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Analysis of Revenue Assurance Proposals

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Introduction

Over the past 70 years, farmers have been concerned about declining real prices and have sought price support relief from the federal government. Every omnibus farm act during this time period has provided price and/or income support to eliminate financial stress partially caused by year-to-year variations (volatility) in annual revenues (income). However, the focus in agricultural policy on price support only has enabled the federal government to provide countercyclical price support, but not necessary countercyclical income support. Therefore, volatility in annual revenues remains. When yields are high and prices are low, farmers receive large market revenues and larger subsidies from the federal government to offset the decline in market prices. When yields are low and prices are high, farmers receive market revenue but little or no subsidies from the federal government because of the high prices. Therefore, farm income has fluctuated in relation to yields.

In recent years, the revenue risks have been partially covered by combining commodity programs, crop insurance, and disaster assistance. The commodity programs have provided price risk protection while crop insurance and disaster assistance have provided some degree of yield risk protection.

Currently the commodity programs offer price protection without cost to farmers and consequently, participation is universal. Disaster assistance is also offered without cost to farmers, but because it is assistance provided in reaction to a specific event (ad hoc) and rarely provides more than a small amount of yield protection, producers cannot rely on this form of assistance for yield risk protection. Indeed, the continual need for reactive disaster assistance may be seen as a sign that the current combination of commodity programs and crop insurance does not effectively provide the contingency (risk protection) markets needed in production agriculture. Crop insurance has numerous instruments that may cover price, yield, or revenue at a cost based on the level of risk protection purchased. However, adverse selection (greater participation by those with higher yield volatility) in crop insurance has led to high premiums and federal subsidies of \$3- to \$4-billion annually.

Various proposals for a national revenue assurance program have been presented to Congress by farm and commodity groups and agricultural policy researchers to provide adequate and effective risk management. These proposals are the result of the farmers' concerns for the lack of appropriate and effective contingency markets, which are needed by U.S. agricultural producers for risk management. The key differences in these proposals include the method of determining yield and price for estimating target revenue, the instruments used to achieve the estimated level of target revenue, and the unit area used to develop the target (for example, nation, state, or county). This analysis illustrates the impacts on total gross income for three counties in Oklahoma with varying degrees of yield volatility, of market determined versus set target prices, national versus county target yields, and the method of integrating the direct payment into revenue assurance.

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We selected two proposals (Babcock/Hart and Zulauf) which have distinctive key differences and compared them to the application of current policy over the last 25 years for dryland wheat production in three Oklahoma counties (Kingfisher, Tillman, and Texas). These three Oklahoma counties were chosen because they represent increasing yield risk from the eastern-most county (Kingfisher) to the western-most county (Texas). We selected wheat as the target crop because it is the primary crop of the Great Plains, and sufficient data are available for our study.

Babcock/Hart Proposal (RA-B)

The RA-B proposal attempts to provide a revenue assurance program that meets the guidelines outlined by U.S. Trade Representative (USTR) Portman to the World Trade Organization (WTO) in 2006. In that proposal, the United States noted that we were prepared to cut our Amber box policies by 60 percent from the current cap of \$19.1 billion to \$7.64 billion. Furthermore, we offered to cap blue box policies to 2.5% of the value of production with product-specific caps based on the 1999-2001 support levels (de minimus) also reduced to 2.5%.²

The sum of the 1991 to 2001 product specific caps was \$16.13 billion and therefore, the proposed new amber box cap of \$7.64 billion and blue box cap of \$5.75 would certainly be binding under current policies, holding all other market conditions constant.

The RA-B proposal (Briefing paper 05-BP 48, November 2005) came out of the Center for Agriculture and Rural Development and is the basis for the current Revenue Countercyclical Program (RCCP) being advanced by the National Corn Growers Association. The RA-B proposal replaces the current loan deficiency payments and countercyclical payments with revenue assurance.

The RA-B proposal has the following three basic components:

1. Individual revenue will not fall below 70% of the Olympic average (average minus the highest and lowest) of the previous 5 years.
2. If revenue (national season average price times county average yield) falls below 85% of the revenue determined by the product of the effective target price (target price less direct payment) times the expected county yield, then all farmers in the county would receive the difference on all planted acres.
3. If revenue (national season average price times county average yield) falls below 95% of the revenue determined by the product of the effective target price (target price less direct payment) times the expected county yield, then all farmers in the county would receive the difference on all base acres.

