

Impact of U.S. Farm Programs on Kansas Farms

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RISK and PROFIT
Conference and Trade Show
August 11-12, 2005
Manhattan, KS

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U.S. farm subsidies have faced increased scrutiny in recent years. Groups representing consumer, environmental, and international competitor interests have stepped up efforts to persuade developed countries to reduce or eliminate farm subsidies. The increased coverage of these interest groups in the media coupled with successful challenges of farm subsidies in the WTO and record domestic budget deficits result in a negative outlook for the future of U.S. farm subsidies. The President's 2006 Budget Proposal provided a possible glimpse into the future of U.S. farm subsidies. However, the reaction to that proposal also demonstrated that support for these programs remains strong in production agriculture.

Whether U.S. farm subsidies should be reduced or eliminated can be debated extensively from an economic and social standpoint. That is not the purpose of this paper, however. Rather, this paper will determine the relative impact that U.S. farm program payments have on Kansas farms, and evaluate the economic consequences of reducing or eliminating government payments.

Who Receives Farm Subsidies?

Before any changes to farm payments are evaluated, it is important to develop a baseline regarding who receives farm subsidies and how large those subsidies are. It is also important to understand the different types and sizes of farms in the U.S. and how government payments are dispersed to those farms. In the *2004 Family Farm Report* from the Economic Research Service (ERS) of USDA, farms were split into three primary categories: small family farms, other family farms, and nonfamily farms. The definition of small family farms in this categorization would be those farms with annual gross sales of less than \$250,000. Other family farms are those with annual gross sales of \$250,000 or more, and nonfamily farms are those that are "organized as nonfamily corporations or cooperatives, as well as farms operated by hired managers" (Banker and MacDonald 2005).

In the *2004 Family Farm Report*, small farms are further separated into five different categories. These small family farm categories are (1) limited-resource farms, (2) retirement farms, (3) residential/lifestyle farms, (4) low-sales farming occupation farms, and (5) high-sales farming occupation farms. Limited resource farms are those with sales less than \$100,000, farm assets less than \$150,000, and total operator household income less than \$20,000. Retirement farms are small farms whose operators report they are retired. Residential/lifestyle farms are small farms whose operators report a major occupation other than farming. Low-sales farming-occupation farms are small farms whose operators report farming as their major occupation and have sales less than \$100,000. High-sales farming-occupation farms are small farms whose operators report farming as their major occupation and have sales between \$100,000 and \$249,999. Other family farms are further separated into large family farms, and very large family farms. Large family farms are those farms that have sales between \$250,000 and \$499,999. Very large family farms are the farms that have sales of \$500,000 or more.

Small farms (all those with sales under \$250,000) comprise 91% of the farms in the U.S., but only 28% of the value of production. Conversely, large and very large family farms constitute nearly 7% of U.S. farms, but are responsible for 58% of the value of production. The remaining 14% of agricultural production comes from nonfamily farms (Banker and MacDonald 2005).

Broken down further, limited-resource, retirement, and residential/lifestyle farms account for nearly 60% of the farms, yet provide only 6% of the value of production. Moreover, 55% of small farms had sales under \$10,000. However, small farms held 68% of farm assets, including 60% of the land. Furthermore, small farms produce a large percentage of the major commodities, including 60% of the value of production for hay, 45% for soybeans, 47% for wheat, 39% for corn, and 38% for beef (Banker and MacDonald 2005). Based on this information, it can be argued that both small and large farms have an important role in production agriculture in the United States.

Focusing on government payments, from 1996-2003 commodity program payments (production flexibility contracts, direct payments, counter-cyclical payments, loan deficiency payments, and marketing loan gains) accounted for nearly 59% of the average annual farm program payments of \$14.9 billion. Commodity payments were followed by ad hoc and emergency payments which accounted for over 27% of average farm payments, and conservation payments at 12% of total payments (USDA-ERS 2004).

High-sales small farms, large family farms, and very large family farms receive approximately 75% of commodity program payments. However, that percentage is roughly equivalent to the percentage of program commodities that they produce. Conversely, over 50% of Conservation Reserve Program (CRP) payments, which make up the majority of conservation payments, are received by retirement and residential/lifestyle farms. In fact 25% of retirement farms receive CRP or Wetland Reserve Program (WRP) payments. Only 10% of residential/lifestyle farms receive CRP or WRP payments, but they comprise 44% of all farms, and enroll an average of 44% of their land in the program—compared to 25% for all participating farms (Banker and MacDonald 2005).

Farms and Government Payments in Kansas

In Kansas, small farms in 2002 (i.e., those with sales less than \$100,000) comprised nearly 82% of all farms (table 1). However, they accounted for less than 10% of all sales, but received over 42% of all government payments (table 2). By contrast, large farms (i.e., those with sales over \$250,000) made up only 7.5% of all farms, but provided nearly 79% of all sales and received 34% of all government payments (USDA-NASS 2004). In 2002, nearly 29% of government payments were CRP or WRP payments. However, commodity program payments in 2002 were lower than previous or subsequent years, thereby making CRP/WRP payments a higher percentage of total government payments. Nevertheless, CRP/WRP payments are a significant source of government payments in Kansas. Although CRP/WRP payments are significant, they vary across farm types and

locations in Kansas. Since farm typology data is not available on a state-level basis, this paper will not discuss, in-depth, the differences in government payments (including CRP/WRP) across typology groups. Rather, specific attention will be given to the relative importance of government payments on a county and farm-level basis in Kansas.

Table 1. Number of Farms and Total Sales by Market Value of Ag Products Sold.

