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# Market-Oriented Agriculture: The Declining Role of Government Commodity Programs in Agricultural Production Decisions

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*In this report . . . The portion of U.S. agricultural production covered by government income support payments has declined over the span of the last two 5-year farm acts. Consequently, nongovernmental supply and demand factors (market forces) are becoming more important in influencing farmers' production decisions. This report illustrates how agricultural supply has moved toward greater reliance on market forces (market orientation) by examining the declining role of government commodity programs in production decisions for corn, wheat, rice, and upland cotton. Payment coverage ratios, which measure the percentage of expected production covered by deficiency payments (income support payments made by the Federal Government to producers of certain agricultural commodities), have decreased. Thus, the role of government commodity programs in influencing farmers' production decisions at both the individual farm and national (aggregate) levels has declined. As a result, the share of U.S. cropland on which planting decisions are made based on market signals has increased, a trend toward market orientation that began with the 1985 farm act and continued with 1990 farm legislation.*

Faced with large stocks in the mid-1980's, Congress introduced more market orientation to agricultural demand in the 1985 act. Loan rates for feed grains and wheat were lowered to below market-clearing levels. Marketing loans were introduced for upland cotton and rice, allowing farmers to repay price-support loans at less than the loan rate when world prices fall below the loan rate. As a result, the marketplace gained access to supplies that might otherwise have been under loan. The resulting lower prices allowed both domestic use and exports to rise. Export demand was further enhanced through programs designed to generate additional demand by importers and programs designed to discourage unfair trade practices of competitors.

While reduced loan rates and marketing loans of the 1985 act increased market orientation of agricultural demand, agricultural supplies continued to be

influenced by the government through income support programs. In 1986, the first year under the 1985 act, target prices were held flat. As lower loan rates and marketing loans allowed market prices to fall to market-clearing levels, higher deficiency payment rates encouraged more farmers to enroll in farm programs. In subsequent years under the 1985 farm act, however, market orientation of agricultural supply began to increase as target prices were reduced and program payment yields (the amount of production that receives deficiency payments per payment acre) were frozen.

Farm legislation enacted in 1990 further increased market orientation of agricultural supply by allowing market returns to influence planting decisions on more land. Farmers who participate in agricultural commodity programs now receive government payments on a smaller share of their planted area, thus receiving only market returns on production from a larger portion of their plantings. Further, planting flexibility allows farmers to alter production patterns on part of their land in response to those market signals without losing their historical acreage base. Thus, agricultural policy now allows prices to adjust more freely to changing market conditions and permits producers to decide what crops to plant based more on market returns and less on government payments.

Government commodity programs influence agricultural supplies through planting decisions by affecting farmers' expectations for costs and benefits of program participation. Loan rates and target prices provide price and income support to participants, but government commodity programs also restrict potential land use choices. Acreage reduction programs (ARPs), for example, require that a specified portion of a farmer's acreage base for a crop be idled as a condition for program participation for that crop. Rules for maintaining historical acreage bases limit cropping alternatives as farmers seek to protect current and future program benefits.

Figure 1

**Payment coverage ratio for a farm program participant**

Payment coverage ratio		Main factors affecting ratio	
$\frac{\text{Payment production}}{\text{Expected actual production}}$		=	$\frac{\text{Program yields}}{\text{Expected yields}} \cdot \frac{\text{Payment acres}}{\text{Actual acres}}$

The influence of government income support for major program crops can be measured by the percentage of production covered by deficiency payments. This payment coverage ratio for a farm program participant is used to show that production decisions for individual producers have become increasingly influenced by market signals. Aggregate payment coverage ratios indicate a reduced government role in the sector through traditional commodity programs. These trends largely reflect fixed program payment yields and reduced payment acreage, factors that will continue to reduce the role of government commodity programs on agricultural supplies.

### Farm-Level Payment Coverage

Farm-level payment coverage ratios measure the influence of government commodity programs on cropping decisions for individual producers. This ratio is defined for a farm program participant as payment production divided by expected production (fig. 1). Expected production is used rather than actual production because the main influence of government commodity programs on production occurs when the farmer makes planting decisions.

