyclical payments in the price range where these payments vary.

offset by the counter-cyclical payments if the base acreage crop is planted (or a crop with highly correlated prices with the base acreage crop), thereby reducing total revenue risk associated with price variability.[10]

***Analytical Frameworks for Counter-Cyclical Payments.*** A simplified representation of this revenue risk reduction aspect of counter-cyclical payments is shown in figures 6 and 7. In these depictions, the farmer is assumed to plant the same crop as the base acreage crop on the farm and prices are assumed to be in the range where CCPs vary (from the loan rate up to the target price minus the direct payment rate). Also, the price and per unit revenue distributions shown in the figures are hypothetical, used only to illustrate concepts related to counter-cyclical payments.

Figure 6 represents the situation with no counter-cyclical payments, such as under the 1996 Farm Act. The supply curve is SS and the expected price of $p_e$ gives a supply response at point e on SS. Implicitly associated with any point on the supply curve is a distribution of price outcomes around the mean expected price. This is represented by the "Price distribution" curve in figure 6, showing price expectations within some level of probability ranging from a low of $p_e^{low}$ to a high of $p_e^{high}$.

[10]The extent of the offset depends on how much of the acreage base is planted, as well as the relationship between the producer's expected selling price for the crop and expected season average price.

With no counter-cyclical payments in figure 6, there is a direct correspondence between changes in market prices and changes in revenues if prices are in the assumed range where the new CCPs vary. As a result, market price variability represented by the price distribution curve in figure 6 also represents per unit revenue variability. For example, if the production decision for a corn producer is based on a price expectation of $2.15 a bushel, but the actual price turns out to be $2.10 a bushel, the reduction in realized revenues from the initial mean expected revenue reflects the full 5-cent-per-bushel market price decline. Similarly, if the actual price is $2.20, revenues reflect the full 5-cent gain in prices.

The situation with counter-cyclical payments of the 2002 Farm Act is depicted in figure 7, with the expected price again at $p_e$ and supply response at point e on SS. With counter-cyclical payments, however, price changes do not directly change per unit revenues by a like amount. For example, for farmers who plant their corn base acreage to corn, about three-fourths of any change in revenues from expected levels due to a change in the price from the initial expected price would be offset by a change in the counter-cyclical payment, which is paid on 85 percent of base acreage and on a payment yield that would be lower than expected actual yields.

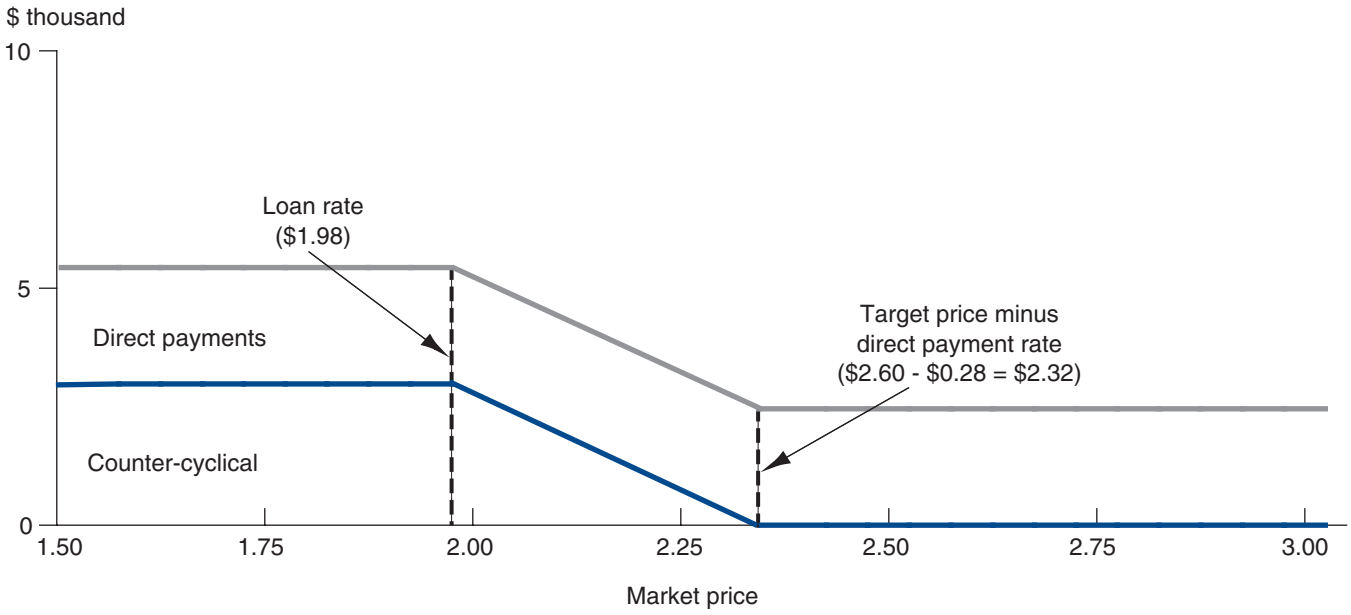
While the distribution of expected market prices is the same as in figure 6, the distribution of the farmer's expected per unit revenues is much narrower in figure 7, as represented by the "Per unit revenue distribution" curve. Per unit revenue expectations covering the same level of probability as is used for the price distribution range from a low of $r_e^{low}$ to a high of $r_e^{high}$. This narrower distribution represents the reduced per unit revenue risk because of the counter-cyclical payments. Using the example above where the expected corn price at planting time is $2.15 a bushel but the actual price is $2.10, the reduction in realized market revenues from the initial expected revenue is now partly offset by an increase in counter-cyclical payments, so the reduction in total revenues (market receipts plus counter-cyclical payments) reflects, on average, only part of the 5-cent-per-bushel market price decline. Alternatively, if the actual price is $2.20, only part of the 5-cent increase is reflected in total revenues.

Beyond the simplified framework of figures 6 and 7, additional changes in per unit revenue distributions occur near the end points of the price range within which the CCPs vary. For expected prices near the loan rate, marketing loan benefits provide downside revenue risk protection that is fully coupled to current production, so downside price risk is reduced further than with counter-cyclical payments. Alternatively, at prices near the target price minus the direct payment rate, counter-cyclical payments continue to offset downside price outcomes, but there is no further offset to revenue-increasing effects of higher price outcomes after CCPs equal zero.