Ag Market Value of Sales	No. of Farms	% of Total Farms	Total Sales (\$1,000)	% of Total Sales
Less than \$1,000	7,214	11.2	1,061	0.0
\$1,000 to \$2,499	6,647	10.3	5,826	0.1
\$2,500 to \$4,999	6,764	10.5	14,754	0.2
\$5,000 to \$9,999	7,961	12.4	39,504	0.5
\$10,000 to \$24,999	10,464	16.2	138,201	1.6
\$25,000 to \$49,999	7,159	11.1	222,946	2.5
\$50,000 to \$99,999	6,513	10.1	425,723	4.9
\$100,000 to \$249,999	6,858	10.6	1,015,924	11.6
\$250,000 to \$499,999	2,896	4.5	942,898	10.8
\$500,000 to \$999,999	1,214	1.9	794,074	9.1
\$1,000,000 to \$2,499,999	473	0.7	689,078	7.9
\$2,500,000 to \$4,999,999	97	0.2	325,124	3.7
\$5,000,000 or more	154	0.2	4,131,131	47.2
Total	64,414	--	8,746,244	--

Source: 2002 Census of Agriculture: Kansas.

Table 2. Number of Farms Receiving Government Payments and Total Government Payments by Market Value of Ag Products Sold.

Ag Market Value of Sales	No. of Farms Receiving Govt. Pmts.	Total Govt. Payments (\$1,000)	% of Total Government Payments	Govt. Pmts. as a % of Total Sales
Less than \$1,000	1,333	642	0.2	60.5
\$1,000 to \$2,499	3,690	5,313	1.6	91.2
\$2,500 to \$4,999	3,703	9,811	3.0	66.5
\$5,000 to \$9,999	4,541	17,375	5.3	44.0
\$10,000 to \$24,999	6,376	31,654	9.6	22.9
\$25,000 to \$49,999	5,043	32,660	9.9	14.6
\$50,000 to \$99,999	4,991	41,418	12.6	9.7
\$100,000 to \$249,999	5,579	77,698	23.7	7.6
\$250,000 to \$499,999	2,421	56,828	17.3	6.0
\$500,000 to \$999,999	1,009	32,655	9.9	4.1
\$1,000,000 to \$2,499,999	379	17,796	5.4	2.6
\$2,500,000 to \$4,999,999	56	2,405	0.7	0.7
\$5,000,000 or more	70	1,988	0.6	0.0
Total	39,191	328,243	--	--

Source: 2002 Census of Agriculture: Kansas.

Without question, farms in Kansas differ due to climate, topography, and proximity to population centers. Average annual precipitation varies from over 42 inches in the southeast corner of the state to under 16 inches on the western border. Much of eastern Kansas is dominated by rolling grasslands, small, irregular-shaped fields, and woodland areas. In contrast, a large portion of western Kansas is dominated by flat cropland with deep soils. These differences are critical in understanding agriculture in Kansas, and understanding how policy changes may affect farms in the state.

Since commodity programs constitute the majority of government payments in both the U.S. and Kansas, farms specializing in crop production obviously will be impacted more by potential reductions in government payments than predominately livestock and non-program commodity farms. Therefore, counties in Kansas that have a higher percentage of land in crops will likely be affected more than those counties with larger amounts of grassland. Tables 3 and 4 show how the counties differ across Kansas by crop reporting district.

Table 3. Average Number of Farms, Crop Farms, and Percentage of Crop Farms per County by Crop Reporting District.

Crop Reporting District	Avg. No. of Farms per County	Avg. No. of Crop Farms per County	Avg. % of Crop Farms per County
Northwest	429	398	92.8
West Central	360	331	91.9
Southwest	388	346	89.2
North Central	554	507	91.5
Central	725	660	91.0
South Central	709	645	91.0
Northeast	762	666	87.4
East Central	745	641	86.0
Southeast	729	585	80.2

Source: 2002 U.S. Census of Agriculture: Kansas.

Table 4. Average Land in Farms and Cropland per County by Crop Reporting District.

Crop Reporting District	Avg. Land in Farms per County	Avg. Cropland in Farms per County	Avg. % of Cropland from Total Farm Land by County	Avg. Cropland per Crop Farm
Northwest	567,372	384,497	67.8	967
West Central	512,178	357,399	69.8	1,080
Southwest	497,894	362,517	72.8	1,047
North Central	479,105	295,323	61.6	582
Central	505,047	326,647	64.7	495
South Central	528,565	349,276	66.1	542
Northeast	297,276	181,715	61.1	273
East Central	321,691	161,545	50.2	252
Southeast	402,723	180,820	44.9	309

Source: 2002 U.S. Census of Agriculture.

These tables show that while there is not much difference in terms of the average number of crop farms to total farms per county from east to west, there is a noticeable difference in average amount of cropland to farmland per county across regions in Kansas. For example, 72.8% of the average land in farms per county in southwest Kansas is cropland, compared to only 44.9% in southeast Kansas. Since counties in southwest Kansas have more land in farms, a higher percentage of cropland, and fewer farms, the average crop farm in western Kansas farms over 3 times the acreage of the average farm in eastern Kansas.

Average county and farm level net income and government payments from 1994-2003 are shown in table 5. Most notably, both on a county and farm basis, government payments exceed net income in all districts except west central and southwest Kansas. Also, net income and government payments are substantially higher in western Kansas than in the eastern districts of the state. The higher government payments on a county basis can be explained by the fact that farms in the west tend to be more crop oriented (see tables 3 and 4), and, on average, have higher levels of production through irrigation. Higher production, both historically (when direct payment yields were frozen), and currently (for marketing loan benefits), will result in higher payments for farms and counties that grow program commodities. Because farms in the west are also significantly larger in terms of acreage, it is also expected that income and government payments would be higher on a farm basis.

Table 5. Average Net Farm Income* and Government Payments by Crop Reporting District (1994-2003).

