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Spatial Differences of Land Use Change within Oklahoma's Wheat Belt

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Abstract:

Farm Service Agency acreage data for the nine Oklahoma Agricultural Statistics Service districts is analyzed to determine the degree of price response in wheat acreage allocation decisions.

Some critics have stated that land use after Freedom to Farm would change little, however these findings show acreage shifted greatly after the policy throughout the state.

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Spatial Differences of Land Use Changes within Oklahoma's Wheat Belt

Wheat has long been an important crop in Oklahoma. However, as wheat prices have continued to change much of this importance may have remained due to the requirements of Federal farm policy. Planting flexibility was introduced in a limited way with the Food Security Act of 1985 and continued and expanded slightly with the Food, Agriculture, Trade and Conservation Act of 1990 (FACTA90) through the various allowances. Under these rules, farmers were still required to plant program crops but could plant alternative crops and still maintain most of their base acreage. Additionally, they could rotate among uses for these crops (e.g., hay or graze-out instead of harvesting for grain when prices are low) without losing base acreage. Additionally, the Agricultural Reconciliation Act of 1990 mandated that farmers give up fifteen percent of their income supplement. As a result, this amount of acreage lost the income payment connected to it whether planted to the base crop or not. Finally, the Federal Agricultural Improvement and Reform (FAIR) Act of 1996, also known as "Freedom to Farm", removed the acreage requirement from farm payments, thus fully implementing planting flexibility.

The question of whether farmers would react sufficiently to changing prices was raised by critics during the debates over FAIR96 and have continued since. With the expiration of FAIR96 looming, determining whether producers have adequately responded to prices and, consequently, whether planting flexibility is a useful policy becomes increasingly important for policymakers. During the five years of FAIR96, prices have been extremely volatile. But whether farmers' cropland allocations have changed more under the current legislation than under previous farm policy remains a central question. This paper answers this question with regard to wheat

cropland in each of the nine Oklahoma Agricultural Statistics Service (OASS) districts.

Background

Relative prices changed rapidly throughout the 1980s as a result of variability in demand, yield and worldwide acreage of each crop. However, farmers could not adequately respond to these changes because of requirements to maintain acreage allocations in order to hold eligibility for Federal income supports. This required inflexibility was relaxed beginning with the Food Security Act of 1985 (FSA85) through the introduction of the Conservation Reserve Program (CRP) and 0,50/85-92. The CRP allowed farmers to move cropland into permanent cover for ten years while 0,50/85-92 enabled producers to protect crop base while planting a different crop and still receive most of the income supplement (Orden, Paarlberg and Roe).

Planting flexibility was again increased with the Food, Agriculture, Conservation and Trade Act of 1990 (FACTA90). The 0-25 provision of FACTA90 authorized farmers to plant up to 25 percent of their base acreage to a non-base crop without loss of crop base. The difference between the previous 0,50/85-92 and this provision is that 0-25 did not pay the income supplement on the shifted acres. As a consequence of the budgetary reconciliation process Congress chose to renew farm legislation under in 1990, farmers lost 15 percent of their income supplement (Orden, Paarlberg and Roe). This loss of income meant that this percentage of cropland would not receive any Federal income support regardless what was planted on it. Any crop except fruits, vegetables and nuts could be planted to this “normal flex” acreage. FACTA90 also provided an additional “optional flex” acreage of 10 percent of base which could be moved to other uses, again with loss of the deficiency payment attached to these acres.

Leading up to FAIR96, some analysts argued that the flexibility afforded to farmers by previous legislation was more than adequate. For instance, Daberkow, Langley and Beach argued that the cropland allocation among the major crops would not change with increased flexibility. Even today some analysts argue that cropland is unresponsive to prices (e.g., Ray).

Others have maintained that producers will respond to prices when given flexibility in planting. Prior to FACTA90, Westcott analyzed the impact of various proposed flexibility alternatives and found that planting decisions would be based on expected market returns when benefits are separated from crop choice. Ray, *et al.* found that FAIR96 planting flexibility would cause increased price variability due to increased acreage variability.

However, of concern to farmers was the constraints made necessary by the requirement to maintain crop bases. As a consequence, many producers continued to argue for greater planting flexibility. Throughout the 1980s and early 1990s, Democratically-controlled Congresses had consistently maintained support for modest cash outs of traditional farm programs. With the election of a reform-minded Republican majority to Congress in 1994, expanded planting flexibility now had powerful legislative champions. In particular, the idea of decoupled payments, rejected in FSA85, returned to the discussion. Rising farm prices and falling commodity stocks combined with budgetary difficulties between Republican House leadership and a Democratic administration resulted in decoupled payments, but not a complete cash-out of farm programs, and the removal of base acreage requirements (Orden, Paarlberg and Roe).

