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REGIONAL ECONOMIC IMPACT OF THE CONSERVATION RESERVE PROGRAM: AN APPLICATION OF INPUT-OUTPUT ANALYSIS

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Abstract

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The purpose of this study was to estimate the short-run economic impacts of the Conservation Reserve Program (CRP) in North Dakota.

The study had two major phases. First, a statewide survey of CRP participants was conducted to determine selected characteristics of those individuals and their enrolled land that would be important for subsequent impact estimation. These characteristics included land attributes and landowner characteristics.

Key survey results were tabulated, then a regional input-output model, previously developed from primary data and consisting of 17 sectors, was used to estimate the indirect effects of the CRP program for each of the state's five pool groups through the fifth sign-up (at which point 1.3 million acres had been enrolled).

Reduced direct expenditures caused by taking CRP land out of production totaled $55 million for the state with nearly 62 percent impacting the retail sector. The direct effects were applied to the input-output model to estimate the total impact of the CRP program. The $55 million in direct effects resulting from the CRP lead to about $141 million in reduced business activity for the state--an overall multiplier of 2.56. This total is spread among 13 sectors of the state's economy with the retail sector absorbing the greatest impact--about 40 percent of the state total. The total CRP-related potential employment reduction was estimated to be 2,416 jobs statewide, or about 0.77 percent of average annual employment in 1987.

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The Conservation Reserve Program (CRP) was authorized by the 1985 Food Security Act (Public Law 99-198) and was passed at a time of heightened concern for environmental quality. Its main objective is to take highly erodible land out of production, thereby reducing wind and water erosion, protecting long-term food-producing capability, reducing sedimentation, improving water quality, creating wildlife habitat, curbing excess production, and providing income support for farmers.

Landowners who wish to participate in CRP must agree to implement a conservation plan that provides for permanent vegetative cover on the land for ten years. In return, the federal government pays the landowner an annual contract payment determined by a bidding process. Land entered must be classified as "highly erodible" by USDA Soil Conservation Service personnel, and no more than 25 percent of an individual county's total cropland may be entered into CRP without USDA approval.

Because the present program has objectives similar to those of the Soil Bank Program of the late 1950s, concern has been expressed in areas with high concentrations of eligible land regarding possible economic impacts of the program.[1] Potential impacts that have been identified include those arising from (1) reduction in use of agricultural inputs such as fuel, fertilizer, and chemicals;

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[1]For a discussion of some impacts of the Soil Bank Program, see Taylor et al. 1961, Barr et al. 1962, and Brown and Weisberger 1958.

(2) reduction in the use of farm labor and machinery; and (3) long-term changes in land use if CRP land is not returned to crop production at the end of the contract period. The analysis reported here was undertaken to estimate the short-run economic impacts of the CRP program in North Dakota (i.e., those arising from reductions in use of agricultural inputs).

PROCEDURES

The study had two major phases. First, a statewide survey of CRP participants was conducted to determine selected characteristics of those individuals and their enrolled land that would be important for subsequent impact estimation. These characteristics included land attributes (such as comparison of costs and returns and soil productivity to those of non-CRP land in the area, comparison of CRP payments to local cash rents, cover option chosen, and cost of cover establishment) and landowner characteristics (such as age, residency, level of farm income, and use of CRP payments). A questionnaire was mailed to nearly 3,000 randomly selected landowners in North Dakota (approximately 40 percent of all participants) in early March 1988. Follow-up mailings resulted in 1,289 useable surveys for a response rate of 44 percent. Response rates were quite similar for each of the state's five pool groups (see Figure 1).

Figure 1 here

Key survey results were tabulated, then a regional input-output model, previously developed from primary data and consisting of 17 sectors, was used to estimate the indirect effects of the CRP program for each of the state's five pool groups. (For a detailed description of the model, see Coon et al. 1985.) An important prerequisite to estimating these indirect effects was estimating the direct effects of program participation on farm expenditures and income. Sectors expected to experience direct effects were (1) the retail trade sector; (2)

finance, insurance, and real estate; (3) business and personal services; and (4) the household sector (see Table 1). The procedures used to estimate these changes in expenditures are summarized in Figure 2. Three main sources of data were used to estimate expenditure changes: (1) county CRP survey data (Mortensen et al. 1988), (2) North Dakota agricultural statistics, and (3) county data from the state Agricultural Stabilization and Conservation Service (ASCS)[2]. Initially compiled on a county-by-county basis, the resulting estimates fall into three main categories: (1) reduced input expenditures, (2) reduced federal commodity payments, and (3) increased CRP contract payments and upkeep costs. (For a more detailed discussion of data sources and estimation procedures, see Mortensen et al. 1989.)