Crop Reporting District	Avg. NFI / County (\$1000)	Avg. Govt. Pmts / County (\$1000)	Avg. NFI / Farm (\$)	Avg. Govt. Pmts / Farm (\$)
Northwest	8,123	10,931	18,935	25,481
West Central	9,120	8,998	25,324	24,988
Southwest	15,062	11,569	38,784	29,789
North Central	7,057	8,466	12,731	15,274
Central	6,209	7,688	8,561	10,600
South Central	5,934	9,769	8,366	13,772
Northeast	4,838	5,144	6,348	6,750
East Central	2,182	3,108	2,929	4,173
Southeast	2,038	3,322	2,797	4,560

*Net Farm Income equals *Total Net Farm Proprietors' Income*. According to the Bureau of Economic Analysis this number consists of the net income that is received by sole proprietorships and partnerships that operate farms. It excludes the income that is received by non-family farm corporations.

While it is not unexpected that net income and government payments would be higher in the west, it may be surprising to some that portions of western Kansas may be less dependent on government payments (i.e., have net income greater than government payments) than eastern Kansas. After all, western Kansas is more crop intensive than eastern Kansas. However, there may be several explanations regarding why portions of western Kansas are less dependent on government payments.

First, a larger portion of small farms tend to reside in the east. Although farm typology data is not currently available regarding those small farms, it is likely that there are more residential/lifestyle farms in the east than the west. These farms are often not as concerned about earning a living from farming as simply enjoying the farm lifestyle.

Second, since direct payment yields and acreage bases were largely frozen in the mid-1980s, farms in the west intensified cropping rotations and shifted the overall crop mix. Consequently, these farms may actually be moving toward receiving a larger percentage of revenue from the market rather than government payments. In contrast, eastern Kansas may have already been farming at a higher cropping intensity, which would thus be reflected in their direct payment yield and acreage base. (Of course, benefits from the marketing loan program are based on current production which would lessen this overall effect.)

Third, CRP payments could distort the relative importance of government payments as a contributor to net income. For example, some counties enrolled larger percentages of cropland into the program than other counties. Those counties that have a large percentage of cropland in CRP would then appear to be receiving a larger portion of net income on a county and farm basis from government payments than is actually occurring. In other words, counties and farms are not as dependent on government payments as the numbers indicate.

Finally, various events such as droughts and fluctuations in livestock prices affect the relative relationship between government payments and net income. For example, northwest Kansas was especially hit hard by drought from 2000-2003. To help those who were affected by those conditions, disaster legislation was passed and emergency disaster payments were distributed to farmers. Obviously, in circumstances such as these, government payments could increase in importance in terms of contributing to net farm income on a county basis. Also, if overall net income is depressed because of poor cattle prices for instance, then government payments will again appear to contribute a greater portion of net income.

While it is interesting to evaluate the importance of government payments for farms in Kansas on an aggregate basis, care must be taken when drawing conclusions. Aggregating income and payment data may end up masking important trends and relationships. Furthermore, little can be said in terms of how changes in farm programs may impact individual farms. Therefore, the remainder of this paper will focus on the impact of government payments on farms in the Kansas Farm Management Association (KFMA). Using KFMA data, more precise analysis can be performed.

Impact of Government Payments Using KFMA Data

Data from farms that were continuously enrolled in the KFMA from 1995-2004 were used to study the relationship between government payments and farm financial performance. The entire data set contained 9,630 farm-year observations. In determining these relationships, a 2001 study by Dumler that determined the relationship between

farm size and profitability was used as a foundation for this study. Following the 2001 study, farms were separated into three regions: east, central, and west. Since farm size issues have become mainstay topics for farm policy debates, in this study, farms were also divided into four size categories. These size categories basically follow the major categories of 2004 *Family Farm Report*. Thus, the four farm size categories based on gross farm income (GFI) are: small farms under \$100,000 GFI, medium farms with GFI from \$100,000 to \$249,999, large farms with GFI from \$250,000 to \$499,999, and very large farms with GFI over \$500,000.

Farms by Area

Following is a brief description of how farms compared in the three regions of the state. As previously mentioned, farms in Kansas differ across the state in climate and typography. However, the average farms in the KFMA data set are quite similar across regions (table 6). In terms of total government payments, the average farm in the west had payments that were nearly 82% higher than the average farm in the east, and almost 49% greater than the average farm in central Kansas. Likewise, as a percentage of gross farm income (GFI), government payments in western Kansas (18.9%) were nearly double that of the east (10.7%). The central region fell in between this range at 14.5%. On a total crop acre basis, however, government payments in each region are within \$2.65/acre.

Table 6. Financial and Production Measures for KFMA Farms in Kansas, 1995-2004.

Measure	Units	East	Central	West
Total Govt. Payments	\$	23,151	28,231	41,972
Govt. Payments/Acre	\$	26.30	24.00	26.65
Govt. Payments/GFI	%	10.7	14.5	18.9
Gross Farm Income (GFI)	\$	247,453	212,942	254,004
Net Farm Income* (NFI)	\$	19,834	10,130	11,503
Total Expense Ratio	%	105.1	105.2	105.0
Total Assets	\$	725,440	607,938	781,818
Total Capital Managed	\$	1,380,247	1,288,509	1,486,091
Rate of Return to Capital Managed (RRCM)	%	1.6	1.1	1.7
Avg. Debt/Equity Ratio	%	83.8	102.8	86.4
Crop Income/GFI	%	48.1	57.9	57.9
Livestock Income/GFI	%	35.0	22.4	16.6
Non-farm Wages	\$	11,114	8,168	8,429
Total Crop Acres	No.	915	1,182	1,730
Acres Harvested	No.	958	1,132	1,189

* Net Farm Income equals gross farm income minus operating expenses, depreciation, unpaid operator labor, and unpaid family labor.