The primary determinants of payment production are payment acres and program yields. The main factors influencing a farmer's expected production are actual acreage and expected yields. Rearranging components of the payment coverage ratio indicates in figure 1 that the ratio is influenced by how program yields compare with expected yields (yield coverage ratio) and how payment acreage compares with actual acreage (acreage coverage ratio).

### Program Yields Versus Actual Yields

Program yields, the amount of production that receives deficiency payments per payment acre, have been frozen for individuals since the 1985 farm act,

but actual yields have trended upward. Consequently, the difference between program yields and actual yields has increased and the fraction of output covered by payments has been reduced.

Trends based on historical yields are used here to depict yield expectations at planting time. To represent these yield expectations for corn, a trend equation is used covering 1975-91 (omitting the major drought year of 1988), adjusted for planting dates and weather. Trend yields for corn rose from 111.3 bushels an acre in 1986 to 120.5 bushels an acre in 1992 (table 1). However, program yields for corn have remained at about 105 bushels an acre, resulting in a widening gap between expected actual (trend) yields and program yields (fig. 2).<sup>1</sup> This has pushed the yield coverage ratio down by about 7 percentage points since 1986 for an average corn producer (table 2).

<sup>1</sup> While program yields are fixed for individual farmers, the national average may vary slightly as different producers participate in the farm programs.

**Table 1—Yield expectations based on historical trends**

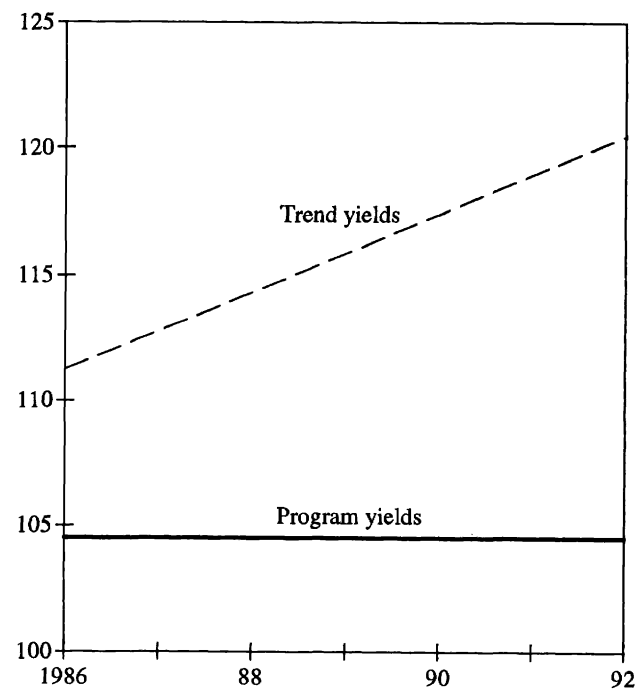
Year	Corn	Wheat	Rice	Upland cotton
	<i>Bu/acre</i>	<i>Bu/acre</i>	<i>Lbs/acre</i>	<i>Lbs/acre</i>
1986	111.3	35.7	5,516	594
1987	112.8	36.1	5,546	607
1988	114.3	36.4	5,576	621
1989	115.9	36.8	5,605	634
1990	117.4	37.1	5,635	648
1991	118.9	37.5	5,664	661
1992	120.5	37.9	5,694	674

