

Analysis of Alternative Safety Net Measures

Based on precedents from existing Federal assistance programs and justified with economic theory, we identify four alternative scenarios. The first three scenarios ensure that farm households maintain an income standard relative to: (1) regional median household income; (2) 185 percent of the poverty line; or (3) average adjusted household expenditures. A fourth scenario is based on the median hourly earnings of the nonfarm self-employed. Using the farm sector classifications discussed above, we explore the distributional effects and costs of four alternative safety net measures by examining two 5-year time periods: 1993-97 and 1999-2003. These time periods extend from the year that the most current farm-level data were available, which was 1997. One drawback in partitioning the temporal analysis in this way is that the time periods overlap a change in agricultural policy regimes.

For the retrospective portion of the scenarios, we used data from 1997 because this was the most recent year for which Agricultural Resource Management Study (ARMS) data were available when this project began. For the projected portion, we used data from 1999 to 2003 because these were the years for which the USDA baseline projections were made at the time this project began. (For more on the baseline projections, see World Agricultural Outlook Board, 1998.) For symmetry, we used the same number of years for the retrospective portion.

Data from the ARMS were used to provide annual estimates of individual farm household income during 1993-97. The ARMS is a survey of about 15,000 farms and, with proper weights, represents all farms in the contiguous United States (see appendix C for more detail on the survey). Our analysis includes roughly 80 percent of farm households. We excluded two types of farms, *retirement* farms and *very large family* farms, from our analysis because, by definition, members of the first group are not active participants in the sector (though they do have substantial assets and land-ownings) and most of the second group would not qualify for a safety net because of their high income level.

Projections for the 1999-2003 period are generated using a farm business financial partial budgeting model. Any potential structural or production response on the part of farms is not considered here. In this aspect the model is static. The model incorporates ele-

ments of income and expenses to project cash flow, assets, and debt. Parameters from USDA's Short-Term Forecast Model, the Baseline Model, and FAPSIM are used as input. Specific categories of income and expenses such as corn receipts and feed costs are inputs into the model. The model operates on individual farm data obtained from ARMS. Model results are summarized here by resource region and farm typology group.

The analyses in the previous section were based on household income. In the rest of this report, however, we use the adjusted farm household income found in column 5 of tables 1 and 3. This household income is adjusted so that (a) depreciation was not deducted from farm businesses, and (b) negative farm business earnings were set to zero.⁶

One distinction between our scenarios and the precedents found in other Federal assistance programs is that some programs use income cutoffs to decide who should receive benefits. However, upon receipt of these benefits, there is no presumption that a recipient's income will rise to that cutoff. For example, even if a family receives the maximum amount of benefits from the largest cash assistance program for poor families in the United States (TANF), household income may still be far below the eligibility cutoff. In the scenarios discussed below, we consider the cost of raising low-income farm households to a particular level of income; existing safety net programs for the general population described above do not do this.

Scenario 1: Regional Median Household Income

The median U.S. household income in 1995 was \$35,050, based on data from the Bureau of the Census. Median household income in the farm resource regions ranged from \$28,666 in the Mississippi Portal to \$39,756 in the Northern Crescent. These income levels were adjusted using the Consumer Price Index (CPI) to define the regional income thresholds for earlier and later years contained in the analysis. In the theoretical section, we demonstrated how any transfer of money from someone richer to someone poorer improved the social welfare as defined by the SWF. This scenario

⁶ Implicitly, we are assuming a safety net would not compensate farmers for expected future replacement of depreciable assets or for past losses. A safety net could instead compensate farmers for these and the results in the following scenarios would change accordingly.

uses the highest relatively reasonable safety net threshold to achieve this result; all the remaining scenarios use lower levels.⁷

For scenario 1, the amount of money needed to raise all farm households to the regional median income is calculated as follows. We first establish the median household income in each region, denoted as $M_{r,t}$, where r denotes the region and t denotes the year. We then calculate the difference between these median household incomes and the income (Y) for each lower income farm household by farm typology and region using the following equations. For the farm typology groups, the gap in each year analyzed is calculated as:

$$\text{Gap}_{\text{typ},t} = \sum_{i=1}^{n_{\text{typ}1}} (M_{r,t} - Y_{r,t,i}), \text{typ} = 1, \dots, 5$$

where typ is the farm typology classification and $n_{\text{typ}1}$ is the number of farm households in that farm typology class with incomes below $M_{r,t}$. We calculated the income gap by region in a similar manner:

$$\text{Gap}_{r,t} = \sum_{i=1}^{n_{r1}} (M_{r,t} - Y_{r,t,i}), r = 1, \dots, 9$$

where n_{r1} is the number of farm households in region r with income below $M_{r,t}$. See appendix C for more details on the data used to estimate costs under the different scenarios.