Table 6 shows several other interesting financial and production measures as well. For instance, as expected, eastern farms earn a higher percentage of GFI from livestock than crops. Moreover, as expected, farms in the west were larger, in terms of total acreage,

but had a lower cropping intensity (acres harvested/total crop acres). Nevertheless, the financial measures across regions were similar.

In the 2001 farm size study by Dumler, the primary profitability ratio used was rate of return to capital managed (RRCM). Capital managed equals total farm assets plus the value of rented land. Thus, the RRCM formula, shown below in equation 1, is:

$$RRCM = (Net\ Farm\ Income + Interest\ Expense) / Total\ Capital\ Managed, \quad (1)$$

where net farm income equals gross farm income minus operating expenses, depreciation, and unpaid labor charges. Although RRCM is not one of the 16 standard farm financial ratios, it is very similar to rate of return on assets. The only difference is that RRCM includes the value of rented land in addition to total assets. Capital managed was used instead of total assets because it gives a broader indication of farm size. The average RRCM per region ranged from 1.1% in central Kansas to 1.7% in western Kansas.

Another important financial measure in table 6 is the total expense ratio. The total expense ratio, shown in equation 2, indicates how much it costs to produce each dollar of gross income.

$$Total\ Expense\ Ratio = Total\ Expenses / Gross\ Farm\ Income. \quad (2)$$

The lower the total expense ratio—the greater cost efficiency (and potentially higher net returns). Like RRCM, the total expense ratio was nearly identical for all three regions. In fact all three areas were within 0.2% of each other. Obviously, a ratio above 100% is a concern, but it should be noted that unpaid operator and family labor are included in total expenses, resulting in a ratio that is higher than would typically be expected.

Farms by Size

Although the average farm in the KFMA is similar across regions, significant differences exist between farms when separated into size categories according to gross farm income. Table 7 shows selected financial and production measures for KFMA farms by farm size. Notably, government payments for very large farms are over 6 times as large as those for small farms. However, government payments per acre for very large farms are less than 50% greater than those for small farms. In addition, very large farms earn a smaller percentage of gross farm income from government payments than do their smaller counterparts. The differences between farms, in terms of government payments, are not surprising. Certainly, it is expected that large farms would receive greater amounts of payments since they farm larger acreages. It is also expected that payments per acre may be greater since the size of farms in this study are determined by gross income. Thus, farms producing high yielding program commodities (i.e., irrigated corn) would likely earn a higher income, and potentially higher government payments on a per acre basis. Finally, larger farms have demonstrated the ability to achieve lower costs and higher yields, thereby making government payments a smaller portion of gross farm income.

Table 7. Financial and Production Measures for KFMA Farms by Size, 1995-2004.

Measure	Units	Small	Medium	Large	Very Large
Total Govt. Payments	\$	10,194	22,674	40,576	66,942
Govt. Payments/Acre	\$	22.56	24.90	27.72	31.49
Govt. Payments/GFI	%	15.6	13.6	11.7	9.3
Gross Farm Income (GFI)	\$	66,469	166,315	348,371	755,987
Net Farm Income* (NFI)	\$	-20,022	1,032	37,222	123,917
Total Expense Ratio	%	136.1	100.8	89.6	84.5
Total Assets	\$	382,596	569,797	914,160	1,584,294
Total Capital Managed	\$	644,087	1,152,746	1,867,243	3,039,967
Rate of Return to Capital Managed (RRCM)	%	-2.5	1.4	3.8	6.1
Avg. Debt/Equity Ratio	%	67.6	90.7	106.8	106.6
Crop Income/GFI	%	49.3	54.3	55.4	48.4
Livestock Income/GFI	%	28.8	26.6	26.7	35.3
Non-farm Wages	\$	13,770	10,196	7,016	3,628
Total Crop Acres	No.	506	1,005	1,577	2,272
Acres Harvested	No.	440	906	1,492	2,246

* Net Farm Income equals gross farm income minus operating expenses, depreciation, unpaid operator labor, and unpaid family labor.

While the government payment information by farm size is interesting, it does not tell the whole story in terms of the relative importance of government payments for farms in Kansas. It is also important to understand the financial characteristics of the different size farms. The most telling financial differences between farm sizes are profitability and expense management. As shown in table 7, profitability, as measured by RRCM, varies from -2.5% for small farms to 6.1% for very large farms. While, in terms of percentage points the difference seems small, the difference in profitability between farm sizes is actually quite large. For example, very large farms earn over four times the return on capital than medium size farms. In another major difference between farms, the total expense ratio drops from 136.1% for small farms to 84.5% for very large farms. This suggests that cost management is a significant factor in farm profitability. It also suggests that large farms have some cost advantages over small farms, or that large farms were able to grow over time because they were efficient cost managers. Otherwise, many of the remaining financial measures are not very dissimilar, or generally follow expectations based on how the farms were classified. Of the remaining variables, the most interesting is the debt/equity ratio. Unlike what many would expect, small farms actually have the lowest debt/equity ratio, meaning they have lower debt loads than larger farms.

Farm by Type

When discussing government payments by area and farm size, it was hypothesized that government payments in the west were higher than those in the east because of irrigation. Likewise, since irrigation usually results in greater production than non-irrigation, it

would be expected that government payments would be higher as well. As table 8 shows, total government payments and payments per acre were larger for irrigated farms.

Table 8. Financial and Production Measures for Irrigated and Non-irrigated KFMA Farms in Kansas, 1995-2004.