Table 1 here
Figure 2 here

After the change in business activity resulting from the CRP program had been estimated for each sector, the resulting change in employment was estimated based on historic relationships between employment and gross business volume in each sector.

RESULTS

CRP participants generally felt their CRP land was less productive than other land in the area and that input costs were slightly higher (Table 2). (Unless otherwise noted, the values shown are the mean for all survey respondents.) CRP contract payments were felt to be 6.7 percent higher, on average, than prevailing cash rental rates in the area. The initial cost of establishing CRP cover averaged $37.20 per acre with more than 42.4 percent of responses falling between $30 and $40. Annual maintenance costs averaged

[2]Impacts of the CRP were analyzed using 1987 data on farm prices and costs and CRP acres through the fifth sign-up due to availability of data and the abnormal nature of the 1988 drought. It should be recognized, however, that not all acres that were enrolled through July 1987 were taken out of production that year.

$6.92, while annual contract payments averaged $36.98. More than 60 percent of all contracts had annual payments of $30 to $40.

The average age of the CRP landowners was 57 years, and 90 percent lived in North Dakota (Table 2). About 73 percent of the respondents had farmed either full- or part-time in 1987. For the farmers, the average gross farm income for 1987 was just over $94,000, or about 20 percent less than that reported for that year by a statewide longitudinal farm panel (Leistritz et al. 1989). The average net cash farm income of $16,259 was about 22 percent less than that for the farm panel. For 41 percent of these producers, their CRP income exceeded their net cash farm income, and about 21 percent said that the program enabled them to continue farming.

Table 2 here

Reduced direct expenditures caused by taking CRP land out of production total $55 million for the state with nearly 62 percent impacting the retail sector (Table 3). Pool groups two, four, and five have the highest net impact at about $12 million each. The household sector is positively affected in pool groups one, two, and three primarily because the CRP rental payments exceeded the farm income and government program payments that were foregone.

Table 3 here

The direct effects were applied to the input-output model to estimate the total impact of the CRP program. Table 4 summarizes baseline business activity (i.e., estimated gross business volume or gross receipts of the respective sectors for the period 1980-87); the changes in business activity associated with CRP-related reductions in expenditures; increases in household incomes; and the net effect of the CRP program on business activity in each sector. The $55 million in direct effects resulting from the CRP result in about $141 million in reduced business activity for the state--an overall multiplier of 2.56. This total

is spread among 13 sectors of the state's economy with the retail sector absorbing the greatest impact--about 40 percent of the state total.

Table 4 here

Among the county groupings, pool group five had the largest absolute impact from the CRP, reflecting the more intensive nature of agriculture in eastern North Dakota (Table 5). Pool group four, on the other hand, had the greatest percentage impact. In no case, however, did the CRP impact exceed 1 percent of the area's baseline business volume. Employment effects of CRP were distributed somewhat differently than effects on business volume; pool group two had the largest total impact. Although the total CRP-related potential employment reduction was estimated to be only 2,416 jobs statewide, or about 0.77 percent of average annual employment in 1987, it should be noted that much of this employment loss may be concentrated in the state's most agriculturally dependent rural areas--areas already hard-hit by reductions in retail trade volume and employment stemming from the depressed state of the agricultural economy.

Table 5 here

CONCLUSIONS AND IMPLICATIONS

The results of this analysis of the impact of the Conservation Reserve Program on the North Dakota economy indicate that impacts of the program to date have been modest at the state and substate regional levels; total business activity was reduced by only 0.54 percent for the state and 0.91 percent for the most substantially affected region. However, it should be noted that the impacts are not distributed uniformly among sectors or communities. Rather, the retail sector accounted for more than 40 percent of the total impact of the program. Further, within the retail sector businesses that rely on farm supplies or machinery for much of their volume are likely to be affected much more than

others. Similarly, because the CRP enrollment varies substantially among counties, those with higher percentages of their land enrolled will obviously experience greater impacts. In North Dakota, five counties had more than 10 percent of their land enrolled through the fifth sign-up (July 1987), and in one county about 22 percent was enrolled. Finally, because substantial acreages have been enrolled in the program in subsequent sign-ups (statewide about 800,000 more acres were added in the sixth and seventh enrollments), the effects of the fully implemented CRP program will be greater than those shown here.