To demonstrate what year-to-year revenues could be under past conditions, we calculate the gross income received from cash sales and revenue assurance payments that is determined by 100% of the difference between target revenue and actual revenue when target exceeds actual revenue. The gross revenue includes the \$0.52/bushel direct payment, and we assume base

² Before negotiations stalled, the plan was to update the Amber-Blue-Green Box system. Amber box spending policies that are trade-distorting and targeted for reduction (marketing loans and price supports), would be reduced and capped with product-specific caps. Blue box programs, policies that are trade distorting (direct payments and counter-cyclical payments), but exempt from reductions, would be capped at 5% of production over a period to be negotiated, with flexibility for countries with large support levels. Green box programs, policies that are non-trade distorting and are acceptable (disaster aid, conservation programs & rural development programs), would be reviewed and criteria clarified. De Minimis would be reduced by an amount to be negotiated; the current level is 5%, but the US has proposed 2.5%.

and actual acres planted to be the same. The target revenue is determined as the current effective target price (target price less direct payment) times the five-year Olympic average county yield. The Total Income received under RA-B is calculated as the actual cash income plus revenue assurance payment plus direct payment as shown below.

Actual cash income is: $USAP_i * ACY_{ij}$.

Revenue assurance payment is 95% of expected income less actual if greater than 0, or: $.95 * (OACY_{ij} * (TP - DP)) - (USAP_i * ACY_{ij})$.

Direct payment is $DP * CBY_{ij}$.

Where:

USAP_i is the U.S. average wheat price in year i,
ACY_{ij} is the actual yield in year i and county j,
OACY_{ij} is the Olympic average yield in year i and county j,
TP is the target price (set in legislation),
DP is the direct payment (set in legislation), and
CBY_{ij} is the base yield in year i and county j.

For example, in 2006 USAP was \$4.30, ACY in Kingfisher County was 25 bushels, OACY was 32.53 bushels, CBY was 34.4 bushels, target price was \$3.92/bu and the direct payment was \$0.52/bu. Thus, actual cash income for Kingfisher County was \$107.50 per acre and the target income was \$110.61 per acre with the per acre direct payment of \$17.89. Total income in Kingfisher County during 2006 would be \$110.61 plus \$17.89 or \$128.50 per acre.

Zulauf Proposal (RA-Z)

The Zulauf proposal (U.S. Agricultural Policy at a Crossroads, Sept. 21, 2006 Testimony before the House Committee on Ag/Subcommittee on General Farm Commodities and Risk Management) is anchored in providing a government program to address continuous revenue risk and removing this risk from the current crop insurance products. Crop insurance would then handle all risk below the national systemic level. With this focus, the RA-Z proposal is often referred to as an integrated crop insurance program. A key difference between the RA-Z and RA-B proposals is the unit area used to determine the revenue target. The RA-Z proposal uses U.S. expected price and U.S. expected average yield to determine the U.S. target revenue while the RA-B proposal uses the U.S. effective target price and county average yield to establish the county target revenue. This is an important distinction in the allocation of benefits as the charts below will demonstrate.

The RA-Z proposal determines the U.S. expected price from the futures price prior to planting, and the expected yield is determined from the yield trend. The actual price received is determined from the futures price at harvest, and the actual yield is the U.S. average harvested yield as reported by USDA. The difference between expected and actual revenue, if any, is the payment farmers would receive in addition to the direct payment. The direct payment is independent of the revenue assurance payment, but it is not independent of the support payment under current policy. Again, the way that the direct payment is used is an important distinction between the RA-Z and the RA-B proposals and current policy. The RA-B proposal and current policy subtract the direct payment from the target price to obtain an effective target price. The direct payment is then added back to gross cash income plus revenue payment to obtain the total gross income. In the RA-Z proposal, the direct payment rate is not subtracted from the target price, but the direct payment is still included in the total gross income value. In

this way, the RA-Z proposal provides price coverage that moves with the market while the RA-B proposal provides a preset price target. The National Corn Growers Association proposal, while based on the RA-B proposal, uses a form of market-determined price to establish the target revenue.

The Total Income received under RA-Z is calculated as:

If $AJFP_i * USTY_i > JJFP_i * USAY_i$
then $ACY_{ij} + (DP * CBY_{ij}) + (AJFP_i * USTY_i - JJFP_i * USAY_i)$
else $USAP_i * ACY_{ij} + (DP * CBY_{ij})$.