The effectiveness of this policy then comes into question. Ray found that wheat acreage has not adequately responded to highly variable prices since FAIR96 took effect. However, this analysis was at the national level. Therefore, any decrease in acreage where the relative price of

wheat is low may be offset by an increase in wheat acreage in another part of the country where the relative price of wheat is high. Since agronomic conditions vary, the profit maximizing response to changing prices must also differ. As opposed to these net national studies, Leonard, Dicks and Richter found a high degree of wheat price-acreage response in three western Oklahoma counties throughout the 1990s. Indeed, Dicks, Ray and Walker found regional effects that differed from national changes prior to FACTA90. In consequence of these results, we look at wheat acreage response for each of the nine Oklahoma Agricultural Statistics Service (OASS) districts.

Data

Farm Service Agency (FSA) crop reporting records from each of the nine OASS districts in Oklahoma for 1990-1999 are summarized for land uses by crop and crop use. Prior to FAIR96, producers were required to report acreage planted to base crops in order to collect commodity program benefits. Each crop's planted acreage and intended use are provided in these reports. Intended use is important as wheat and other small grains can be used for grain production, grazing or hay.

The FSA crop report contains information for each field, in each tract, for every farm identification number associated with every producer's farm. Farmers annually indicate crop and crop use for each field on an aerial photo. Changing farm or field boundaries may result in modification or removal of an identification number. Boundary modifications may be due to alterations in physical accessibility (e.g., flooding), physical structures (e.g., fences) or use (e.g., a wheat field broken into a wheat field and a soybean field). Ownership changes may also

modify identifiers.

FSA county offices maintain data for only three years in computer files. Previous years' data (beginning in 1987) are stored at USDA's Kansas City Computer Center (KCC). KCC provided data for 1990-1999 in order for comparison of land use under the limited flexibility of FACTA90 with that under the expanded flexibility of FAIR96. Due to disclosure rules, KCC provided data for each farm with a scrambled identifier. Thus, no farm operator can be identified with any particular identification number. Additionally, a single producer may farm land tagged with multiple identifiers and the scrambling means that none of the identification numbers can be aggregated to a particular operator. However, assurances have been made by KCC that all identifiers have been scrambled only once. In other words, any single number in a given state and county that is reported for multiple years refers to the same producer for all of those years.

In consequence of the combined effects of scrambling and unidentifiable modifications to original farm identification numbers, this analysis concentrates on farm identifiers which consistently report for all of the ten years in the study. The distributions of farm size, crop mix and intended use of this consistent set of observations does not differ from the entire FSA data set. However, any land use changes found in this set can be confidently understood to be true changes in land use and not due to changes in the identifier associated with that land. The acreage for each OASS district is taken from these consistently reporting farms.

Results

According to OASS, planted wheat acreage throughout Oklahoma has been in steady, but slight, decline over the decade. In the southern Plains, wheat is planted from late August to late

November. In order for wheat to be used as winter grazing, it must be planted early. However, later planting has positive yield effects. Growers must decide by March whether to “graze-out” the wheat, harvest for grain or cut for hay in order to comply with FSA regulations.

Price analysis of harvested acreage (i.e., wheat for grain) follows Nerlove’s simple adaptive expectations model. The adaptive expectations model assumes that farmers adjust their planting decision in the current year based on last year’s price. Barten and Vanlout, as well as Govindasamy and Jin, have substantiated this approach in recent years. An earlier version of this model applied to wheat was utilized by Burt and Worthington.

Figure 1 shows the wheat grain harvested acreages for those Oklahoma districts which planted over half of their acreage to wheat, on average over the period. This figure includes the North Central district, which is considered the “wheat belt”. Our initial hypothesis was that this region may have some movement away from wheat in response to the falling wheat price, but would be less elastic than districts that grow less wheat and have lower average yields. Oddly enough, this is not quite what happened. All of the “wheat producing” districts had a constant reduction in wheat acreage throughout the decade, but particularly marked decreases in wheat harvest after 1997, the first year of FAIR96 and the one year that had a combination of high prices and lack of other need for disaster payments. In other words, the uniquely good year in the period. The especially surprising result is that all of these districts had approximately the same amount of reduction in wheat grain harvested acreage, roughly a 20 percent decrease in total cropland.