In addition to the negative effects resulting from initial reductions in agricultural activities, the program has a number of positive aspects. A short-run impact has been to sharply increase the demand for grass seed used in establishing vegetative cover. Other, longer-run effects could stem from achievement of the program's conservation objectives, particularly if much of the land remains in noncrop uses after the contracts expire. Estimating possible economic consequences of such effects as reduced soil erosion, increased water quality, and enhanced wildlife habitat was beyond the scope of this study. Such impacts should be addressed in future analyses, however, and input-output analysis would be a very appropriate tool for quantifying some of these effects.

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TABLE 1. BUSINESS SECTORS AFFECTED BY THE CONSERVATION RESERVE PROGRAM AND ITEMS PURCHASED IN EACH SECTOR

Sector	Items Purchased
(8) Retail	Fertilizer, fuel, oil, seed, chemicals, machinery, hardware.
(9) Finance, insurance, and real estate	Crop insurance, property insurance, borrowed capital.
(10) Business and personal services	Machinery repairs, custom farm operations, legal and accounting services.
(12) Households	Net income from farm operations, payments to hired labor.

TABLE 2. SELECTED CHARACTERISTICS OF CRP LAND AND PARTICIPANTS, NORTH DAKOTA, 1988

Item	Units	Value
Yields--CRP land compared to land not in CRP	Percent	-9.5
Input costs--CRP land compared to land not in CRP	Percent	0.5
CRP contract payment compared to cash rent	Percent	6.7
Costs per acre to establish CRP cover	Dollars	37.20
Costs per acre to maintain CRP cover	Dollars	6.92
Annual CRP contract payment	Dollars	36.98
Type of CRP cover:		
Grass and/or legumes	Percent	91.0
Trees (on part of area)	Percent	9.0
Landowner Age	Years	57.2
Landowner residence:		
North Dakota	Percent	90.0
Bordering states	Percent	4.2
Elsewhere	Percent	5.8
Landowner occupation:		
Farmer	Percent	73.0
Other	Percent	27.0
Gross farm income, 1987 (farmers only):		
Average	Dollars	92,440
Distribution:		
Less than $40,000	Percent	34.5
$40,000 to $99,999	Percent	35.0
$100,000 to $249,999	Percent	23.3
Over $250,000	Percent	7.1
Net Cash Farm Income, 1987 (farmers only):		
Average	Dollars	16,259
Distribution:		
Negative	Percent	14.2
$0 to $9,999	Percent	37.5
$10,000 to $19,999	Percent	17.2
$20,000 to $39,999	Percent	19.9
$40,000 and over	Percent	11.1

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TABLE 2. SELECTED CHARACTERISTICS OF CRP LAND AND PARTICIPANTS, NORTH DAKOTA, 1988, CONTINUED

Item	Units	Value
CRP payment as a percent of net farm income:		
Over 100 percent or net farm income was negative	Percent	40.6
50 to 100 percent	Percent	13.2
26 to 50 percent	Percent	18.5
0 to 25 percent	Percent	27.8
Did the CRP program enable you to continue farming?		
Yes	Percent	20.6

TABLE 3. ACRES ENROLLED IN CRP AND THE ASSOCIATED LOSS OF PRODUCTION EXPENDITURES AND CHANGE IN INCOME, BY CRP POOL GROUP, 1987

Pool Group	Acres Through 5th Sign-up	Reduced Expenditures			Change in Income
		Retail(8)	Fire(9)	B&P Serv(10)	Households(12)
		(thousand dollars)			
1	244,518	-4,940	-1,787	-1,619	10
2	381,409	-8,539	-3,074	-2,649	2,033
3	260,548	-6,563	-2,406	-1,961	755
4	240,997	-7,986	-2,541	-1,950	-92
5	174,975	-7,262	-2,112	-1,772	-1,448
STATE	1,302,048	-35,291	-11,919	-9,951	1,258
STATE TOTAL (Percentage of Reduced Expenditures)		61.7%	20.9%	17.4%	