Where:

AJFP_i is the July wheat futures price in August in year i,
JJFP_i is the July wheat futures price in July in year i,
USTY_i is the U.S. trend yield for wheat in year i,
USAY_i is the U.S. average yield for wheat in year i,
USAP_i is the U.S. average wheat price in year i,
ACY_{ij} is the actual yield in year i and county j,
OACY_{ij} is the Olympic average yield in year i and county j,
DP is the direct payment (set in legislation), and
CBY_{ij} is the base yield in year i and county j.

For example, in 2006 AJFP was \$3.64, JJFP was \$5.03, USTY was 38.7 bushels, USAY was 38.7 bushels, USAP was \$4.30, ACY in Kingfisher County was 25 bushels, OACY was 32.53 bushels, CBY was 34.4 bushels, target price was \$3.92/bu and the direct payment was \$0.52/bu. Thus, U.S. target revenue was \$140.96 per acre and the actual income was \$194.66 per acre. Because actual income exceeds target income total income for the county is cash income \$107.50 plus direct payment \$17.89 or \$125.39

As with the RA-B proposal, we add 100% of the calculated revenue assurance payment to the total cash income plus direct payment to determine total gross income. This calculation provides for an equal comparison of the target revenue approaches and current policy. However, under current policy, only 85% of the eligible acreage receives support payments (direct and countercyclical). Percentage reductions in payments could be made to each proposal to meet budget guidelines, and the effects of these percentage reductions would vary by program and the method used to achieve the reduction.

The following three charts provide a comparison from 1983 to 2006 of the average annual gross revenues for each of the three Oklahoma counties considered, under current policy, the RA-B proposal and the RA-Z proposal. We selected this period to capture the best view of yield volatility, which is the component that the revenue assurance proposals seek to cover that is not covered by current policy. However, prior to 1996, acreage reduction programs (ARP) were used to manage supply, and these programs affected the spatial allocation of crop acreage, and did so in a way that affected yields. Locally, yields may have improved with high ARPs as the least profitable fields were placed in the program first. However, nationally and regionally, yields may have declined under the ARP as less profitable acreage was held in production as a result of program benefits. We are uncertain how potential changes in land use before and after 1996 have affected our analyses. To view these results only as they relate to the annual variation in

yields within a county eliminates the need to identify any past impact of policy on land use and yields.

Figure 1. Comparison of the county average revenue that would have occurred under the RA-B, RA-Z and current commodity program for the period 1983-2006 in Kingfisher County.