The districts where wheat is a secondary crop, that is those with average acreage allocations less than 50 percent, had mainly a constant and slight decrease in acreage over the

course of the decade (figure 2). The primary difference in the decrease found in these areas and those of the primary districts is that the increase in acreage in 1997 in response to high price is far less marked in the secondary districts. Additionally, the change in acreage over the decade is less dramatic than that in the primary districts. Indeed, the Panhandle district harvested nearly as much wheat for grain in 1999 as in 1990, about 30 percent of total cropland in both years, and its trendline is practically flat for the whole period. Most of these districts were originally hypothesized to be far more elastic than the North Central district. Instead, their response is far less stunning.

However, these results may not be entirely out of character. The main crop with increased acreage in the primary districts is grasses (figure 3). This shift may be seen as a long term shift as these are improved pastures and will not likely move back to wheat production on an annual basis. In fact, even with expiring CRP contracts we find that wheat acreage is being shifted in these areas and the greatest movement has been toward grass. Thus, the FAIR96 flexibility provisions, AMTA payments and absence of crop acreage base requirements has enabled farmers in the primary wheat producing districts to reallocate their acreage and they have done so.

The secondary wheat producing districts do not have as significant an increase in grasses, although roughly constant increases in acreage planted to grass exists in all these areas with the exception of the Panhandle (figure 4). This is easily explained when one understands the importance of non-cropland pastures in the agriculture of this district. Most of the grasslands of the Panhandle are not defined as cropland by the FSA and are therefore not subject to reporting requirements. As a consequence, a noticeable increase in acreage planted to grass in this district

would be suspect.

Although the acreage changes in the secondary wheat producing areas are less dramatic than those in the primary districts, they nonetheless show that planting flexibility has been effective. These results show that the expanded flexibility and removal of crop acreage requirements given by FAIR96 have been especially utilized by Oklahoma farmers. While critics of this policy have argued that flexibility and decoupling payments would have, and has had, no effect on planting decisions, this analysis shows that Oklahoma differs from these aggregated national studies and Oklahoma farmers have taken advantage of the change.

Conclusions

Planting flexibility has been a major issue with farmers since the 1980s. The Federal Agricultural Improvement and Reform Act of 1996 (FAIR96) allowed for increased planting flexibility than previous farm bills by removing the crop base requirement and paying farm income supports that were not tied to planting decisions. However, both during the debate over FAIR96 and after its passage many critics argued that planting flexibility would have no effect on acreage decisions. While some analysts have found little acreage variability after FAIR96 at the national level, these analyses have been conducted using national aggregated data. The problem with aggregated acreage analysis is that it sums up changes at the local level. In other words, acreage moved out of a crop in one area of the country is offset by acreage moved into that crop in another location. The continuing debate over the merits of planting flexibility, and the results of both levels of analysis, will be important to upcoming farm bill deliberations.

This paper looks at acreage decisions in the nine Oklahoma Agricultural Statistics Service

districts. Far from having low acreage variability, all of these districts utilized to some degree the FACTA90 flexibility among harvesting wheat for grain, hay and grazing the acreage out. After the full flexibility of FAIR96 took effect, growers throughout the state again took advantage of the changes in the program to respond to falling wheat prices. Meanwhile, cropland planted to grass has increased in all of the districts except the Panhandle from 1990 to 1999. Thus, farmers in most of Oklahoma have made some long term shift to improved pastures that will not likely move back to wheat production should wheat prices rise. The FAIR96 flexibility provisions, AMTA payments and the absence of acreage base requirements have allowed farmers to reallocate their acreage and they have begun taking advantage of these reforms.

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Table 1. Oklahoma Wheat Grain Acreages and Prices

	Lag Price (\$)	Planted Acres (millions)	Harvested Acres*
1990	3.79	7.4	2238452
1991	2.57	7.4	1765911
1992	2.85	7.3	2110145
1993	3.19	7.1	2056557
1994	2.94	7.0	2001676
1995	3.41	6.8	1974614
1996	4.41	6.8	2331046
1997	4.73	6.7	1946694
1998	3.21	6.6	1953156
1999	2.57	6.4	1742453

* Harvested for Grain, statewide.