Measure	Units	Irrigated	Non-irrigated
Total Govt. Payments	\$	49,340	30,831
Govt. Payments/Acre	\$	36.72	23.99
Govt. Payments/GFI	%	15.4	15.5
Gross Farm Income (GFI)	\$	340,594	222,114
Net Farm Income* (NFI)	\$	30,008	15,009
Total Expense Ratio	%	97.0	105.0
Total Assets	\$	808,074	671,815
Total Capital Managed	\$	1,583,416	1,382,611
Rate of Return to Capital Managed (RRCM)	%	3.1	1.4
Avg. Debt/Equity Ratio	%	106.3	91.6
Crop Income/GFI	%	71.5	64.5
Livestock Income/GFI	%	6.3	13.7
Non-farm Wages	\$	8,453	9,874
Total Crop Acres	No.	1,456	1,298
Acres Harvested	No.	1,224	1,215

* Net Farm Income equals gross farm income minus operating expenses, depreciation, unpaid operator labor, and unpaid family labor.

Statistical Model

A statistical model was developed from the KFMA data set to quantify the relationship between profitability and several other explanatory variables, including government payments. The profitability measure used in the statistical models was rate of return to capital managed. The purpose of this extensive model was to quantify the effect that these variables had on RRCM. The model can be expressed as:

$$RRCM = B_0 + B_1 YEAR + B_2 GOVTPP + B_3 CINCP + B_4 TEXPR + B_5 AVGDE + B_6 AVGDE^2 + B_7 GFI + B_8 GFI^2,$$

where YEAR is a binary, or “dummy” variable that allows for changes in RRCM over time (year is defined as 1995 = 95, etc.), GOVTPP is the percentage of gross income earned from government payments, CINCP is the percentage of gross income earned from crops, TEXPR is the total expense ratio, AVGDE is the average debt/equity ratio, and GFI is gross farm income. Squared terms on AVGDE and GFI allow for non-linear relationships with RRCM.

The results of this model are shown in table 9. The R² value, at 71.2%, indicates the amount of variability in RRCM that is explained by the other variables. Thus, 71.2% of the variability in RRCM can be explained by the six independent variables in the model. Two of the most important things to consider when interpreting the results of the

regression model are the sign of the coefficient and whether or not the variable is statistically different from zero. Beginning with the YEAR variable, we can see from table 9 that RRCM was statistically different from the base year (2004) in seven of the nine years from 1995 through 2004.

Table 9. Regression Results for KFMA Profitability Model.

Variable	Coefficient	t-statistic
Intercept	0.1099	62.13
1995	0.0050*	3.86
1996	0.0148*	11.72
1997	0.0113*	9.00
1998	-0.0030*	-2.33
1999	-0.0011	-0.78
2000	-0.0044*	-3.27
2001	-0.0046*	-3.50
2002	-0.0027*	-2.13
2003	-0.0038*	-2.98
GVTTP	0.0154*	4.44
CINCP	-0.0025*	-2.27
TEXPR	-0.1055*	-102.37
AVGDE	0.0036*	10.21
AVGDE ²	-0.0002*	-6.27
GFI	0.0001*	16.45
GFI ²	-0.0000*	-2.63

*Indicates significantly different from zero at 0.05 level.

** 2004 is the base year.

The general purpose of government payments is to provide a safety net for farmers in an economic environment where many forces are out of their control. Because these payments are designed to boost farm income, it would be reasonable to expect that government payments would be an important variable in determining RRCM. The percent of gross farm income from government payments (GVTTP) was used instead of total government payments because it also gives an indication of the crop/livestock mix of the farm. GVTTP is statistically significant and positive, meaning that as the percentage of GFI earned from government payments increases, RRCM increases as well. However, for every 1% increase in GVTTP, RRCM increases by only 0.015%.

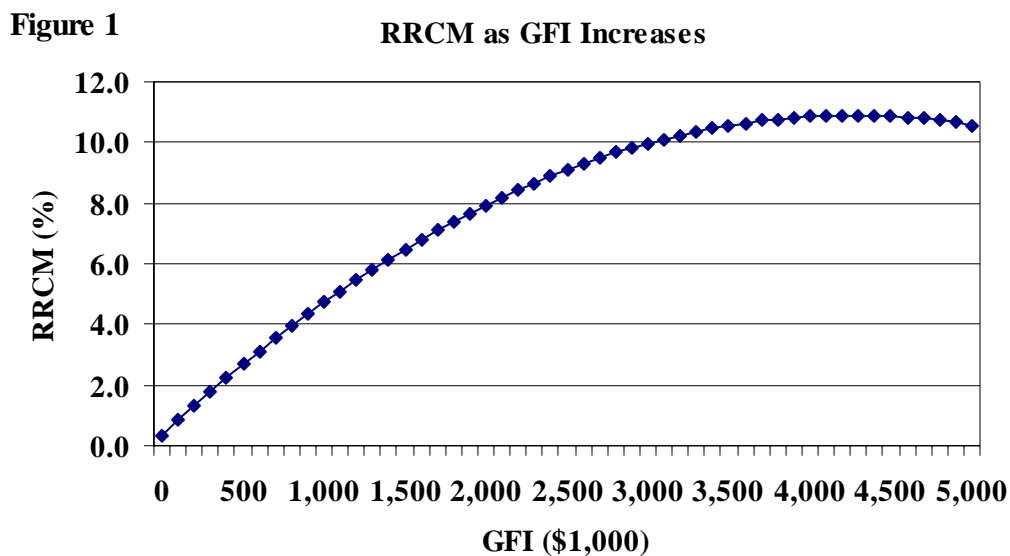
The CINCP variable was included in the model to determine whether the crop/livestock mix of a farm had any impact on RRCM. According to this model, as the percentage of gross income earned from crops increases, RRCM decreases. Although, this variable is statistically significant, like GVTTP, the effect is small.

The total expense ratio (TEXPR), defined on page 8, gives an indication of how well a farm manages costs, which in turn will affect profitability. The TEXPR variable in the model is highly significant and negative, meaning that for every 1% increase in TEXPR, RRCM will decrease by about 0.1%. For example, assume that a farm had a total

expense ratio of 90% and a corresponding RRCM of 5%. If the total expense ratio increased to 91%, and everything else was held constant, RRCM would fall to 4.9%.