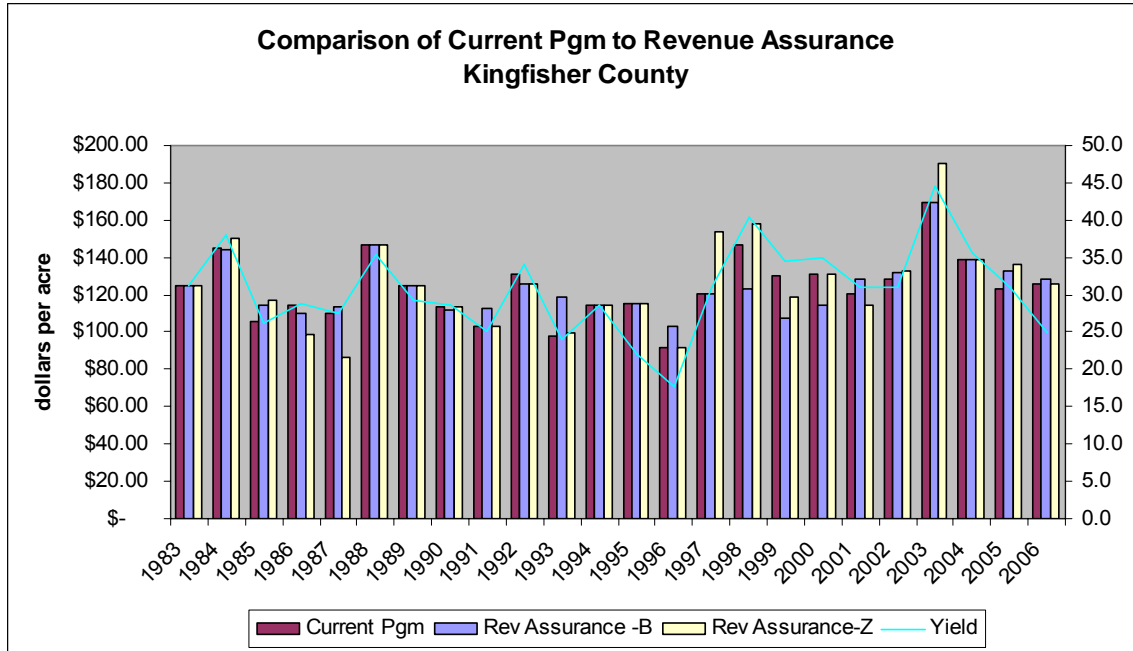


Figure 2. Comparison of the county average revenue that would have occurred under the RA-B, RA-Z and current commodity program for the period 1983-2006 in Tillman County.

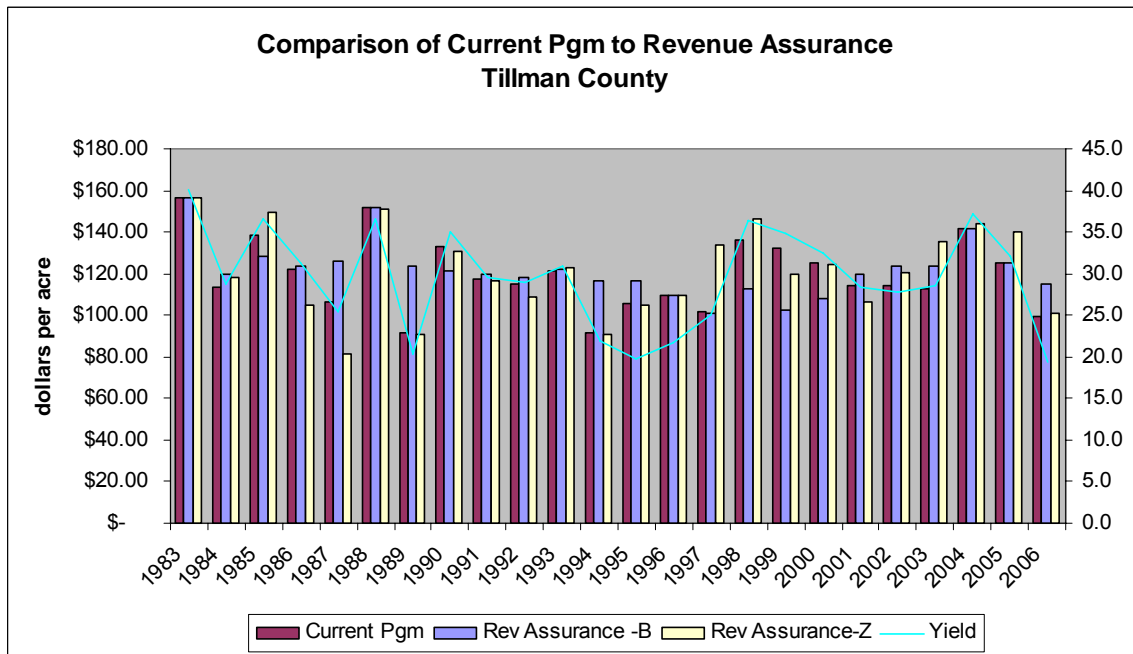
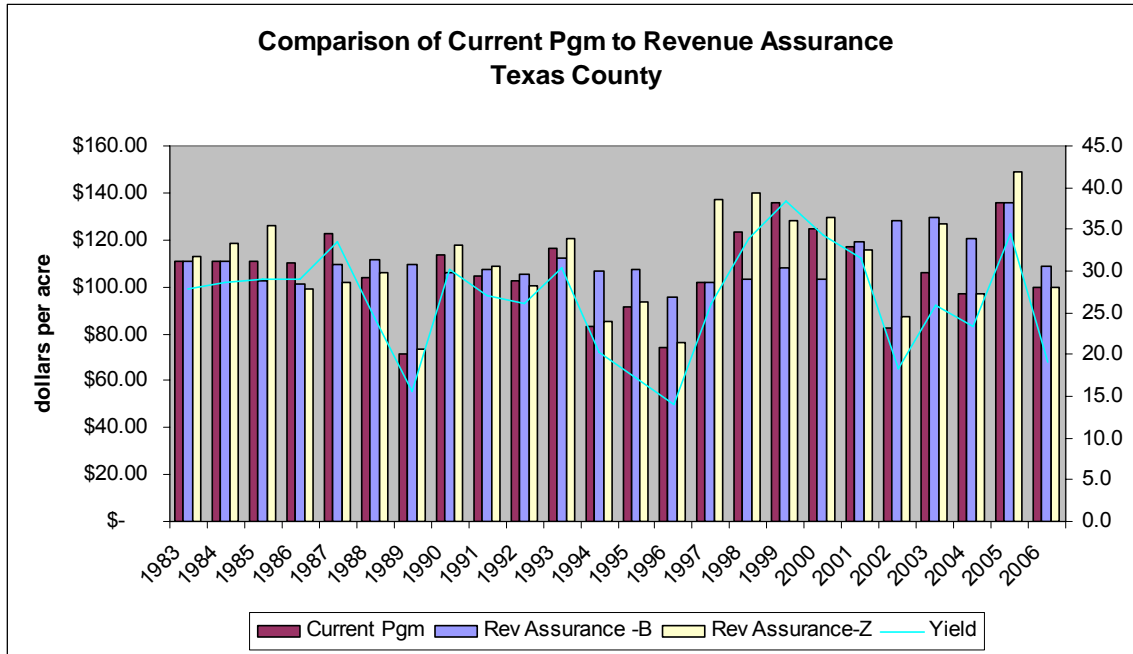