Figure 1, Wheat Grain Acreage v. Price
Primary Wheat Grain Districts

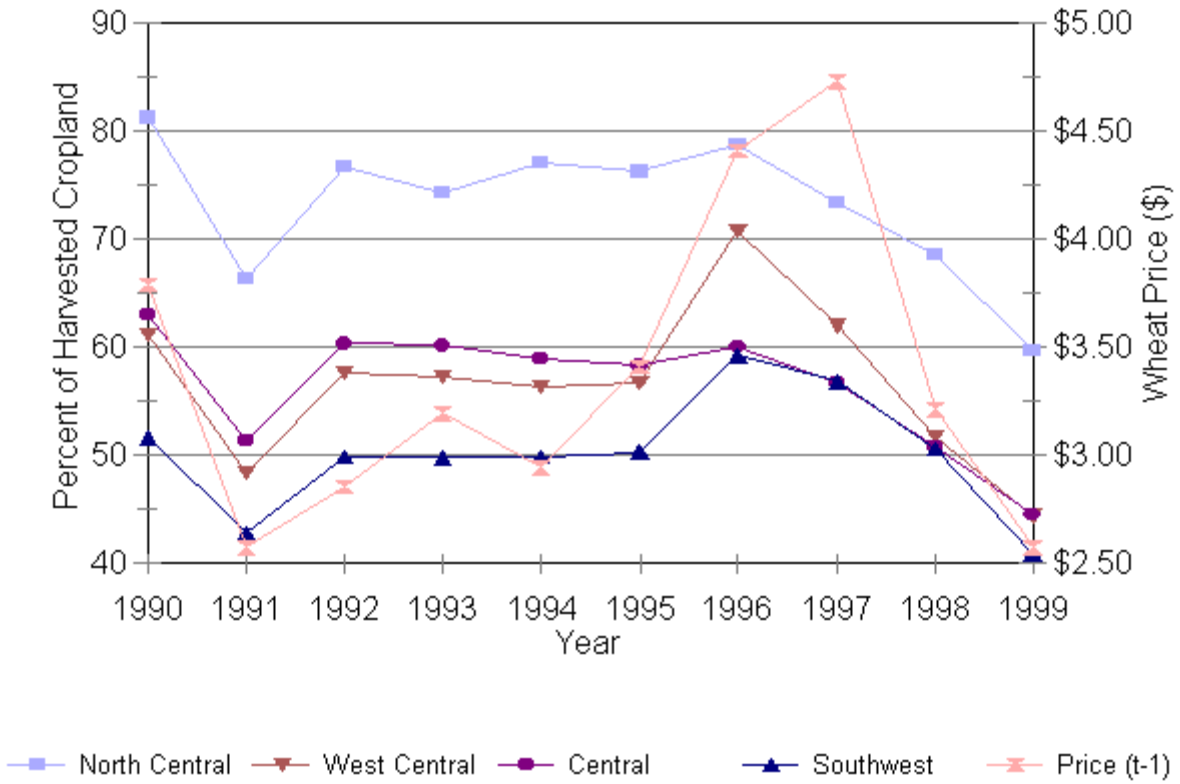


Figure 2, Wheat Grain Acreage v. Price
Secondary Wheat Grain Districts