Figure 2

## Trend yields widen gap to program yields

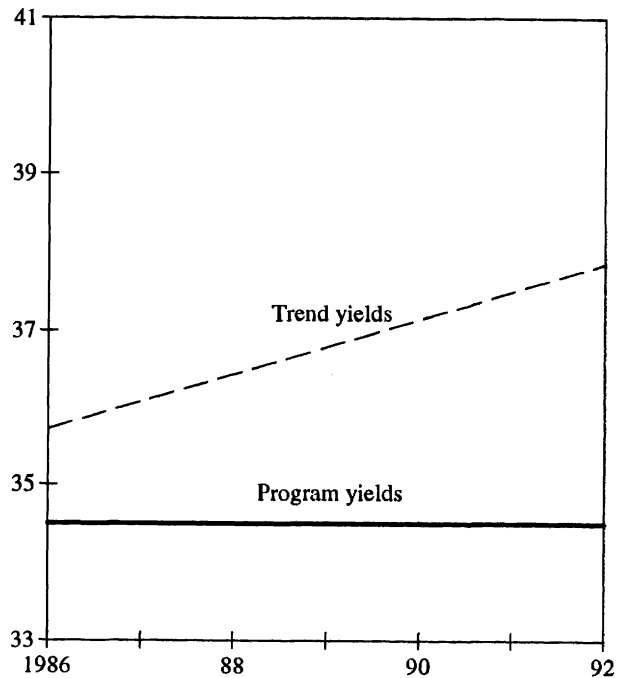
### Corn

Bushels per acre



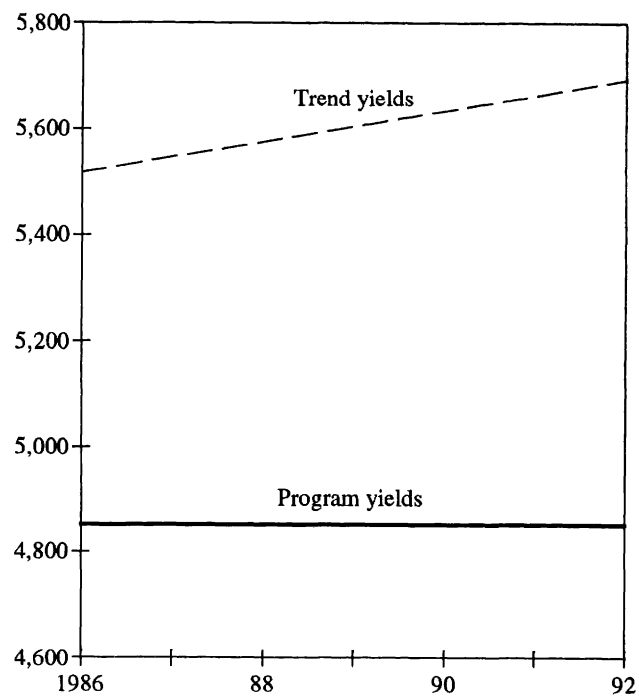
### Wheat

Bushels per acre



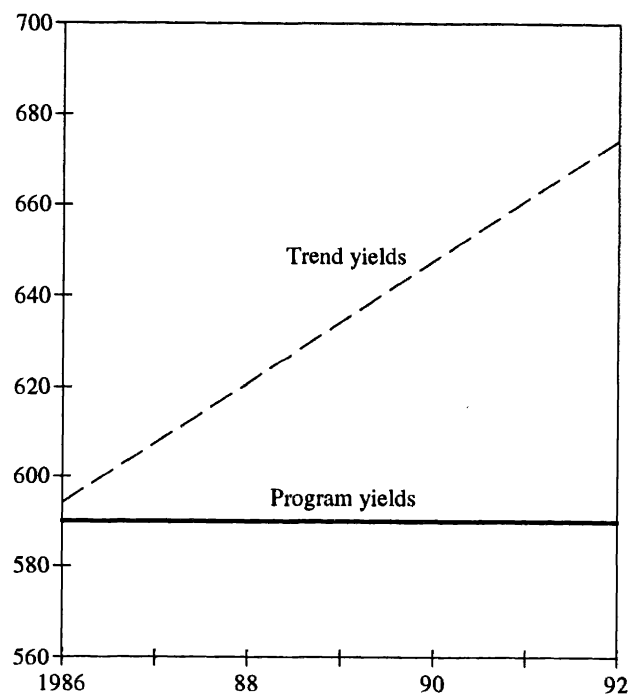
### Rice

Pounds per acre



### Upland cotton

Pounds per acre



**Table 2—Yield coverage ratios using trend yields <sup>1</sup>**

Year	Corn	Wheat	Rice	Upland cotton
<i>Percent</i>				
1986	93.9	96.6	87.9	99.3
1987	92.6	95.6	87.5	97.2
1988	91.4	94.8	87.0	95.0
1989	90.2	93.8	86.5	93.1
1990	89.0	93.0	86.1	91.0
1991	87.9	92.0	85.6	89.3
1992	86.7	91.0	85.2	87.5

<sup>1</sup> Yield coverage ratios assume per acre program yields of 104.5 bushels for corn, 34.5 bushels for wheat, 4,850 pounds for rice, and 590 pounds for upland cotton.