Another framework for analyzing potential effects of CCPs is to consider that the farmer receives direct payments and, depending on the market price, counter-cyclical payments even if no crop is produced (fig. 8). In the price range from the loan rate up to the target price minus the direct payment rate, the farmer's program revenue is the most variable, reflecting the negative relationship of counter-cyclical payments to market price movements. One consideration when deciding what crop to produce would be that market revenues would offset some of this program-related revenue variability in that price range if the farmer produces the base acreage crop (or a highly price-correlated alternative).

***CCP Implications for Production and Risk Management.*** If there is value to the farmer in reducing the variability of expected revenues (such as for a risk-averse producer or their risk-averse lender), then the negative correlation between the expected counter-cyclical payments for the program crop and the expected market revenues for the same crop (or for a highly price-correlated alternative crop) may have some influence on production choices. That is, although the reduction in per unit revenue risk provided by counter-cyclical payments offsets both

Figure 8
**Counter-cyclical and direct payments for corn under the 2002 Farm Act**




Note: Assumes 100 acres of corn, 100 acres of corn base, 135 bushels/acre yield, 103 bushels/acre direct payment yield, and 120 bushels/acre counter-cyclical payment yield.

reductions and gains in prices, the revenue risk reduction could affect production if the penalty associated with downside revenue outcomes is viewed as greater than the benefits of revenue increases.

This revenue stabilization consideration would supplement the typical profit maximization incentive underlying planting decisions. For risk-averse producers, planting decisions would partly reflect the amount of revenue risk the producer is willing to carry. The cropping mix and acreage allocation chosen would be determined on the basis of the tradeoff between expected net returns and the value of revenue risk reduction, subject to the producer's degree of risk aversion. The resulting equilibrium level of production by the risk-averse farmer would reflect the joint consideration of profit maximization and revenue stabilization concerns.

As suggested in the CCP analytical frameworks, for risk-averse farmers, the revenue risk reduction provided by counter-cyclical payments may, in some cases, encourage farmers to plant the program crop for which they have base acreage (or a crop for which prices are highly correlated to those of the program crop). If the base acreage crop is planted, the season average market price of the crop produced would be the same price used to determine the counter-cyclical payment. In this situation, the reduction in variability of total revenues due to CCPs is most direct. Any expansion would distribute the revenue risk reduction of the CCPs (paid on a fixed payment quantity) over more actual production, with the amount of per unit revenue risk reduction falling as production increases. The CCPs would then protect per unit revenues against a smaller portion of the price variability, with the production level chosen partly reflecting the amount of per unit revenue risk the producer is willing to carry. Nonetheless, whatever the level of production chosen in this situation, some amount of per unit revenue risk reduction for the program crop is provided relative to the case of no CCPs.

Alternatively, because CCPs reduce overall revenue risk, a risk-averse farmer may switch some land to riskier crops that provide higher mean expected returns but also higher variability of those returns. Again, the production mix chosen would be based on the jointly considered factors of profit maximization and revenue risk reduction, and would reflect the degree of risk aversion of the farmer.

Additionally, the farmer may also change the mix of risk management strategies used. Since CCPs provide a new revenue risk reduction instrument, the adjustments may reduce the use of alternative risk management strategies by risk-averse farmers.

While these CCP analytical frameworks and discussion provide qualitative arguments for counter-cyclical payments to have some influences on agricultural production, the magnitude of these effects is an empirical issue and a topic for further research. Although expected net returns would likely remain a dominant consideration in cropping choices for most situations, revenue risk reduction provided by counter-cyclical payments would be likely to have the greatest potential to affect production choices for risk-averse producers.

### *Direct Payments*

Direct payments are largely decoupled since program benefits do not depend on the farmer's production or market conditions, and the payments do not affect per unit returns. However, direct payments are tied to acreage, so these benefits will be capitalized into farmland values, thereby increasing aggregate producer wealth. Mechanisms for direct payments to potentially affect production decisions are through wealth and investment effects (Westcott and Young, 2002).[11,12] Three such avenues for these effects are (1) a direct wealth effect through risk aversion reduction, (2) a wealth-facilitated increased investment effect partly reflecting reduced credit constraints, and (3) a secondary wealth effect resulting from the increase in investment.

Direct payments increase farmers' wealth, reflecting gains in farm sector equity that result from the capitalization of expected future farm program benefits into the value of farmland. These payments may change production somewhat if the changes in wealth influence farmers' perception of, attitudes toward, and responses to potential financial risks associated with production alternatives. If payments raise producers' wealth and lower their risk aversion, 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. Chavas and Holt found evidence of declining absolute risk aversion with higher wealth, implied by positive wealth effects on the plantings of corn and soybeans.

Higher cash flow provided by direct payments and higher net worth resulting from these benefits can also

[11]Counter-cyclical payments and other more coupled payments may also influence production through these mechanisms.

[12]An OECD report provides a good discussion of effects of agricultural policies across different degrees of decoupled programs.

facilitate additional agricultural 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. However, agricultural investment can also rise for farmers who were credit constrained, as lenders may be more willing to make loans to farmers with higher guaranteed incomes, higher farm equity, and lower risk of default. Greater loan availability facilitates additional agricultural production by allowing these farmers to more easily invest in profitable opportunities on their farm operations. Additionally, the reduced risk of default could lead to lower interest rates on loans to farmers, also facilitating an increase in investment in farm operations.

For some farmers, increased liquidity provided by the payments also may reduce 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.

Increased investment facilitated by direct payments raises farm sector equity and wealth, thereby providing an additional, secondary avenue to wealth effects on production.

To the extent that direct payments influence production through these wealth and investment mechanisms, they would do so similarly to the decoupled production flexibility contract payments under the 1996 Farm Act. Since the overall average annual magnitudes of direct payments and production flexibility contract payments are comparable at about $5 billion, no new effects are anticipated under the 2002 Farm Act.

### *Updating Base Acreage and Payment Yields*

The 2002 Farm Act permits the updating of base acreage used for determining direct and counter-cyclical payments. Additionally, for those who update their base acreage, the legislation provides various options for updating yields for use in determining counter-cyclical payments.