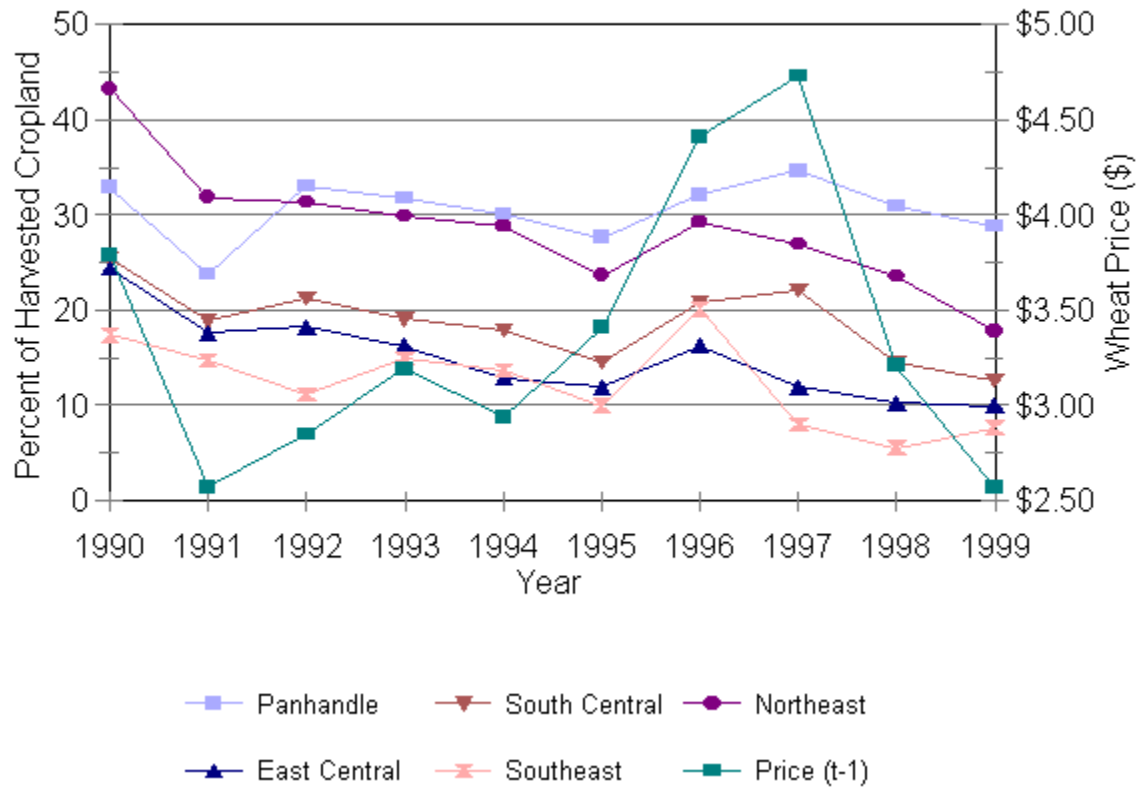


Figure 3, Grass Acreage v. Wheat Price
Primary Wheat Grain Districts

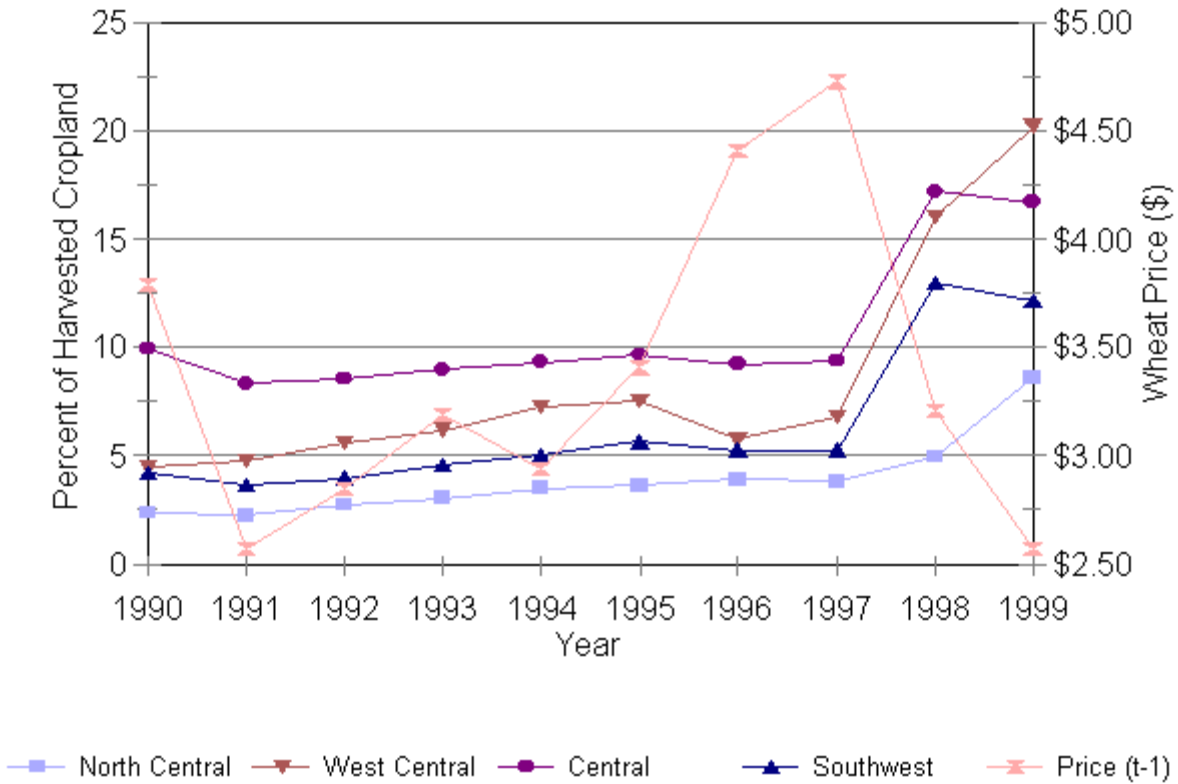


Figure 4, Grass Acreage v. Wheat Price
Secondary Wheat Grain Districts