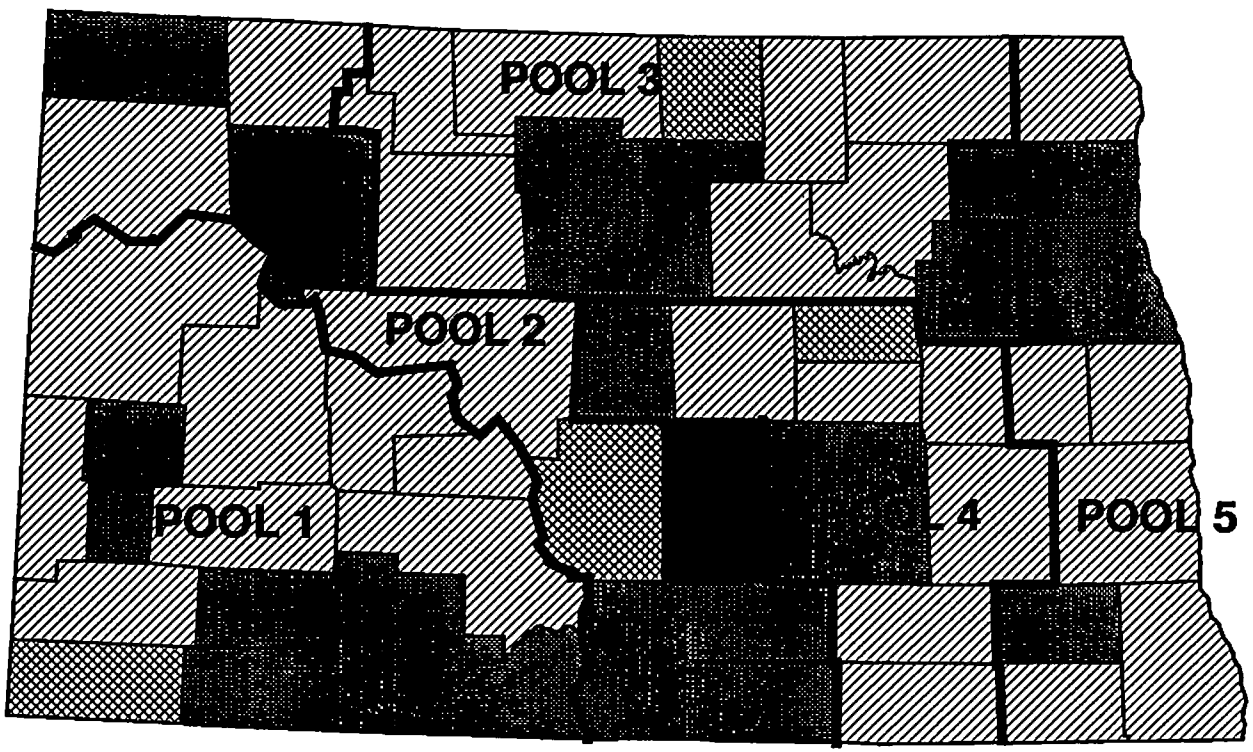
TABLE 4. AVERAGE 1980-1987 BASELINE BUSINESS ACTIVITY AND BUSINESS ACTIVITY ASSOCIATED WITH REDUCED PRODUCTION EXPENDITURES AND INCOME CHANGE RESULTING FROM CRP ACRES BY ECONOMIC SECTOR, NORTH DAKOTA, 1987

Sector		Baseline Business Activity[a]	CRP Business Activity		
			Production Expenditures	Income Change	Net Change
		thousand dollars			
(1)	Ag, livestock	1,406,058	-4,254	85	-4,169
(2)	Ag, crops	3,662,184	-1,709	33	-1,676
(3)	Nonmetal mining	49,420	-186	7	-179
(4)	Construction	730,076	-2,650	113	-2,537
(5)	Transportation	91,330	-627	12	-615
(6)	Comm & pub utilities	659,314	-4,540	133	-4,407
(7)	Ag proc & misc mfg	2,143,329	-2,670	52	-2,618
(8)	Retail trade	5,321,801	-57,505	937	-56,568
(9)	FIRE	1,110,927	-16,731	211	-16,520
(10)	Bus & pers services	488,715	-12,056	76	-11,980
(11)	Prof & soc services	521,151	-2,442	124	-2,318
(12)	Households	7,955,811	-35,685	1,953	-33,732
(13)	Government	679,028	-3,437	136	-3,301
(14)	Coal mining	134,774	0	0	0
(15)	Thermal elec generation	225,900	0	0	0
(16)	Petroleum exp/extraction	883,623	0	0	0
(17)	Petroleum refining	120,864	0	0	0
TOTAL	26,247,305	-144,492	3,872	-140,620	

[a]Baseline business activity is based on the 1980-1987 average sales for final demand in terms of 1987=base dollars.

TABLE 5. DISTRIBUTION OF CRP ACRES, TOTAL CRP IMPACT ON BUSINESS VOLUME, AND CRP-RELATED EMPLOYMENT CHANGE AMONG POOL GROUPS

Pool Group	CRP Acres	Total CRP Impact	CRP Impact as a Percentage of Pool Baseline	CRP-Related Employment Change
	(%)	(million $)	(%)	(number)
1	18.8	21.2	-0.33	371
2	29.3	30.0	-0.68	552
3	20.0	25.5	-0.52	453
4	18.5	31.6	-0.91	523
5	13.4	32.2	-0.39	517
TOTAL	100.0	140.5	-0.54	2,416



STATE	TOTAL CROPLAND IN POOL GROUPS	
28,115,546 cropland acres	1- 4.7 percent	4- 5.0 percent
1,302,048 CRP acres	2- 6.8 percent	5- 3.2 percent
4.6 percent of cropland in CRP	3- 3.8 percent	

SOURCE: USDA Soil Conservation Service, 1988.