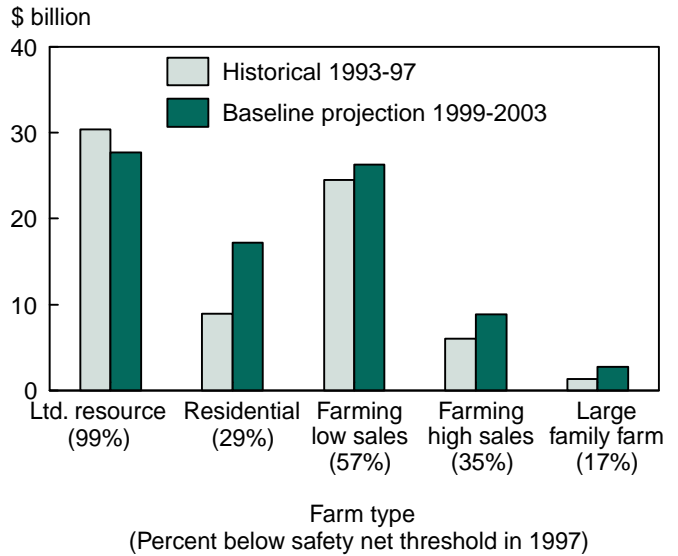
The historical 5-year cost of a safety net based on median U.S. household income was about \$71 billion and would cover roughly 800,000 farm households. Annual costs ranged between \$12.5 billion in 1997 to \$15.5 billion in 1996. The projected cost of this safety net for the 1999-2003 period was \$82 billion.

The majority of the benefits (\$54 billion) would accrue to *limited resource* and *farming, low sales* households (fig. 2 and table 5). Costs of this safety net were lowest for the *large family farm* typology group at \$1.3 billion. While there were farms with income below the safety net threshold in each farm typology group, the proportion in need of assistance varied greatly. For example, in 1997, nearly all *limited resource* farm households qualified for assistance using this safety net measure. In contrast, only 17 percent of *large family farm* households had income below the safety net threshold. More than one in three farms designated as *farming, high sales* qualified for assistance, but histori-

⁷ Note that, theoretically, a transfer of money from the wealthiest person in a country to the second wealthiest person is welfare-improving under the SWF established above.

Figure 2

Scenario 1—Regional median household income costs by farm type



cal costs were less than for the *residential lifestyle* group where only 29 percent qualified for assistance.

By region, the historical 5-year cost of a safety net based on median U.S. household income ranged from \$2 billion in the Basin and Range to \$13.5 billion in the Heartland (appendix fig. 1 and appendix table 1). In 1997, almost 40 percent of Heartland farm households qualified for assistance using this safety net measure. The highest costs within the Heartland region were for *farming, low sales* farm households at \$5.6 billion. Almost one in five farms in this region were categorized as this type in 1997. *Residential lifestyle* farms accounted for a larger share of Heartland farms (43 percent), but they did not qualify for assistance as often as *farming, low-sales* farms. The cost for this safety net was also relatively high in the Eastern Uplands region at \$12.2 billion. More than half of the farm households in this region were categorized as *limited resource* or *farming, low sales*. The Fruitful Rim region had the lowest percentage (34 percent) of farms qualifying for assistance.

In 1997, three regions—the Northern Crescent, Southern Seaboard, and Basin and Range—had 50 percent or more of farms qualifying for assistance, using the median regional household income safety net measure. The Northern Crescent has one of the largest concentrations of *limited resource* farms at 14 percent. The Southern Seaboard region contained a relatively high proportion of *limited resource* and *farming, low sales* farm households that qualified for assistance.

Table 5—Results for median household income safety net by farm typology

	Limited resource	Residential lifestyle	Farming, low sales	Farming, high sales	Large family	Total
1993						
Number of farm households	290,710	689,842	506,207	204,149	68,113	1,759,021
Households below threshold	289,801	186,655	320,647	59,957	11,583	868,643
Cost (\$million)	6,277	1,480	4,954	1,042	216	13,969
1994						
Number of farm households	281,404	717,581	484,969	193,436	69,802	1,747,192
Households below threshold	278,840	189,784	296,140	71,800	11,756	848,320
Cost (\$million)	6,564	1,770	4,914	1,721	226	15,196
1995						
Number of farm households	244,903	718,021	507,370	195,028	71,609	1,736,931
Households below threshold	244,320	169,140	291,075	65,541	12,887	782,963
Cost (\$million)	5,647	1,616	5,240	1,113	251	13,867
1996						
Number of farm households	291,655	537,178	524,847	192,266	95,483	1,641,429
Households below threshold	291,290	172,378	347,396	55,898	15,877	882,839
Cost (\$million)	6,924	1,611	5,705	933	360	15,533
1997						
Number of farm households	195,572	811,752	396,698	178,210	79,240	1,661,471
Households below threshold	194,566	233,321	226,037	61,460	13,118	728,501
Cost (\$million)	4,988	2,413	3,706	1,217	261	12,585
Program costs 1993-97 (\$million)	30,401	8,890	24,520	6,026	1,314	71,150
Estimated costs 1999-2003 (USDA baseline)	27,706	17,179	26,295	8,832	2,720	82,732

Source: Calculated by ERS using data from the ARMS and forecasts from the USDA baseline.

