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LOCAL ECONOMIC IMPACTS OF CONSERVATION RESERVE PROGRAM ENROLLMENTS: A SUB-COUNTY ANALYSIS

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The Conservation Reserve Program is the centerpiece of the largest set of conservation measures ever undertaken by the federal government. The program was introduced as part of the 1985 Farm Bill and has been continued under the 1995 legislation. Before the contracts expired in 1996 and USDA initiated an early release program in 1995, 35.6 million "highly erodible" acres had been committed to the CRP after 12 enrollment periods (Osborn).

The CRP was designed to accomplish the twin goals of soil conservation and supply control. At the same time, concern was expressed over the impact on local rural economies of such large-scale reductions in farming activity. Therefore, the CRP legislation included a provision that no more than 25 percent of the cropland in any county could be set aside. The 25 percent limit seems to have been passed from previous programs rather than derived from any recent analytical efforts; the Soil Bank of 1956 operated under the same enrollment limits.

Capping enrollments at the county level leaves room for considerable sub-county variation, however. Minnesota's Red River Valley is one example. In Marshall County, the high-income sugar beet crops that many farmers grow in the western part of the county leave little incentive to enroll land in the program. The eastern part of the county, though flat, is prone to wind erosion and is where almost all the county's enrolled acres are found. Enrollment for Marshall County is 14 percent, well below the 25 percent limit. But at the zip code level, we estimated sign-ups as low as zero percent and as high as 35.7 percent.

In this paper, we question whether "community" or "local" economies can be adequately studied by researchers using county data or protected by policies administered at the county level. Our example will be 19 rural counties in Minnesota for which CRP data are available at the zip code level.

Review of Literature

There is no shortage of studies concerning economic impacts of CRP enrollments. Most, such as Martin et al.; Broomhall and Johnson; Hyberg et al.; Mortenson et al.; and Devino et al., have found negative impacts on local economic activity. At least one study, that of Myers and Sutherland, found short-run positive economic effects, and Ribaudo et al. included environmental factors in showing a positive benefit for the program.

In addition to direct economic impacts, land set-aside programs like the CRP have been shown to contribute to rural out-migration. One study of 100 agriculturally dependent counties across the country showed that rural nonfarm population would have been approximately 30 percent greater in the absence of the cropland diversion programs over four decades (Van der Sluis). The CRP was included in that study. Another study of 150 rural counties in the Southern plains found that cropland idling programs had an estimated negative effect on population six times that of converting cropland to pasture (Roberts).

All of these studies used county-level data and therefore implicitly assumed that the terms "county," "local" and "community" are interchangeable. The obvious difficulty in this was well-expressed by Buttel, Lancell and Lee in their county-level of rural communities and agricultural structure in the Northeast:

> There is, of course, an obvious disparity between the conceptual language that we have employed - rural communities or places and their farming hinterlands - and that which is implicated in the use of county-level data; counties which contain a large number of communities that typically exhibit a high degree of variation in the population sizes, economic bases and other characteristics.... the heterogeneity of the community conditions within any particular county is a significant issue and a potential limitation of the present study. (p. 215)

In one of the few departures from county-level analysis, Henderson, Tweeten and Woods studied 22 communities in three Oklahoma counties to determine ex-ante how the Conservation Reserve Program would affect retail sales in communities of various sizes. Ordinary least squares analysis was used on panel data from 1977-1984 to determine how changes in farm income, particularly a shift from crop income to government payments, would affect retail sales. They found a positive relationship between government payments and retail sales in the largest communities, and a negative relationship for businesses in the smallest communities. They also found that income from government payments was more likely to be spent in larger communities than was income from crop sales. The study predicted that CRP would reduce the level of farm consumer spending in the smallest communities, even if total personal farm income remained unchanged. However, larger communities might benefit, as consumers shift their purchases toward bigger towns.

Method and Data

The method used in this study is a straight-forward ordinary least squares estimation using three indicators of community economic well-being: median household income, the percent of people in poverty, and population. It was assumed that variations in these variables could be explained with various combinations of: percent of workforce in service jobs, farm income per farm residence, percent of total population in farm residence, percent of workforce with jobs outside the county, percent of acres enrolled in CRP, and the unemployment rate.

These variables were selected after conducting a series of interviews in the counties to be studied and in accordance with an extensive review of literature concerning general studies of the relationship between agriculture and local economic activity. The interview and literature search are reported in detail by Hamilton.

Secondary data for the study were found from two main sources: the U.S. Bureau of the Census and the Minnesota Department of Agriculture. Data for 1990 were collected at both the county and zip-code level for 19 Minnesota counties. The counties were chosen because of their inclusion in a Minnesota Department of Agriculture mapping project that made it possible to determine the sub-county distribution of the CRP enrolled acres.

The number of CRP acres was recorded at the township level. Townships were aggregated into zip codes using a 1990 MapInfo zip code boundary data base. Cropland data was not directly available at this level, so total land acres was used as a proxy in determining the percent CRP enrollment. The percent enrollment used in this study will therefore underestimate that used by USDA.