## Research Issues—Effects of Decoupled Programs on Commodity Markets

Analysis of commodity programs of the 2002 Farm Act raises an important set of research issues related to the potential commodity market effects of "decoupled" programs, the benefits of which are not linked to current farm production decisions of producers. Each of the provisions of the new legislation discussed in this section—counter-cyclical payments, direct payments, and base acreage and program yield updates—are largely decoupled. Nonetheless, as discussed qualitatively, each of these provisions may have some influence on production decisions of farmers through various indirect mechanisms.

Further analysis of the possible impacts of programs such as these is needed to more fully understand the scope of effects of farm policies. Quantifying these influences would be particularly useful but is also challenging due to data limitations regarding farm-level decisionmaking for program participants.

Research issues needing further study include the role of risk in the agricultural sector, including the degree to which revenue risk reduction aspects of counter-cyclical payments may influence production choices; how farmers use government payments, particularly how increased cash flow and liquidity provided by direct payments (as well as by other payments) affect production, borrowing activity, and agricultural investment relative to nonagricultural uses; and how expectations of future program benefits influence current cropping choices through the potential for building program crop base acreage, and how such influences may differ depending on whether market prices are relatively low or relatively high.

As part of an ongoing research effort on agricultural policy topics, a forthcoming ERS report (Burfisher and Hopkins) uses Agricultural Resource Management Survey data (USDA, ERS) to examine effects of decoupled production flexibility contract payments. This report will provide some empirical perspectives on research issues related to decoupled programs.

These base acreage and payment yield updates may influence current production choices if farmers expect that future legislation will again allow them to update these program parameters for their farms. 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. 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. Such updates may also reduce incentives to grow lower yielding varieties of program crops that have other marketable characteristics.

Allowing acreage bases and payment yields to be updated could reduce economic efficiency in production if farmers do not fully respond to signals from the marketplace, but instead respond to market signals augmented by expected benefits of future programs and program changes. Such influences would depend on market prices, which would affect the expected value of future farm program benefits. In a low market price setting, future farm program benefits would be expected to be relatively high, so building base acreage would be of value. However, in a higher price setting (including higher prices for crops that compete with program crops), future farm program benefits would not be expected to be as high, the associated program-related value of base acreage would be smaller, and farmers may be more inclined to plant other crops rather than program crops.

## Model Simulated Effects of the 2002 Farm Act

A sectorwide model simulation analysis of the impacts of the 2002 Farm Act was conducted for key features of the new law that affect commodity markets. Thus, the main focus of the analysis is on the commodity title of the new legislation and CRP provisions of the conservation title. The analysis does not include impacts of other conservation programs or impacts of changes in provisions of other titles, such as trade, credit, energy, rural development, and nutrition.

The primary features of the new law included in the commodity market analysis are:

- Changes in loan rates for marketing assistance loans,
- Acreage adjustments to reflect the larger maximum enrollment established for the CRP, and
- Acreage adjustments to reflect expected expansion of plantings of dry peas and lentils, crops which now are eligible for marketing loans.[13]

Direct payments and counter-cyclical payments were assumed in this model simulation analysis to have no impact on production. These payments are largely decoupled from production decisions of individual farmers as benefits are paid on historically based acreage and yields and do not depend on the current production choices of the farmer. As discussed earlier, production could be affected as a result of increased wealth and investment facilitated by the payments and revenue risk reduction provided by counter-cyclical payments. However, no available research provides quantitative measures of these potential indirect effects, although the influence of these programs is likely to be relatively small compared with price- and production-linked coupled payments.

The analysis used a multi-commodity simulation model covering most program commodities and livestock. Results were supplemented with single-commodity analyses from USDA interagency commodity committees for dairy, sugar, peanuts, pulses, minor oilseeds, wool, mohair, and honey. Impacts on farm income were based on the commodity market impacts and estimates of new government payments under the 2002 Farm Act.

### *The Simulation Model—FAPSIM*

Model simulations from the USDA-ERS Food and Agricultural Policy Simulator (FAPSIM) were used to depict impacts of the 2002 Farm Act for major field crops. FAPSIM is an annual econometric model of the U.S. agricultural sector. Commodities included in FAPSIM are corn, sorghum, barley, oats, wheat, rice, upland cotton, soybeans, cattle, hogs, broilers, turkeys, eggs, and dairy. Each commodity submodel contains equations to estimate production, prices, and various demand components. The submodels are then linked together through common variables that are important to the different commodities. The model solution computes the market prices that equilibrate supply and demand in all of the commodity markets simultaneously.

FAPSIM contains three broad types of relationships: definitional, institutional, and behavioral. Definitional equations include identities that reflect mathematical

[13]Small chickpeas are also eligible for marketing loans under the new legislation, but little change is expected in their acreage because they are not designated as a permitted alternative vegetable under planting flexibility provisions.

relationships that must hold among the data in the model. For example, total demand must equal total supply for a commodity at any point in time. The model constrains solutions to satisfy all identities of this type.

Institutional equations involve relationships between variables that reflect certain institutional arrangements in the sector. This would include counter-cyclical payment rates, for example, that will be determined annually under the 2002 Farm Act based on fixed formulas established in the legislation.

Definitional and institutional equations reflect known relationships that necessarily hold among the variables in the model. Behavioral equations differ because the exact relationship among variables is not known and must be estimated. Economic theory determines the types of variables to include in behavioral equations, but theory does not indicate the precise relationship between the variables. Examples of behavior relationships in FAPSIM are the acreage equations for different field crops. Economic theory indicates that production should be positively related to the price received for the commodity and negatively related to prices of inputs required in the production process. Producer net returns are used in the FAPSIM acreage equations to capture these economic effects. The net returns measures also include effects of major features of U.S. agricultural policy that can influence planting choices, such as economic incentives provided by marketing loan benefits (Westcott and Price). Additionally, the acreage equations include net returns for other crops that compete with each other for land use.

The ability of the FAPSIM model to simulate different policies lends itself to analysis of the 2002 Farm Act, allowing appropriate dynamic supply and demand responses associated with the different policy provisions. Commodity market impacts on production and prices from FAPSIM also have implications for government payments and farm income.