The Basin and Range region had a high proportion of farm households that qualified, as a result of the low household income of *residential lifestyle* farms in that region. These patterns largely reflect regional disparity in the nonfarm economy, because for the majority of *residential lifestyle* farm households, off-farm income more than offsets any negative farm income in terms of total farm household income.

Scenario 2: 185 Percent of the Poverty Line

The poverty line for a family of four was \$16,400 in 1997; 185 percent of this amount is \$30,340. This income cutoff is denoted as $PL_{185,t}$. We then calculate the income gap by farm typology and region in a manner similar to above. By farm typology:

$$\text{Gap}_{\text{typ},t} = \sum_{i=1}^{n_{\text{typ}2}} (PL_{185,t} - Y_{t,i}), \text{typ} = 1, \dots, 5$$

and by region:

$$\text{Gap}_{r,t} = \sum_{i=1}^{n_{r2}} (PL_{185,t} - Y_{t,i}), r = 1, \dots, 9$$

where $n_{\text{typ}2}$ is the number of farm households in a farm typology class with incomes below $PL_{185,t}$ and n_{r2} is the number of farm households in region r with incomes below PL_{185} .

The historical 5-year cost of the scenario 2 safety net was about \$42 billion. The threshold for scenario 2 was about \$8,000 less than that of scenario 1, based on the median household income. As a result, costs for scenario 2 over the 1993-97 period were nearly \$30 billion lower than costs for scenario 1. Under the 185 percent of poverty measure, just over 530,000 farm households would receive assistance compared with approximately 800,000 households using the median household income safety net measure. The projected cost for the 1999-2003 period based on the 185-percent-of-poverty measure was \$49 billion.

The total costs for this scenario would be substantially less if we had applied the official poverty line to each household rather than using the weighted average of the four-person poverty line for all households, regard-

less of household size.⁸ As seen in table 2, the average farm household size was 2.7 persons in 1996. In addition, farm types with especially low incomes have lower than average farm household sizes. For example, the average household size in *limited resource* farms was 2.4 people in 1996.

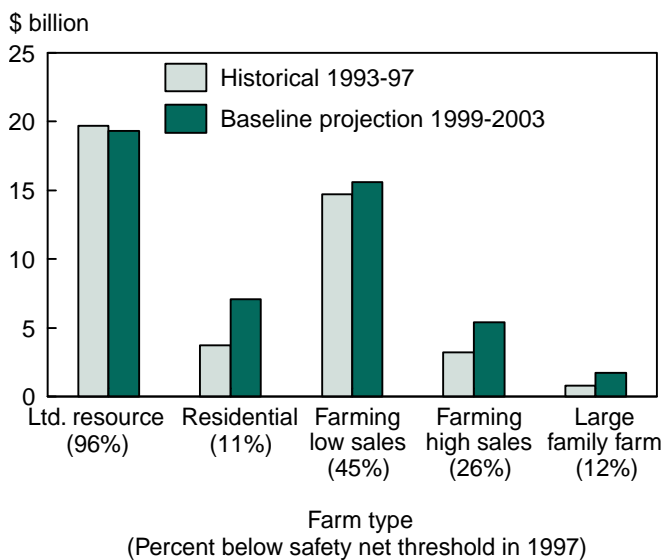
Similar to patterns under scenario 1, the bulk of the benefits accrued to *limited resource* and *farming, low sales* households (fig. 3 and table 6). These two typology groups had the highest proportion of farms that qualified for assistance, at 96 percent and 45 percent. Only 12-14 percent of *residential lifestyle* and *large family farm* households qualified for assistance using the 185-percent-of-poverty measure. Average cost per recipient is highest for *limited resource* and *large family farm* classifications, each having costs at over \$18,000 in 1997. This finding suggests that the largest differences between the median household income scenario and the 185-percent-of-poverty scenario occur for these groups. The regional distribution of costs for the 185-percent-of-poverty scenario was similar to that of the median household income scenario (appendix fig. 2 and appendix table 2). Three regions, the Heartland, Northern Crescent, and Eastern Uplands, accounted for half of the historical costs. Costs per eligible household were highest in the Eastern Uplands and Mississippi Portal regions, at over \$18,000 per eligible household. The Mississippi Portal, Northern Great Plains, and the Basin and Range Regions were the lowest historical cost regions at \$2.3 billion, \$2 billion, and \$1.5 billion, respectively. This Mississippi Portal had high cost per recipient, but low overall costs because a small proportion of farms are located in that region.