Figure 3. Comparison of the county average revenue that would have occurred under the RA-B, RA-Z and current commodity program for the period 1983-2006 in Texas County.



Figures 1, 2 and 3 above help to illustrate important elements of the revenue assurance approach to risk management. First, their effectiveness in stabilizing revenue is highly dependent on the geographical aggregation of yield. The average annual wheat yields in Oklahoma are below those of the United States. Therefore, as the comparison of the approaches of the RA-B and RA-Z proposals indicate, basing yields on the U.S. average or trend provides a higher target revenue than using the county average or trend. Likewise, for counties whose yields exceed the national average or trend, the estimated target revenue will be less under the national average yield than the county yield.

In addition, using county average yields to determine the target revenue provides less annual variation in gross revenue and therefore better revenue risk protection. This point is important since adverse yield events are less likely to occur nationally and more likely to occur by state or by county because of adverse weather events (drought, freeze, or floods, for example). One argument against using county average yields in the target revenue calculation is that it reduces the need for crop insurance, which is a difficult empirical question to address. However, some adverse weather conditions are location specific (such as hail, fire, and wind), and crop insurance is still needed to cover these events. Also, not needing insurance payouts for county and multi-county disasters should reduce the cost of insurance and increase the number of policies. This result also occurs for the national revenue deficiency program, although the extent of the reduction in insurance rates would be smaller because county yields are more correlated with farm yields than are national yields.

The major difference between the RA-B and RA-Z proposals is related to the difference in the annual yield variation between the U.S. trend yield and the county averages, the difference in expected and target price, and the difference in the direct payment implementation method. The difference in the method for determining the target yield is amplified in Texas County where county yield variation is greatest. Using the U.S. average yield rather than trend yield in the RA-

Z proposal would have reduced the difference in gross income associated with yield variation since the U.S. yield in most years followed the yield variation in the three Oklahoma counties. However, the magnitude of variation in the U.S. yields was considerably less than that in the Oklahoma counties as shown in the chart below. Note that for the periods where yield is the lowest, the current program provides little income protection, but the revenue assurance program provides a great deal more coverage.

Figure 4. Annual average wheat yields for three Oklahoma counties and the United States from 1978 to 2006.