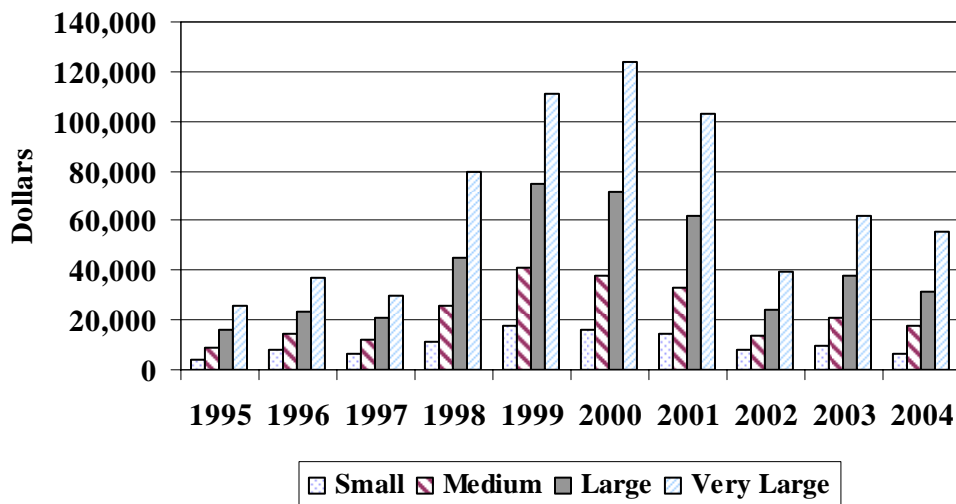
An average debt/equity ratio (AVGDE and $AVGDE^2$) was included in this model to determine the impact debt may have on profitability. According to the regression results, as the average debt/equity increases (i.e., a farm is more highly leveraged), RRCM increases as well, but at a decreasing rate. Again, this variable is statistically significant, but its impact is minor. This indicates that, on average, farms in the KFMA are using their borrowed funds to earn positive returns on their operations. Of course, caution should be used in increasing leverage as cash flow problems can develop.

The final variable is gross farm income (GFI and GFI^2). As previously mentioned, a squared term for GFI was included in the model to allow for a non-linear relationship between GFI and RRCM. In the model both variables are statistically significant, with GFI positive and GFI^2 negative, indicating that as farms get bigger—in terms of GFI, RRCM increases, but at a decreasing rate. By holding all other variables constant and varying GFI and GFI^2 , we can determine the point at which RRCM levels off with continued increases in GFI. Figure 1 shows that RRCM increases until GFI reaches \$4.3 million. At that point GFI plateaus and then starts to decrease. This result would suggest that profitability is maximized with GFI of \$4.3 million. However, extreme care must be taken in making that assertion. First, data on large farms is limited in the KFMA, making projections at higher levels of GFI more problematic. For example, the maximum GFI for a farm in the data set used to derive this model was \$2.8 million. Second, in order to predict RRCM as GFI increases, all other variables were held constant. However, as previous data showed, as farm size increased, *TEXPR* decreased. Since this variable was held constant to illustrate the relationship between RRCM and GFI, the advantage most large farms have in terms of costs are eliminated, making it appear that economies of size are maximized at \$4.3 million in GFI.



The preceding statistical model indicates that government payments are a significant factor in the overall financial performance of a farm. However, the same model also shows that increasing the percentage of GFI that comes from government payments has less of an impact on profitability than other variables. Expenses and total revenue have a greater impact on profitability than government payments do. It is important to understand this when evaluating farm policy alternatives. In today's farm policy environment there are government officials and interest groups who are advocating reductions in payments or even the complete elimination of farm subsidies. Some of the information previously presented would seem to suggest that, on average, farms may be able to absorb a reduction in government payments without a catastrophic reduction in profitability. This may be especially true with larger farms. At the same time there is the realization that in some years, government payments were a vital contributor to gross income (figure 2).

Figure 2 **Average Government Payments per Farm**



Loss of Government Payments

To further determine the impact of government payments on farm profitability, additional analysis was performed with the KFMA data set. In this analysis, scenarios in which government payments were reduced by 10%, and completely eliminated were developed. Without question, it would be expected that both gross and net income would fall if government payments were reduced or eliminated immediately, and everything else remained constant. However, reducing or eliminating government payments will likely have consequences outside of simply reducing income. Most notably, land values would likely fall as government payments dropped. A study by Kastens and Dhuyvetter estimated that cropland values in Kansas would fall by 36.3% if government payments were eliminated. A reduction in land values of that magnitude could have a devastating effect on the financial viability of many Kansas farms. The estimated decline in land values, however, assumes that 100% of government payments are capitalized into land. In reality, government payments are not likely to be fully capitalized into land values.

Nevertheless, using the assumption that government payments are fully capitalized into land values provides a “worst case scenario” in terms of the impact of a reduction in government payments. This could also be considered a “worst case scenario” because cash rent for cropland was not reduced in conjunction with land values. This was necessary because the KFMA data does not distinguish between crop, pasture, and other cash rent.

To account for the fact that government payments get capitalized into land values, in this analysis, land values were reduced by 3.6% in the scenario in which government payments were reduced by 10%, and by 36.3% in the scenario in which government payments were completely eliminated. For farms that own land, the reduction in land values will negatively effect the solvency position of those farms, and may reduce the profitability of those farms as well. Table 10 shows the changes in net farm income, rate of return on assets, and rate of return on equity as government payments are reduced. As government payments are reduced, net farm income is reduced by the same amount. Since larger farms receive larger payments, total income losses are greater for larger farms. On a percentage basis, however, smaller farms are more adversely affected.