Wheat yield expectations have risen from 35.7 bushels an acre in 1986 to 37.9 bushels an acre in 1992, using a simple 1975-91 trend. Wheat program yields have been near 35 bushels an acre nationally, so an average wheat producer's yield coverage ratio has fallen nearly 6 percentage points since 1986. Rice yield expectations use a 1975-91 trend with a varietal adoption adjustment factor starting in 1985. Moderate trend yield gains since 1986 have held the reduction in the yield coverage ratio for rice to under 3 percentage points, falling from 87.9 percent to 85.2 percent of trend yields. Yield expectations for upland cotton based on a simple 1975-91 trend indicate stronger relative yield gains. This pushes the yield coverage ratio for upland cotton down almost 12 percentage points from 1986 to 1992, to 87.5 percent of trend yields.

#### Payment Acres Versus Actual Acres

Payment acres are the acres on which participating producers receive deficiency payments. Under both current and previous legislation, farmers receive no payments on land idled under ARPs. An additional reduction in payment acres, 15 percent of a producer's crop base, was introduced in 1990 farm legislation. Participating farmers receive no deficiency payment on this land regardless of the crop planted. However, planting flexibility for 25 percent of a producer's crop base was also added. In combination, these two new policy features mean that a producer will in most cases be able to respond to market signals in planting decisions for 15 percent of the acreage base, called normal flex acres. In general, a farmer may plant any crop except fruits and vegetables on flexibility acres and still protect the historical acreage base.

For example, a program participant with 100 acres of corn base under a 5-percent national corn ARP would receive deficiency payments on 95 acres under the 1985 act if corn were planted on that land, representing 100 percent of permitted plantings under the program. Payment acreage is reduced by another 15 percent of the producer's acreage base for the crop under 1990 legislation, so the farmer would receive deficiency payments for corn on a maximum of 80 of the 95 acres. This reduces the acreage coverage ratio by 16 percentage points, from 100 percent of permitted plantings to 84 percent.<sup>2</sup>

Larger relative reductions in the acreage coverage ratio occur with higher ARPs because normal flex acres (15 percent of base) represent a larger portion of permitted plantings. With a 10-percent ARP, for example, payment on 75 of the 90 acres permitted for plantings represents 83 percent acreage coverage.

#### Individual Payment Coverage Ratios

Combining the effects of reduced yield coverage and lower acreage coverage, the amount of expected production that received deficiency payments for a farm program participant is lower under 1990 legislation than under the 1985 act (table 3). A participating corn farmer's payment coverage ratio has fallen from about 94 percent to 73 percent of expected production since the mid-1980's. Similarly, the payment coverage ratio for farmers participating in programs for other crops has also fallen, from about 97 to 77 percent for wheat, 88 to 72 percent for rice, and 99 to 73 percent for upland cotton.

The shift toward less dependence on government commodity programs and greater reliance on markets is apparent in declining farm-level payment coverage ratios. A gradual reduction in payment coverage ratios occurs because expected yields increase while program payment yields are fixed. A larger reduction in payment coverage ratios between 1990 and 1991 was a result of changes in farm legislation, which reduced payment acreage by 15 percent of base.