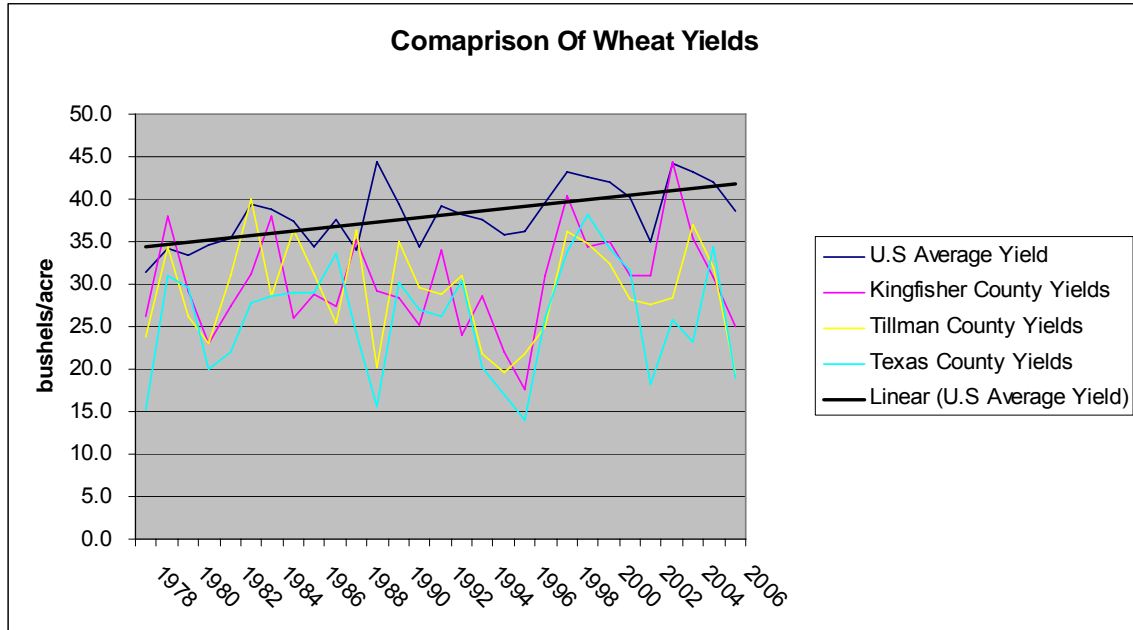


Table 1 below contains a summary of the three policy options: the RA-B and RA-Z proposals and current policy. The higher mean payout of the RA-Z proposal is directly related to the method of using the market determined price for target revenue and including the direct payment in the total gross income without adjusting the target revenue. While this method also affects the standard deviation, the effect is minor compared to the effect of the difference in yield variation between the national and county level yields. Clearly, the RA-B proposal offers much greater income stability than either current policy or the RA-Z proposal. However, the RA-Z proposal provides protection more in line with the market, which is at the root of that proposal. This distinction between the two proposals is extremely important. The RA-B proposal considers a “standard” target revenue while the RA-Z proposal considers a target revenue in line with the market and therefore seeks to offer protection at market values. This result occurs because the RA-Z proposal is based on futures prices while the RA-B is based on the current congressionally-mandated target price.

Table 1. Statistical measures of gross income for the period 1983 to 2006 under the RA-B and RA-Z revenue assurance proposals and the current commodity program.

	<i>RA-Z</i>	<i>Current</i>	<i>RA-B</i>
		Texas County, OK	
Mean	114.76	106.25	110.63
Median	112.29	108.07	108.65
Standard Deviation	22.27	17.14	9.68
Range	73.71	64.59	40.27
Minimum	78.52	71.36	95.61
Maximum	152.23	135.96	135.88

Discussion

This analysis of the two proposals and current policy describes the implications for total gross income of market-determined versus set target prices, national versus county target yields, and the method of integrating the direct payment into the revenue assurance. However, regardless of these factors, an important consideration for the revenue assurance program will be the incentives provided to producers in the same unit area with different levels of productivity. In using the national average yield, the incentives are regional as well as local for wheat. Almost three out of four counties in the United States produce wheat, and the variation in average annual yields between counties is large.

As an example of the impact on producers with different yields, consider farmers with yields from 30 to 50 bushels per acre in counties with average (target) yields of 30, 40 and 50 bushels per acre as shown in Figures 5, 6 and 7 below. Assuming a target price of \$3.50, we map the gross income at actual prices of \$2.50 to \$5.00 per bushel and actual yields from 30 to 50 bushels per acre. For a county (target) yield of 30 and target price of \$3.50, the target revenue would be \$118.50 per acre (target yield x (greater of target or market price) plus direct payment). Any combination of actual price and yield that provides actual revenue below that target revenue would be protected, while actual revenue above that level would not be protected. Farmers with average yields of 40 bushels per acre would only receive revenue coverage up to \$2.60. Beyond that price, revenue is not protected.