### *Simulation Assumptions*

A 1996 Farm Act scenario was developed using the FAPSIM model, which was used as the reference scenario in this analysis. A 2002 Farm Act scenario was also developed, with comparisons to the 1996 Farm Act reference scenario becoming the basis for describing impacts of the 2002 Farm Act. The analysis covers 10 years, from 2002 through 2011, and assumes continuation of the provisions of the two farm acts. The simulations reflect a backdrop of improving domestic and international economic growth, particularly in developing countries, which provides a foundation for gains in global trade and U.S. agricultural exports, resulting in rising market prices in the sector over the next decade.

The simulations were conducted based on projected market conditions at the time the new legislation was enacted in May 2002, including trend yield assumptions for 2002 crops. Changes since then lowered 2002 production and raised prices for many crops, resulting in minimal marketing loan benefits and no anticipated counter-cyclical payments for 2002 crops of wheat, corn, sorghum, barley, oats, soybeans, and other oilseeds.

***1996 Farm Act Scenario.*** The 1996 Farm Act model simulation assumed that loan rates for corn, wheat, soybeans, and upland cotton were set using the market-price-based formula determination, as permitted under that law, subject to legislated minimums and maximums (figs. 9-12 and appendix table A-1). Loan rates for minor feed grains were assumed to be set based on the current year's corn loan rate and past relationships between their market prices and corn prices. The loan rate for rice was assumed to remain unchanged at $6.50 per hundredweight. These loan rate determination assumptions are consistent with those used in USDA's long-term baseline projections under the 1996 Farm Act (USDA, OCE). (Impacts of the 2002 Farm Act compared with an alternative reference scenario that assumes capped loan rates under the 1996 Farm Act are summarized in the box on page 24.)

The CRP was assumed to build to its maximum permitted acreage under the 1996 Farm Act of 36.4 million acres by 2005. This scenario assumes no further emergency government assistance to the sector after 2001.

***2002 Farm Act Scenario.*** The 2002 Farm Act scenario included key commodity provisions of the new legislation. Loan rates for marketing assistance loans were changed to the levels specified in the new law, rather than being responsive to historical price movements (figs. 9-12 and appendix table A-1). For each crop, other than rice, this policy change results in higher loan rates than in the 1996 Farm Act scenario with formula-determined loan rates. The rice loan rate remained at $6.50 per hundredweight.

Effects of adding marketing loan provisions for dry peas and lentils were included in the model by assuming that the expansion of plantings for those crops came from wheat acreage.[14]

[14]While the initial gross impact was subtracted from wheat plantings, relative net returns among competing crops determine the final acreage allocations and the net acreage impacts.