Figure 1. Percentage of total cropland enrolled in CRP by category, July 1987.

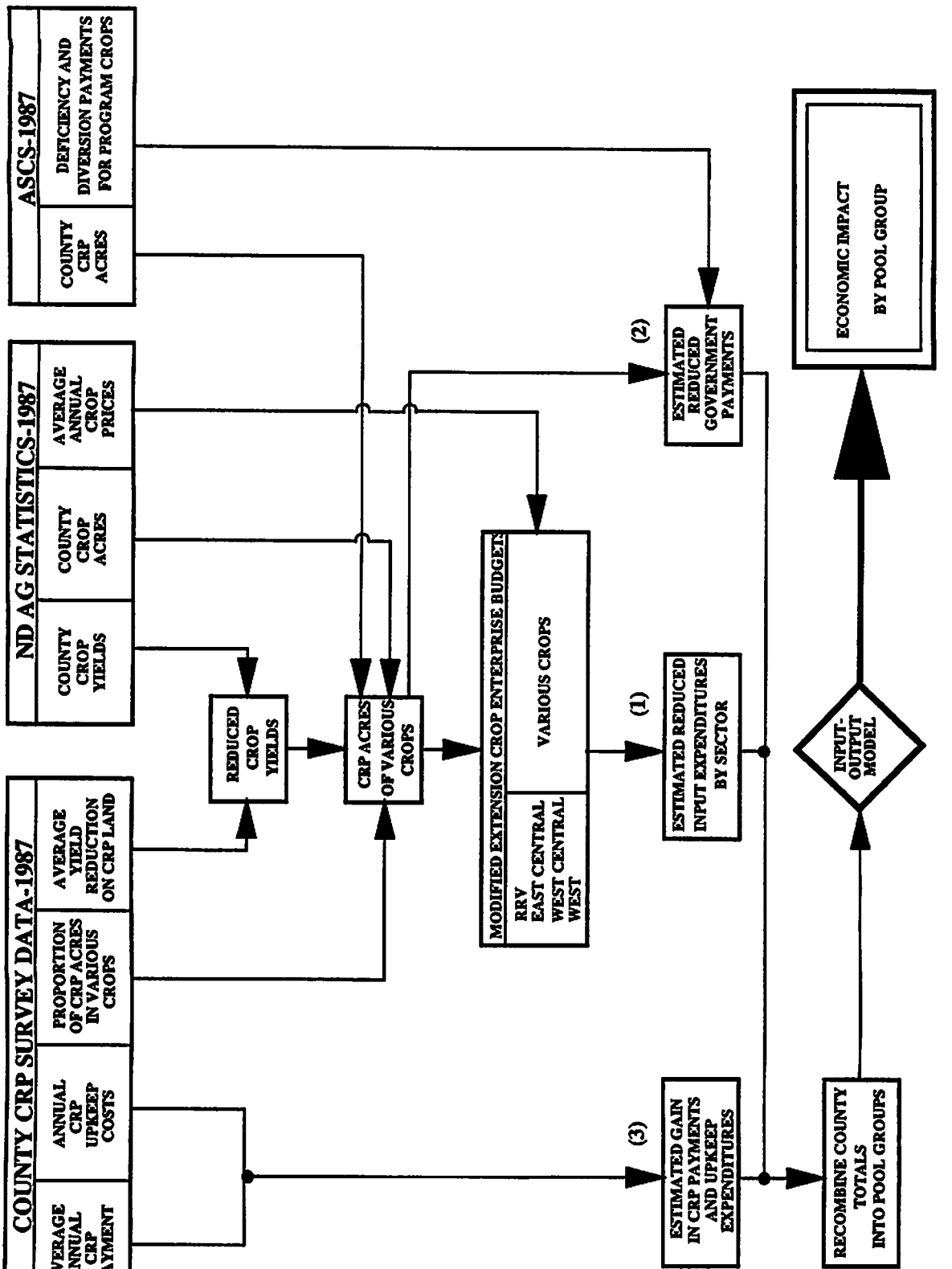


Figure 2. Procedure for estimating direct impacts of CRP.