Three separate cross sectional models were estimated. Median household income was regressed on the percentage farm population, farm income, the percent of labor force in manufacturing, the percent of labor force in service, and the percent of land enrolled in the CRP. The percent of people below the poverty level was regressed against the percentage farm population, farm income, the percent of labor force employed in manufacturing, the percent of labor force employed in services, the percent of labor force seeking work outside the county and the percent of land enrolled in the CRP. Population was regressed against the farm population, farm income, the unemployment rate and the percent of land enrolled in the CRP.

Each of the models was first estimated with county data, then with a subsample of data from zip codes that appeared to be most susceptible to negative repercussions of CRP enrollment.

Results

The results of the three estimations using county level data are presented in Table 1. For purposed of this study, two things are most important. First, each of the models appears to have reasonable explanatory power, and second, the CRP variable shows very low statistical significance across the board. A reasonable person might well conclude from this that the story of changes in the economic indicators had very little to do with CRP.

At the zip code level, however, a different picture emerges. Descriptive statistics for those zip codes with more than 15 percent of total land enrolled in CRP were compared with similar statistics for the 180 zip codes, comprising the 19 counties under study. The proportion of farm population was higher, average farm income and median household income were lower and the mean population per zip code was more than one-third lower than that for the entire sample of 180 zip codes. Poverty rates and unemployment rates were slightly higher, while the average percent of the labor force employed in the services or manufacturing sectors were slightly lower than in the full sample.

Roberts concluded:

> ...the agricultural sector has been important to rural change, and the effects of changes in agricultural land use are very small and quickly swamped by changes in the nonfarm sector, except where off-farm employment opportunities are virtually absent. (p. 285)

Furthermore, we previously noted Henderson, Tweeten and Woods found that most impacts from the CRP would be felt in smaller communities. Our community interviews, too, suggested that CRP effects are most noticeable in communities which are small and have few off-farm employment opportunities.

The three models previously estimated for county data were again estimated with a subset of zip code level data. Zip codes in the subsample had at least 15 percent of land area enrolled, had manufacturing employment below the full sample mean, and had overall population below the full sample mean. There were 18 such zip codes in the subsample.

The results of estimating the three models with the zip code subsample

are shown in Table 2. These three models, like those for the county-level data, show reasonable explanatory power. But the conclusions to be drawn about CRP enrollment are very different. The statistical significance of the CRP variable is much higher in all three models. Furthermore, the signs of the coefficients are consistent with our interviews and literature review.

Conclusion

Almost every agriculture and community impact study in the literature uses county level data as the measure of "community." This occurs despite the wide variation of agriculture, size and type of communities and employment opportunities within county borders. The Conservation Reserve Program is one program in which the enrollment pattern is a direct result of variations in geography and agricultural cropping decisions.

The effect of taking a subsample of high enrollment CRP areas that have small populations and few employment opportunities was one of suggesting dramatically different conclusions than those drawn using county data. From this result, it appears researchers can benefit from studying "community" or "local" economic impacts at a sub-county level, particularly those programs which have an uneven pattern of enrollment within county borders.

An important question for policy is also raised. Currently, county CRP enrollment limits are set at 25 percent of total cropland. However, this study shows that impacts of the program hit hardest in sub-county areas which are not protected by an enrollment limit. In order to protect communities with much higher enrollment concentrations, a new limitation boundary should be set at the township or community level instead of at the county level.

Table 1. Estimates of Community Indicators Using County Data

Variable	Med. Household Income	% Subpoverty	Population
constant	10951.20 (2.75)	17.52 (2.60)	74861.80 (2.59)
Percent farm population	-102.70 (-2.08)	0.054 (0.61)	-797.0 (-1.73)
Income per farm household	0.20 (0.96)	-0.0002 (-0.56)	-1.99 (-1.29)
Percent employed in manufacturing	134.1 (2.85)	-0.32 (-3.68)	
Percent employed in services	-53.0 (-0.52)	0.14 (0.83)	
Percent working outside county		0.06 (0.76)	
Percent unemployment			-2686.1 (-1.39)
Percent CRP	-17.13 (0.18)	0.07 (0.44)	43.5 (0.06)
R2	0.54	0.62	0.28

t-statistics in parenthesis
n = 19

Table 2. Estimates of Community Indicators for Zip Codes

Variable	Med. Household Income	% Subpoverty	Population
constant	1094.68 (0.32)	27.47 (1.74)	1545.53 (1.96)
Percent farm population	78.73 (4.40)	-0.17 (-2.11)	-23.38 (-2.55)
Income per farm household	0.46 (2.26)	-0.0004 (-0.41)	0.15 (1.84)
Percent employed in manufacturing	627.38 (3.5)	-0.05 (-0.6)	
Percent employed in services	358.75 (2.32)	-0.009 (-0.41)	
Percent working outside county		0.33 (1.87)	
Percent unemployment			-41.87 (-0.75)
Percent CRP	-129.86 (-2.30)	-0.49 (-1.63)	-43.75 (-2.07)
adjusted R2	0.68	0.78	0.36

t-statistics in parenthesis
n = 18

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