Table 10. Net Farm Income, Rate of Return on Assets, and Rate of Return on Equity for KFMA Farms by Farm Size, 1995-2004.

Measure	Small	Medium	Large	Very Large
Net Farm Income (NFI)	\$-20,411	\$1,138	\$37,570	\$125,048
NFI w/ Govt. Pmts				
Reduced by 10%	\$-21,418	\$-1,132	\$33,496	\$118,308
NFI w/o Govt. Pmts	\$-30,484	\$-21,566	\$-3,168	\$57,654
Rate of Return on				
Assets (ROA)	-5.21%	3.21%	8.20%	12.32%
ROA w/ Govt. Pmts				
Reduced by 10%	-5.69%	2.75%	7.75%	11.92%
ROA w/o Govt. Pmts	-10.82%	-2.06%	3.26%	7.99%
Rate of Return on				
Equity (ROE)	-15.47%	-1.08%	8.34%	17.67%
ROE w/ Govt. Pmts				
Reduced by 10%	-17.18%	-2.91%	7.25%	17.02%
ROE w/o Govt. Pmts	-26.63%	-13.17%	-3.11%	8.82%

Because income levels differ dramatically between farm sizes, better measures of changes in profitability include the rate of return on assets (ROA) and equity (ROE). ROA and ROE were used instead of RRCM because they provide a better indication of how changes in government payments affect profitability in terms of a producer’s investment and not a landlord’s. According to the data shown in table 10, ROA decreases by less than 0.5 percentage points for all farm sizes if government payments are reduced by 10 percent. Declines in ROE range from 1.83 percentage points for medium farms to 0.65 percentage points for very large farms.

If government payments are eliminated altogether, rate of return on assets decreases by approximately 5 percentage points across the three smallest farm sizes, and by 4 percentage points for very large farms. Rate of return on equity drops by 11 to 12 percentage points for small, medium, and large farms, but only by 9 percentage points for very large farms. In spite of the declines, rate of return on assets and equity remains positive for very large farms.

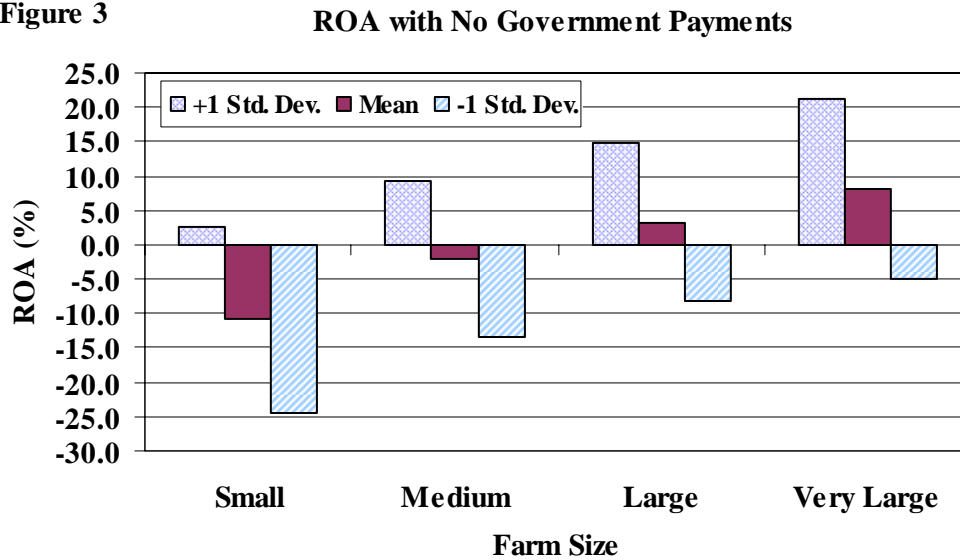
Table 11. Average Total Assets, Liabilities, and Equity for KFMA Farms by Farm Size, 1995-2004.

Measure	Small	Medium	Large	Very Large
Total Assets	\$359,673	\$550,718	\$907,280	\$1,576,239
Total Assets w/ Govt. Pmts Reduced by 10%	\$352,470	\$541,261	\$893,041	\$1,553,817
Total Assets w/o Govt. Pmts	\$287,045	\$455,353	\$763,697	\$1,350,152
Total Liabilities	\$75,586	\$155,899	\$282,799	\$549,080
Equity (Net Worth)	\$284,087	\$394,819	\$624,481	\$1,027,159
Equity w/ Govt. Pmts Reduced by 10%	\$276,884	\$385,361	\$610,241	\$1,004,737
Equity w/o Govt. Pmts	\$211,459	\$299,454	\$480,897	\$801,073

Based on the values in table 11, average total assets fell 20.2%, 17.3%, 15.8%, and 14.3% for small, medium, large, and very large farms, respectively. The difference in asset values is due to small farms having a greater portion of assets in land. Larger farms tend to rent a higher percentage of land versus owning, making long term assets such as land a smaller percentage of total assets than small farms. As liabilities remained constant, the average debt/asset ratio for each size of farm increased by about 6 percentage points, with small farms having the lowest ratio at 26.3%, and with very large farms having the highest ratio at 40.7%. Average declines in equity ranged from 25.6% for small farms to 22.0% for very large farms. Although the average financial position declined for KFMA farms when government payments were eliminated, the number of farms that become insolvent during the 1995-2004 timeframe increased by only 2 percent (0.7% to 2.7%).