As the county average (target) yield is increased from 30 to 40 bushels, the level of revenue assurance is increased to \$158 per acre and more of the potential actual yield and price incomes are protected by the revenue assurance. Finally, with the county average (target) yield increased from 40 to 50 bushels, revenue assurance increases to \$197.50 per acre, and most of the potential actual yield and price incomes for the farm are protected.

This simple analysis indicates that while revenue is protected in all three counties with different average yields, farmers whose yields exceed the average will have less protection than farmers with yields approaching the average. Over time, this result may lead farmers to cut back on yield enhancing inputs (seed, fertilizer, chemicals) to lower yields or to purchase additional crop insurance to cover the gap in revenue protection attributable to the difference in farm and county level yields.

Targeting revenue at the county level does a good job of providing a high degree of risk management to individual farmers. What would not be covered (hail, fire, perhaps wind, and

some disease) is largely poolable and could be insured through federal crop insurance at a much lower rate than today's rates.

The national revenue deficiency payment could be scaled to the individual farmer's expected gross revenue to minimize concerns about fairness within the program. Because different farmers have different gross revenues, eliminating the bias towards less productive outcomes requires scaling the national revenue deficiency payment to individual farmers' gross income at risk. This scaling is important in several comparative situations, including dryland crops and irrigated crops within the same county. A simple scaling formula could use the ratio of the farmer's expected revenue per acre to the national expected revenue per acre and then multiply this ratio by the national revenue deficiency payment. Therefore, the national revenue deficiency payment is scaled to the farmer's expected gross revenue.

Figure 5. Gross income at various levels of farm yield and price with revenue assurance using 30 bushels as target yield, \$3.50 as target price and a \$.45 per bushel direct payment.

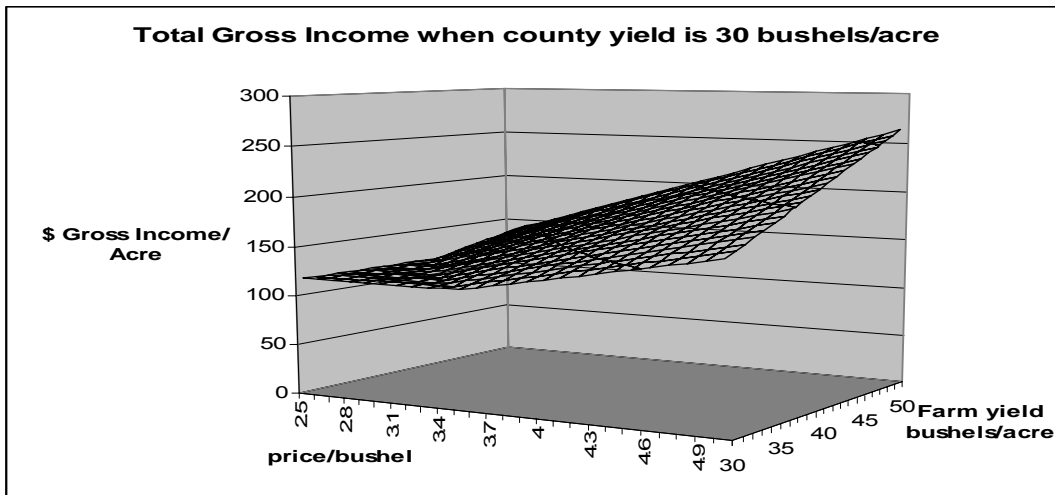


Figure 6. Gross income at various levels of farm yield and price with revenue assurance using 40 bushels as target yield, \$3.50 as target price and a \$.45 per bushel direct payment.