Figure 9
**Commodity loan rates, wheat**

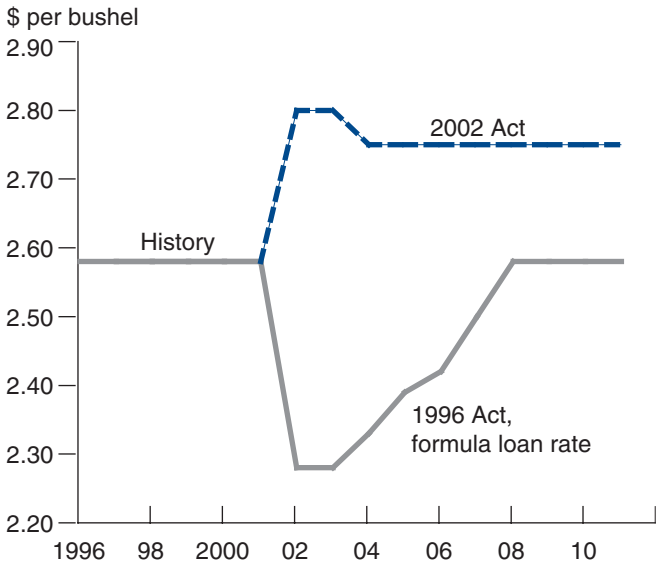



Figure 10
**Commodity loan rates, corn**

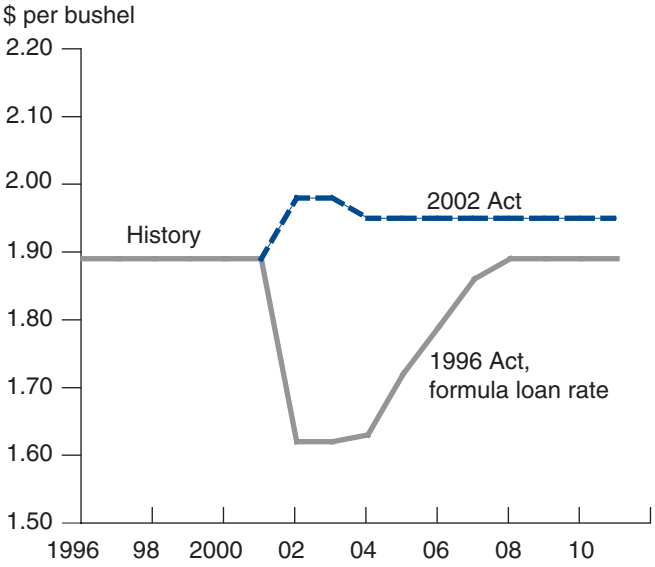



Figure 11
**Commodity loan rates, sorghum**

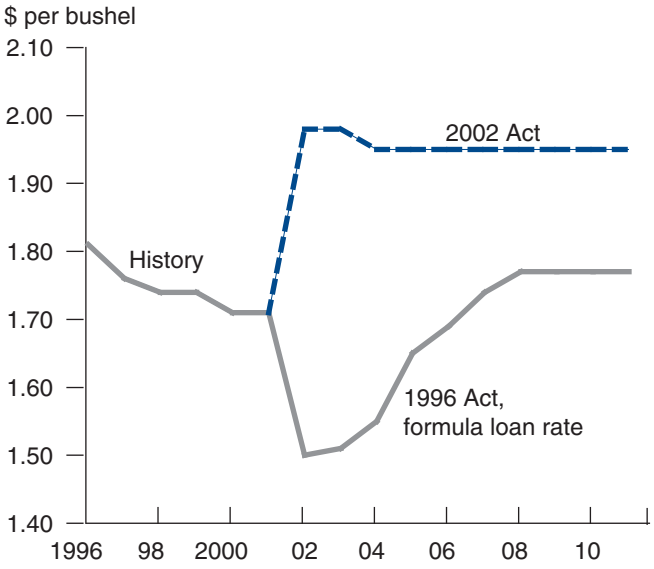
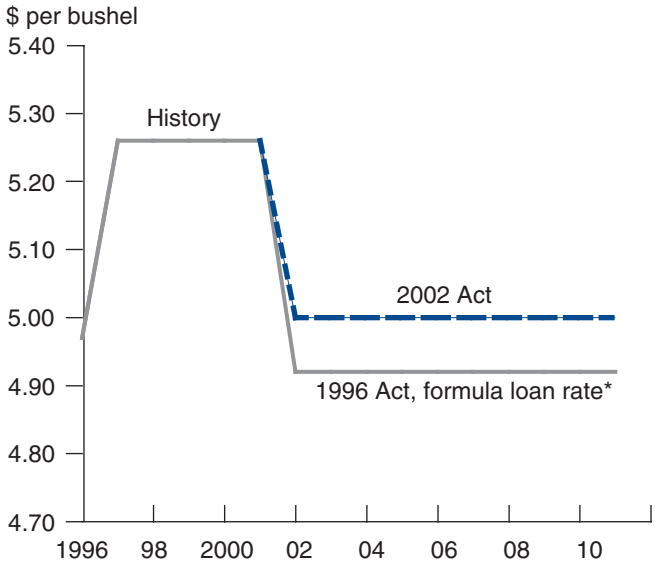



Figure 12
**Commodity loan rates, soybeans**




*Soybean loan rate at its 1996 Act legislative minimum of $4.92 a bushel.

A larger CRP is permitted under the 2002 Farm Act. The scenario allows the CRP to grow to its maximum acreage of 39.2 million acres by 2006 (fig. 13). Two-thirds of the acreage change in CRP enrollment was assumed to affect crop plantings, allocated to individual crops based on assumed crop-specific enrollments that reflect 2001 plantings.[15]

[15]Again, gross acreage impacts are assumed in the model simulations, with net acreage impacts determined in the model based on relative net returns among competing crops.

Because of the timing of the enactment of the 2002 Farm Act in May 2002, many plantings choices for spring planted crops had largely been determined. However, because some of the new law's provisions were generally anticipated (although not specifically known), some planting decisions may have reflected that general information. Thus, half of the model-implied changes in 2002 plantings was assumed to occur, with no impact allowed for 2002 winter wheat acreage.

### *Impacts on Major Field Crops*

The primary impacts on commodities of the 2002 Farm Act are through acreage and production changes. Additional market impacts reflect changes in equilibrium levels of prices and demand in response to the acreage and production changes. Impacts on crops discussed in this section, therefore, focus on acreage and prices, which are also shown in Appendix A (tables A-2 and A-3). Further details of the simulation results for individual field crops are presented in Appendix B.

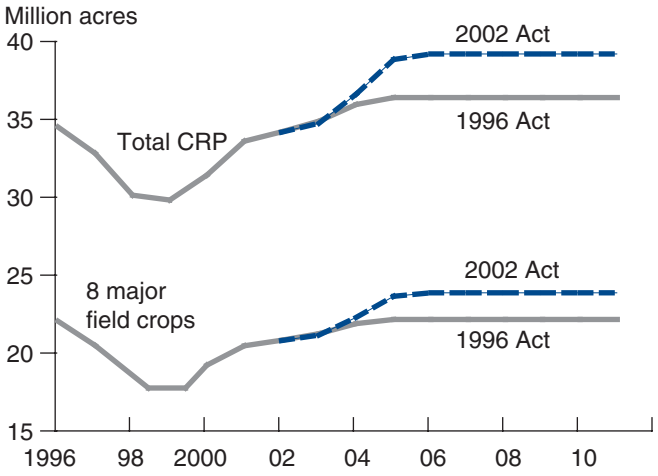
Results in the initial years reflect changes in absolute and relative loan rates, as well as the timing of when prices rise to levels above those where there are marketing loan benefits. In the longer run, the larger CRP and the effects of expanded plantings of dry peas and lentils dominate the field crop impacts.

Most impacts on commodity markets for major field crops initially come from marketing loans, which are fully coupled to production. With higher loan rates for most commodities, total plantings for major crops are up in 2002-04, years when prices are in the range where marketing loan benefits are highest. Acreage for eight major field crops increases the most in 2003, up 2 million acres (fig. 14 and appendix table A-2). This relatively small impact of less than 1 percent partly reflects an inelastic aggregate acreage response in the sector where plantings change proportionately less than the economic incentives provided by prices and net returns. Despite an increase in own-price and cross-price responsiveness facilitated in recent years under nearly full planting flexibility (Lin et al.), individual responses remain inelastic and tend to have partly offsetting effects on aggregate acreage responsiveness.

Plantings in the initial years change the most for wheat, corn, sorghum, and soybeans (figs. 15-18 and appendix table A-2). Acreage is up for wheat, corn, and sorghum reflecting the loan rate increases for those crops. However, soybean plantings decline in 2002 and 2003 because its loan rate increase is small relative to those of competing crops, so acreage is switched to other crops, particularly corn. Part of the reason that the increase in the soybean loan rate is relatively small is that it was at its legislated floor of $4.92 a bushel in the 1996 Farm Act scenario, thus constrained from fully reflecting past market prices, unlike the loan rate for corn. Acreage changes for barley, oats, upland cotton, and rice are minimal. (See box on page 24 for discussion of impacts relative to a capped loan rate scenario under the 1996 Farm Act.)