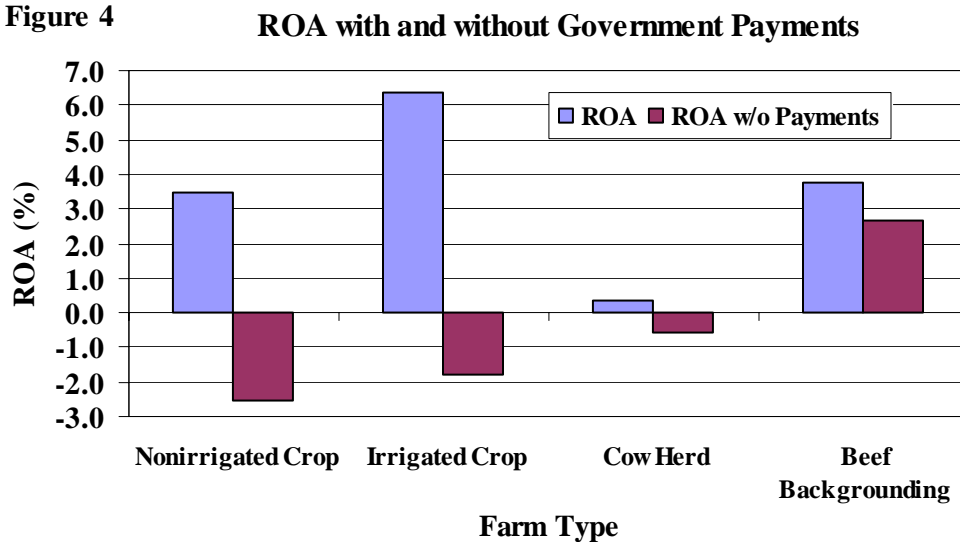
While the preceding discussion simply illustrates the impact of government payments through mean values, it is also important to understand that there is a tremendous amount of variability between farms as well. For example, figure 3 shows the mean ROA without government payments by farm size. Looking exclusively at small farms, the average ROA without government payments was -10.8%. However, at one standard deviation above and below the mean, ROA would be 2.7% and -24.4%, respectively. This indicates that many, but not all farms will become unprofitable if government payments are eliminated.

Figure 3



There are many potential reasons why the loss of government payments may have different effects on farms in Kansas. First and foremost, since most government payments are targeted toward specific commodities, those farms that have historically produced those commodities will receive the bulk of farm program payments. Therefore, if farm programs are reduced or eliminated, those farms will likely be affected more than farms that do not produce those commodities. For example, figure 4 shows ROA and ROA without government payments for four types of farms in the KFMA data set. These farms include non-irrigated crop, irrigated crop, cow herd, and beef backgrounding. As one would expect, ROA suffers larger declines for both non-irrigated and irrigated farms than cow herd or beef backgrounding operations. Irrigated farms suffer the largest decline in returns, and cow herd operations the smallest. Beef backgrounding operations are the only ones who earn a positive return.

Figure 4



A second reason for the variability of impact of farm program payments is that farms vary significantly in terms of their ability to consistently earn positive returns. It was demonstrated earlier that larger farms have shown the ability to produce at lower cost than their smaller counterparts. That ability has allowed larger farms to earn higher profits and be less dependent on government payments. In addition, some farms within a particular size class have demonstrated the ability to earn higher returns than comparably sized farms without the benefit of additional government payments.

Finally, as previously mentioned farms in the data set may have experienced different conditions over the last 10 years, such as drought and highs and lows in cattle prices that have increased or decreased the amount of government payments they received relative to average and to other farms.

Discussion and Summary

The fact that profitability varies so much between farms with and without government payments has some major implications for farms in Kansas and the forthcoming debate over the 2007 farm bill. In recent farm bill debates, support for farm subsidies has been broad and bipartisan. Recently, however, that support has splintered to some degree and become increasingly contentious as federal budget pressures developed and advocacy groups have protested against farm program payments being inefficient and detrimental to poor, developing countries. As a result, proposals have been made to reduce farm program payments.

This paper has shown that, over the last 10 years, farm program payments have been a significant factor in farm profitability. However, it has also shown that other factors, such as cost management and production have larger effects on profitability than government payments. Nevertheless, if government payments were reduced or eliminated, farm profitability would be diminished. Obviously, those farms that specialize in the production of farm program commodities would suffer larger losses than those who do not specialize in those commodities. In addition, larger farms would be able to absorb the loss of government payments better than small farms, and in many cases even remain profitable. On the other hand small farms were not profitable, on average, even with government payments. Because farm profitability varies significantly between farms, some difficult questions arise regarding future farm policy.

For instance, since large farms are typically more profitable than small farms, and receive a smaller portion of gross income from government payments, it could be construed by some that payment limitations could be imposed on large farms with minimal effect on profitability. To do so, however, requires a means to impose those limits. In other words, should payment limitations be based on a strict ceiling of total payments, number of acres farmed, gross income, or some other measure? This leads to the issue of equity. The problem with using one of the above measures to define an “equitable” distribution of government payments is that one’s particular definition of “equitable” may not meet another’s definition. This can already be seen in the reaction of various commodity

groups to proposed stricter payment limitations. One commodity group's definition of an equitable distribution of payments does not agree with another's.

Then there is the issue of the variability of profits and motives between similar farms (i.e., size and type). As a group, small farms have difficulty competing with large farms. But in terms of profitability, some can compare favorably with large farms. Other small farms are not profit oriented. They have other primary occupations, but enjoy and value the agricultural lifestyle. The remaining group of small farms faces challenges such as limited resources and production or management inefficiencies. (Large farms can face these challenges as well). Even if people would agree to target farm payments to small farms, the question exists as to whether those payments should be targeted to all three of those groups. These circumstances make forming farm policy difficult. That is why it is important to understand the structure of agricultural and understand how changes in policy may impact farms. When the process of understanding the relationship between government payments and farm profitability begins, often more questions arise than are answered. Consequently, this study is just one step in a broader effort to provide information to a complex issue.

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