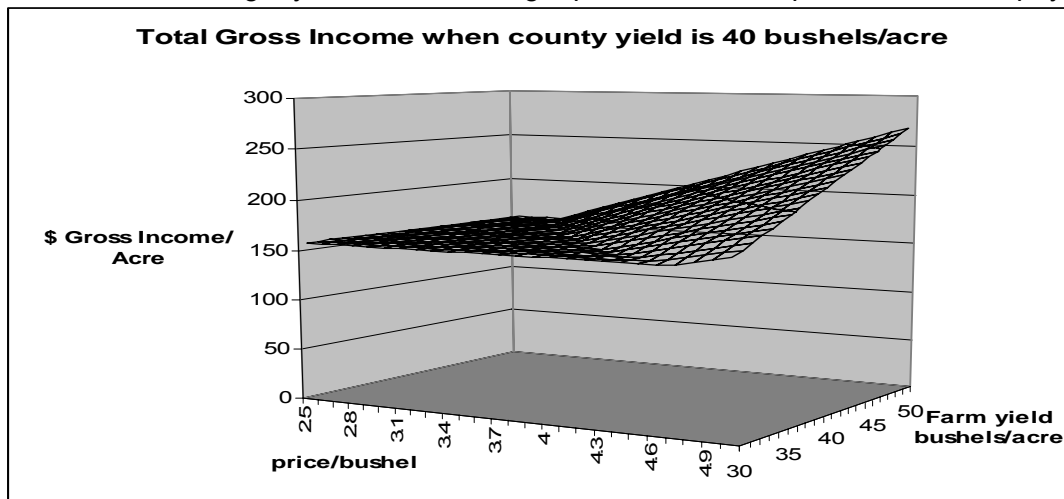
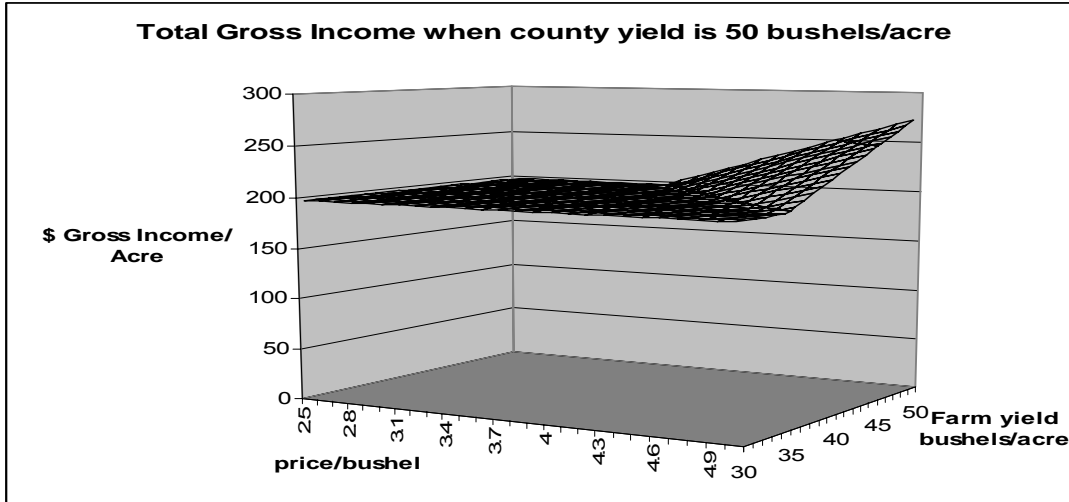


Figure 7. Gross income at various levels of farm yield and price with revenue assurance using 50 bushels as target yield, \$3.50 as target price and a \$.45 per bushel direct payment.



We have analyzed two proposed revenue assurance programs for Kingfisher, Tillman and Texas Counties in Oklahoma for the period from 1983 to 2006 and compared the revenue assurance proposals to the current program applied during the same period. We have illustrated examples of various methods for determining target yield and target price as well as actual price. We have also indicated different methods for including the direct payment and reducing the level of coverage to reduce budget exposure³ and different methods of paying portions of the revenue assurance to meet WTO limits.

Regardless of the methods used to calibrate the revenue assurance program, impacts on land-use patterns will exist as they have with all other previous farm support programs. While these impacts may be minimized in the short run, unless annual adjustments are made to both expected yield and price, the impacts will be magnified over the longer run.

Finally, we have not discussed a very important component of the potential effectiveness of the revenue assurance program and that is implementation. Except for the adjustments to yields and acreage that were permitted one time under the Farm Security and Rural Investment Act of 2002, USDA has not collected yield information since the Food Security Act of 1985 was implemented. With the revenue assurance program, especially where the program attempts to include the producer's individual risk, historic yields and acreage must be collected and verified. Also, if the revenue assurance program is to be integrated with crop insurance, this requirement must be achieved for both the farm and the fields within the farm.

³ Specifically the national revenue deficiency payment may be calculated as [(coverage rate * expected per acre revenue) - (realized revenue per acre)] or [coverage rate*(expected per acre revenue - realized revenue per acre)] As an example, [(95%*\$100) - \$80] = \$15 while [95%* (\$100-\$80)] = \$19.