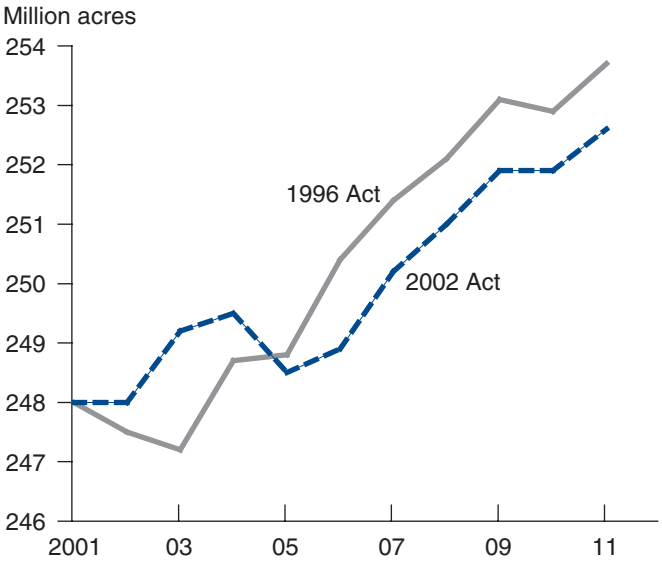
Starting in 2005, total plantings are lower under the 2002 Farm Act because marketing loan impacts are diminished (as prices for most commodities are above ranges where there are marketing loan benefits), more acreage is enrolled to the CRP, and some land is switched to dry peas and lentils (fig. 14 and appendix table A-2). From 2006 through 2011, planted acreage for eight major field crops is reduced by 1.0-1.5 million acres a year (less than 0.6 percent). Plantings for wheat, corn, and soybeans decrease the most, with only small changes for other crops (figs. 15-18 and appendix table A-2).

Figure 13
**Conservation Reserve Program**




Notes: The eight major field crops are corn, sorghum, barley, oats, wheat, rice, upland cotton, and soybeans. Allocations of CRP enrollment to specific crops reflect plantings through 2001.

Figure 14
**Planted area, eight major crops**



Price impacts reflect the changes in plantings (appendix table A-3). Prices for wheat, corn, and sorghum are reduced initially, while prices for soybeans and soybean products are higher. The largest price impacts are in 2003 when the acreage shifts are highest. Only minor price impacts result for upland cotton and rice, reflecting small changes in acreage for these crops under the 2002 Farm Act. In the longer run, with planted acreage lower, prices are generally higher. Long-run price impacts are small, however, with wheat prices up 6 cents a bushel (1.7-1.8 percent) and smaller impacts for other crops.

### *Impacts on Livestock*

Livestock sector effects (appendix table A-4) reflect changes in response to feed costs.[16] Most price changes for livestock feed are small, so production impacts for livestock are also small. Nonetheless, prices for corn and other feed grains initially decline, while prices for soybean meal initially rise. Overall, feed costs for meat production decrease initially, although costs for

[16]The analysis does not include any potential effects of country-of-origin labeling requirements for meats covered by those provisions.