<sup>2</sup> Acreage shifts under planting flexibility can affect the measurement of a farmer's acreage coverage ratio by influencing both payment acres as well as actual acres. If the farmer in the example with a 5-percent corn ARP planted all 15 normal flex acres to another crop, payments would accrue to all 80 acres planted to corn. Alternatively, if the farmer planted more than 95 acres to corn by flexing to corn from some other program crop, payments on the 80 acres would represent a smaller portion of total corn acreage. Adjustments to acreage coverage ratios due to flex shifts are not included because flex acreage shifts are optional, at the discretion of the producer, while the focus here is on legislated mandatory changes that affect the payment coverage ratio.

**Table 3—Farm-level payment coverage ratios for expected production**

Year	Corn	Wheat	Rice	Upland cotton
<i>Percent</i>				
1986	93.9	96.6	87.9	99.3
1987	92.6	95.6	87.5	97.2
1988	91.4	94.8	87.0	95.0
1989	90.2	93.8	86.5	93.1
1990	89.0	93.0	86.1	91.0
1991	73.6	75.8 <sup>1</sup>	72.1	75.2
1992	73.0	76.7	72.4	72.9

<sup>1</sup> 1991 wheat calculation is for farmers who did not use the winter wheat option.

As government commodity programs have become less important in influencing farmers' planting decisions, flexibility provisions have provided farmers the opportunity to respond to market signals in their cropping choices on a portion of their land.

### Aggregate Payment Coverage

The role of government commodity programs in aggregate for a crop can also be measured by a payment coverage ratio. In addition to the factors that affect an individual's payment coverage ratio, the aggregate payment coverage ratio for a crop is influenced by the program provisions for the crop and the program participation rate. Program participation is the percentage of eligible base acres enrolled in a commodity program. Farmers have the greatest incentive to participate when the expected price of the crop is low relative to the target price and when ARPs are low. As program participation rates change, the amount of production covered by payments changes to reflect both the change in the participation rate and the level of the ARP. In general, the payment coverage ratio increases as more acres are enrolled in the programs.

Since 1986, target prices have declined and market prices have generally risen, thereby lowering expected deficiency payment rates and reducing incentives to enroll in farm programs (table 4). However, ARPs are generally lower than in the 1980's, encouraging higher participation. Participation rates have gradually fallen for corn, while remaining more constant for wheat, rice, and upland cotton.

**Table 4—Factors affecting farm program participation**

Year	Target prices	Market prices	Acreage reduction program	Program participation rate
<i>---- \$/bu ----      --- Percent ---</i>				
Corn:				
1986	3.03	1.50	17.5	86
1987	3.03	1.94	20.0	90
1988	2.93	2.54	20.0	87
1989	2.84	2.36	10.0	79
1990	2.75	2.28	10.0	77
1991	2.75	2.37	7.5	76
1992	2.75	---	5.0	76
Wheat:				
1986	4.38	2.42	22.5	85
1987	4.38	2.57	27.5	87
1988	4.23	3.72	27.5	86
1989	4.10	3.72	10.0	78
1990	4.00	2.61	5.0	83
1991	4.00	3.00	15.0	85
1992	4.00	---	5.0	83
<i>---- \$/cwt ----      --- Percent ---</i>				
Rice:				
1986	11.90	3.75	35.0	94
1987	11.66	7.27	35.0	96
1988	11.15	6.83	25.0	94
1989	10.80	7.35	25.0	94
1990	10.71	6.70	20.0	94
1991	10.71	7.58	5.0	95
1992	10.71	---	0.0	96
Upland cotton:				
1986	81.0	51.5	25.0	92
1987	79.4	63.7	25.0	92
1988	75.9	55.6	12.5	89
1989	73.4	63.6	25.0	89
1990	72.9	67.1	12.5	86
1991	72.9	56.8	5.0	84
1992	72.9	---	10.0	89

--- = not available.