Figure 15
**Planted area, wheat**

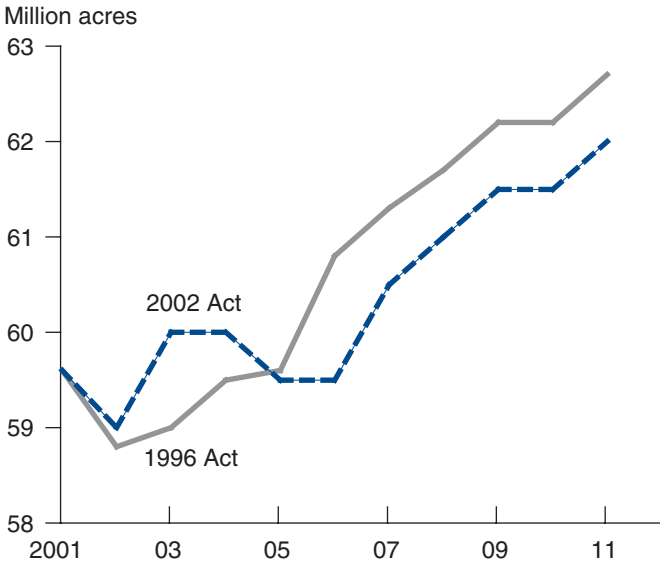



Figure 16
**Planted area, corn**

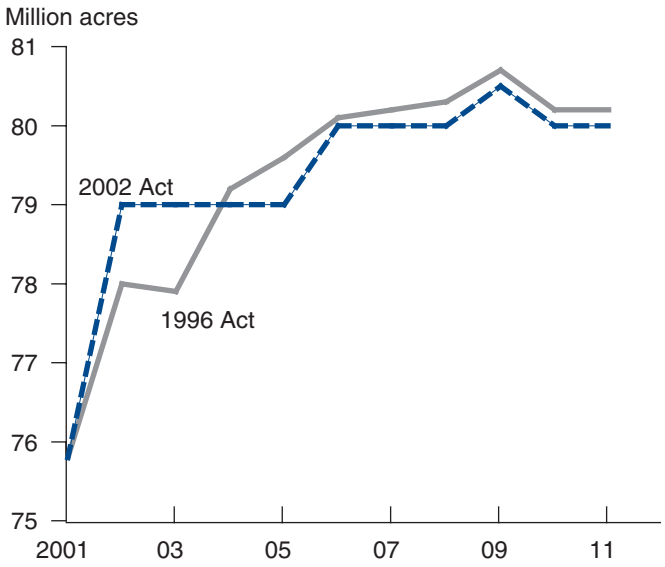



Figure 17
**Planted area, sorghum**

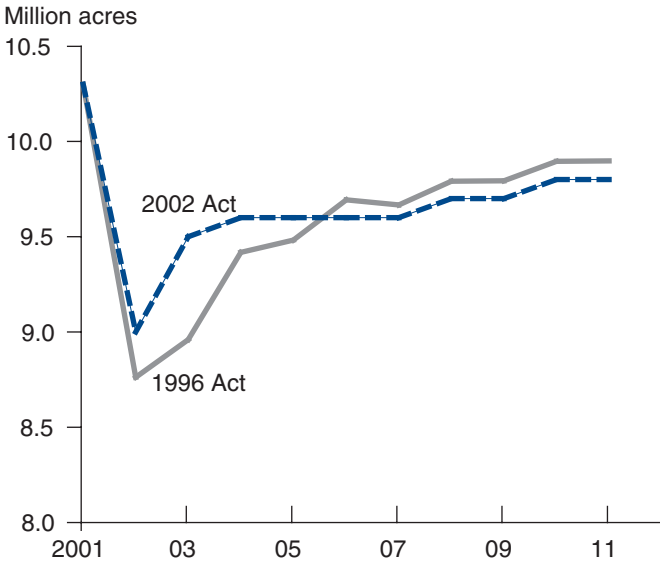
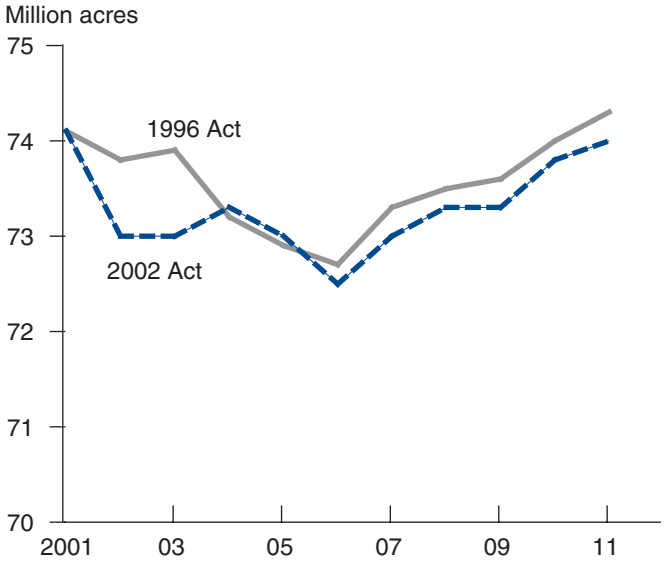



Figure 18
**Planted area, soybeans**



poultry feed, which use relatively more protein meal, fall relatively the least. Thus, while beef and pork production increase slightly in the initial years, broiler production is down marginally as a reduction in broiler prices (due to higher total meat production) offsets the broiler feed cost reduction. Livestock production impacts are small in these initial years, with the largest change being only 0.4 percent for beef in 2004.

In the later years, with crop plantings reduced and feed prices slightly higher, meat production is down marginally, although production impacts for individual meats are no greater than 0.3 percent.

Price impacts for livestock are likewise small. Initially, livestock prices are lower, reflecting the increase in total meat production, but prices are higher in the later years as meat production declines. The largest livestock price changes are less than 1.5 percent, with most price changes less than 1 percent.

### *Impacts on Other Commodities*

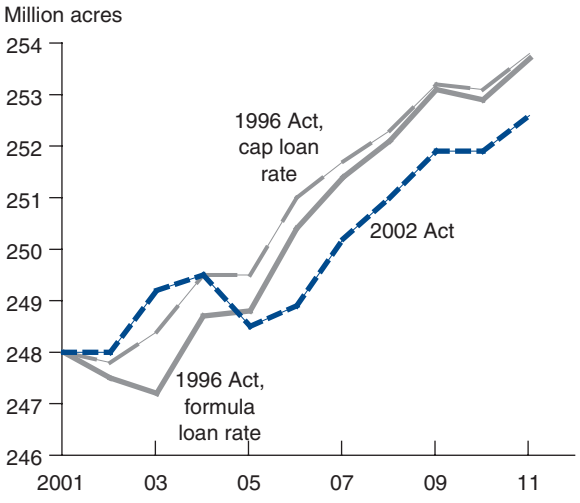
Impacts of the 2002 Farm Act on other commodities reflect analyses conducted by various interagency commodity committees in USDA. Selected results are discussed here.

## 2002 Farm Act Scenario Versus a Capped Loan Rate Scenario Under the 1996 Farm Act

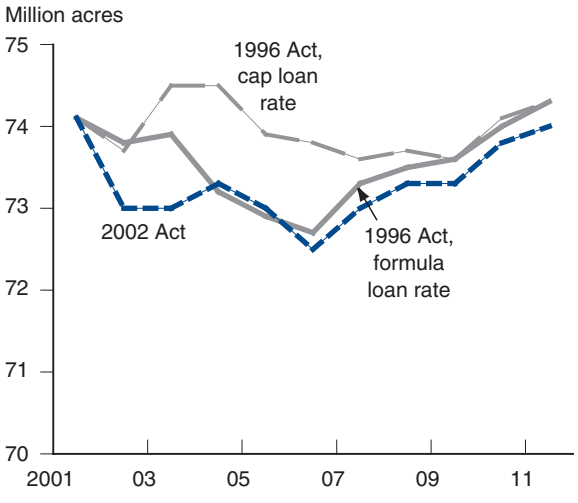
An alternative scenario under the 1996 Farm Act for comparison purposes in measuring impacts of the 2002 Farm Act assumes that commodity loan rates were kept at their maximum levels permitted under the 1996 Act (their 2001 levels), rather than being allowed to decline based on the formulas contained in that legislation. This scenario holds the loan rate for corn at $1.89 a bushel; wheat, $2.58 a bushel; soybeans, $5.26 a bushel; and upland cotton, $0.5192 a pound. With higher loan rates under this 1996 Farm Act scenario, the loan rate changes to the 2002 Farm Act loan rates were generally smaller. Thus, overall acreage impacts in the initial years due to loan rate changes are not as large as with a formula loan rate scenario for the 1996 Farm Act (see figure, eight-crop plantings). Again, the largest acreage increase is in 2003, but it is less than 1 million acres and represents only about 0.3 percent of total plantings for these crops.

However, because the 2002 Farm Act lowered the loan rate for soybeans ($5.00 per bushel) relative to its maximum permitted under the 1996 Farm Act ($5.26 per bushel), there are some important crop allocation differences in the impacts. In particular, soybean plantings are higher in the capped loan rate scenario under the 1996 Act, with part of that additional land coming from corn. Thus, the impacts of the 2002 Farm Act have a more pronounced switch from soybeans over a longer period when compared with a capped loan rate scenario under the 1996 Farm Act (see figure, soybean plantings).