The definition of an aggregate payment coverage ratio for a crop (the portion of expected production covered by payments) is the same as that used in the farm-level analysis. However, the measurement of the ratio is somewhat different to make use of available aggregate data for each crop. Payment production is approximated by dividing estimated regular (non-0/92, non-50/92) deficiency payments for a crop by the per

Figure 3

**Aggregate payment coverage ratio for a crop <sup>1</sup>**

Payment coverage ratio		Main factors affecting ratio
$\frac{\text{Payment production}}{\text{Expected actual production}}$		$\frac{\text{Deficiency payments} / \text{Payment rate}}{\text{Harvested acres} \cdot \text{Expected yields}}$

<sup>1</sup> Harvested acres for 1991 and 1992 are adjusted for flex shifts, as discussed in footnote 3, since acreage shifts under planting flexibility can affect the measurement of payment coverage ratios.

bushel deficiency payment rate (fig. 3). Expected total production for a crop is derived by multiplying harvested acreage by expectations of yields at plantings.<sup>3</sup> Yield expectations are again based on historical trends.

Table 5 shows aggregate payment coverage ratios since 1986 for corn, wheat, rice, and upland cotton, including preliminary estimates for 1992. Payment coverage has fallen for these crops since the relatively high levels during the first few years under the 1985 farm act.

Payment coverage for corn shows a significant decrease from 1990 to 1991, mostly due to the reduction of payment acreage by 15 percent of base. Payment coverage fell again in 1992, reflecting slightly lower program participation and the growing gap between program yields and expected actual yields.

Payment coverage for wheat declined the most in 1989 as program participation dropped to 78 percent. Payment coverage fell only slightly in 1991 as the participation rate was up and more than half of enrolled wheat land used the winter wheat option, thereby not facing the reduction of payment acreage by 15 percent of base. Payment coverage for wheat was down some in 1992 as the gap between program yields and expected actual yields widened and all wheat program participants faced the reduction of payment acreage by 15 percent of base. A lower wheat ARP, however, kept the wheat payment coverage ratio from falling further.

**Table 5—Aggregate payment coverage ratios**

Year	Corn	Wheat	Rice	Upland cotton
				Percent
1986	70.8	79.0	76.4	90.6
1987	79.3	84.4	80.8	83.8
1988	80.0	81.4	75.6	76.8
1989	73.4	72.1	78.0	80.7
1990	68.9	70.7	78.5	77.8
1991	55.8	70.5	70.2	62.8
1992 <sup>1</sup>	54.2	67.6	70.7	65.1

<sup>1</sup> Estimates for 1992 are preliminary.

Payment coverage for rice and for upland cotton also declined in 1991, primarily reflecting the reduction in payment acreage. Payment coverage for rice rose slightly in 1992. A higher participation rate and the effects of a lower rice ARP pushed the payment coverage ratio up, which was partly offset by trend yield growth. An increase in the participation rate for upland cotton pushed its payment coverage ratio up in 1992, offsetting the effects of trend yield growth and a higher upland cotton ARP.

### Longrun Implications

Expected yields based on trends will continue to grow, widening the gap to fixed payment yields and raising expected actual production. Thus, payment coverage will fall further under a continuation of current agricultural policy, particularly the reduction in payment acres of 15 percent of base. Table 6 shows that projected farm-level payment coverage ratios for corn, wheat, rice, and upland cotton in 1995 and 2000

<sup>3</sup> Net acreage flexed from each crop is added to harvested acreage in 1991 and 1992 to adjust for the effects of planting flexibility, thus adding the forgone expected production of the flexed acreage to expected actual production for that crop.

**Table 6—Current and projected farm-level payment coverage ratios**

Year	Corn	Wheat	Rice	Upland cotton
<i>Percent</i>				
1992	73.0	76.7	72.4	72.9
1995 <sup>1</sup>	70.3	74.7	71.3	68.8
2000 <sup>1</sup>	66.3	71.4	69.5	62.9

<sup>1</sup> Projected ratios assume the same ARPs as in 1992.

will be lower than 1992 ratios. In addition, if target prices remain fixed and market prices increase, deficiency payment rates will decline. As a result, program participation rates will also likely fall, lowering aggregate payment coverage ratios for each crop.

Farmers will base more of their planting decisions on market signals as government payments continue to cover a declining portion of production at both the individual farm and national aggregate levels. Planting flexibility provisions will continue to provide farmers the opportunity to respond to market signals in their cropping choices on part of their land.

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## For additional information . . .

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