**Planted area, eight major crops, under alternative loan rates**




**Planted area, soybeans, under alternative loan rates**



***Dairy.*** Milk production is slightly higher in the initial years under the 2002 Farm Act, reflecting increased economic incentives provided by the national dairy market loss payments through September 2005. These payments help to stabilize and enhance producer revenue. The expansion in output is expected to be among the smaller farms because there is a limit (2.4 million pounds) on the quantity of milk for which payments are available. Payments to larger producers have little or no impact on milk output because production beyond the limit will only receive the market price. Milk prices are slightly lower due to the overall increase in milk production.

***Peanuts.*** The removal of peanut quotas and the two-tier price support program is expected to lead to an increase in peanut production. Production by farmers who were receiving the quota loan rate at the margin may decline. However, production is likely to rise for farmers who were producing for the peanut additional market or who were not producing because of the barriers of the quota system as these farmers can now receive the market price for domestic edible peanuts for their output. With the elimination of the quota loan rate and with higher production, average prices for peanuts are expected to be lower under the 2002 Farm Act. Marketing loan provisions for peanuts may create incentives to maintain production at higher levels than would occur in the absence of the program if prices fall below the peanut loan rate.

***Sugar.*** Termination of loan forfeiture penalties in the sugar provisions of the 2002 Farm Act provides an economic incentive for some increase in production. However, to operate the program at no cost to the Federal Government, other provisions of the law, such as marketing allotments and CCC inventory disposition, would likely be used to manage sugar supplies and reduce overall sugar output.

***Pulses.*** Acreage planted to dry peas and lentils is expected to be larger because of the addition of marketing loan provisions for these crops under the 2002 Farm Act. Most of this increase in plantings is assumed to be in areas where wheat is or has been a predominant crop. Prices for dry peas and lentils will be lower under the 2002 Farm Act. Little change is expected in plantings and production of small chickpeas. Even though small chickpeas are eligible for marketing loans under the new legislation, they are not designated as a permitted alternative vegetable under planting flexibility provisions.

### *Impacts on Farm Income*

Farm income impacts (appendix table A-5) were derived by using FAPSIM model results for major program crops and livestock (except dairy), supplemented by interagency commodity analyses for dairy, sugar, peanuts, pulses, minor oilseeds, wool, mohair, and honey, as well as by estimates for new government payments.

Price and production impacts under the 2002 Farm Act are not big enough to generate large changes in cash receipts. Reductions in cash receipts are small in the initial years, with the largest change at about $1.1 billion in 2003, mostly reflecting lower prices for dairy and peanuts. In the later years of the analysis (2008-11), cash receipts are up an average of about $500 million. These increases are largely due to higher livestock cash receipts, reflecting lower production and higher prices for livestock. Production for major field crops is reduced in these later years, increasing prices and cash receipts for those crops. However, lower cash receipts for peanuts under the 2002 Farm Act keep total cash receipts for crops marginally reduced.

Production expenses rise by as much as $2.2 billion (in 2003) and are up about $900 million in the later years of the analysis. Much of the increase in production expenses is for higher net rent to nonoperator landlords, reflecting the pass-through of higher government payments. Higher manufactured input costs in the initial years, when total field crop acreage is increased, and higher livestock feed costs in later years, when feed grain and soybean meal prices rise, also contribute to increases in total production expenses.

Government payments to farmers represent the largest source of change in farm income under the 2002 Farm Act (fig. 19 and appendix table A-5). Over 2002-04, an average of nearly $10 billion annually of additional government payments is provided to the farm sector, mostly reflecting the new counter-cyclical payments, increased marketing loan benefits, and higher direct payments. Marketing loan benefits are higher as the changes in loan rates affect three factors that influence program costs: (1) loan rates are increased for most crops, which raise program costs; (2) higher loan rates encourage increased production, raising program costs; and (3) higher production lowers prices, further raising program costs. Direct payments are larger than the 2002 level of production flexibility contract payments of the 1996 Farm Act. Counter-cyclical payments provide a new source of government payments and farm income. CRP payments are higher under the 2002 Farm Act due to the increase in land enrolled in this program.

Smaller increases in government payments are seen for subsequent years, as market prices for most program crops are higher, reducing both marketing loan benefits and counter-cyclical payments. Nonetheless, government payments average $3 billion higher a year in 2008-11 than under the 1996 Farm Act, mostly accounted for by counter-cyclical payments and higher direct payments.

Thus, primarily reflecting the increase in government payments, net farm income is higher under the 2002 Farm Act, particularly in the early years when marketing loan impacts and counter-cyclical payments are the largest (fig. 20 and appendix table A-5). Farm income averages more than $7 billion higher annually in 2002-04, with smaller impacts in later years of the analysis, averaging $2.6 billion higher in 2008-11.

### *Impacts on Retail Food Prices*

Retail food prices are not expected to be appreciably affected, because prices for most program commodities are expected to change only marginally. Grain-based food product prices will be unchanged, with small changes likely for retail prices for dairy products, peanuts, and sugar. Livestock production and prices do not change enough to result in significant impacts on retail meat prices.

Figure 19
**Direct government payments**

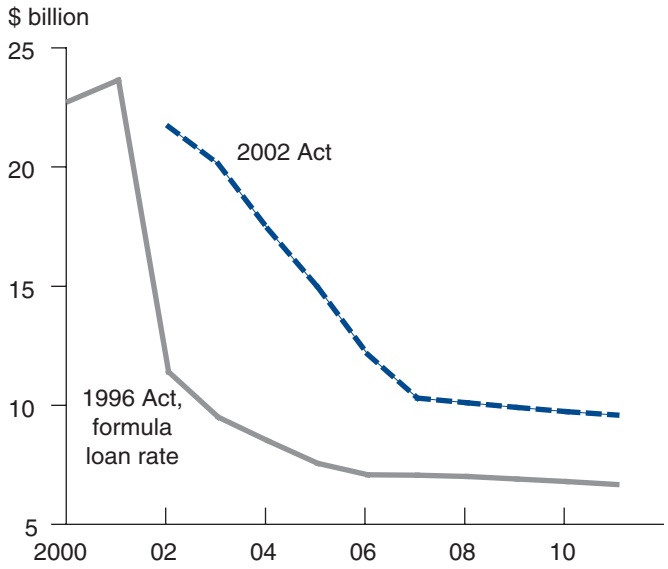



Figure 20
**Net farm income**