The proportion of farm households that qualified for assistance in 1997 ranged from 25 percent in the Fruitful Rim region to 43 percent in the Southern Seaboard. The eligible proportion varied from one year to the next. For example, 53 percent of farm households in the Fruitful Rim region qualified for assistance in 1996 compared with 25 percent in 1997. Although total safety net costs were relatively stable across years, annual costs varied considerably by region. A quantitative measure of variability such as the coefficient of variation equaled 14 percent for total costs over the 1993-97 period. Regional coefficients of variation ranged from 21 percent for the Heartland to

⁸ Information on the number of farm household members was not available in the 1997 ARMS Phase III.

Figure 3

Scenario 2—185-percent-of-the-poverty-line costs by farm type



more than 60 percent for the Fruitful Rim, Basin and Range, and Mississippi Portal.

Scenario 3: Average Adjusted Expenditures

U.S. household expenditures averaged \$33,797 in 1996, according to the Consumer Expenditure Survey (CES). However, housing and transportation expenditures incurred by farm households (as distinct from the farm business) are about half those incurred by U.S. households.⁹ We adjusted average U.S. household expenditures to \$25,863 to reflect this difference in housing and transportation expenses. Using methods similar to those described above, we define average household expenditures as EXP_t and then calculate the income gap by farm typology class and region as:

$$Gap_{typ,t} = \sum_{i=1}^{n_{typ3}} (EXP_t - Y_{t,i}), typ = 1, \dots, 5$$

$$Gap_{r,t} = \sum_{i=1}^{n_{r3}} (EXP_t - Y_{t,i}), r = 1, \dots, 9$$

where n_{typ3} is the number of farm households in each farm typology class with incomes below EXP_t and n_{r3} is the number of households in each region with incomes below EXP_t .

⁹ This difference does not imply that farm households spend less on housing and transportation than other households, but that some of these expenses are commingled with the farm business.

Table 6—Results for 185 percent of poverty safety net by farm typology

	Limited resource	Residential lifestyle	Farming, low sales	Farming, high sales	Large family	Total
1993						
Number of farm households	290,710	689,842	506,207	204,149	68,113	1,759,021
Households below threshold	279,252	60,632	231,414	44,574	9,264	625,136
Cost (\$million)	3,966	459	3,027	623	134	8,209
1994						
Number of farm households	281,404	717,581	484,969	193,436	69,802	1,747,192
Households below threshold	266,579	87,433	226,114	49,039	8,687	637,852
Cost (\$million)	4,331	667	3,117	706	145	8,966
1995						
Number of farm households	244,902	718,020	507,370	195,027	71,609	1,736,928
Households below threshold	237,465	82,914	219,229	47,316	9,852	596,776
Cost (\$million)	3,612	568	3,077	645	156	8,058
1996						
Number of farm households	291,655	537,178	524,847	192,266	95,483	1,641,429
Households below threshold	288,990	68,677	260,741	37,925	12,298	668,631
Cost (\$million)	4,398	989	3,065	490	242	9,184
1997						
Number of farm households	195,571	811,751	396,697	178,210	79,240	1,661,469
Households below threshold	187,836	90,353	179,601	46,414	9,333	513,537
Cost (\$million)	3,423	1,001	2,449	723	168	7,765
Program costs 1993-97 (\$million)	19,730	3,685	14,736	3,186	845	42,181
Estimated costs 1999-2003 (USDA baseline)	19,251	7,120	15,604	5,367	1,709	49,051

Source: Calculated by ERS using data from the ARMS and forecasts from the USDA baseline.

The total cost during 1993-97 of an expenditure safety net is estimated at \$30.8 billion, which is lower than the other scenarios. The number of farm households that would qualify for assistance in 1997 was 450,000 or about 25 percent of all households considered. Average cost per household was just over \$13,000. The projected cost for this safety net measure was \$36 billion for the 1999-2003 period.

More than 80 percent of the total cost of this safety net was accounted for by *limited resource* and *farming, low sales* farm households (fig. 4 and table 7). Only about 10 percent of *residential lifestyle* or *large family* farms qualified for assistance. Almost one in four households of *farming, high sales* farms were eligible for assistance. The 5-year cost for this typology group was relatively low at \$2.4 billion, reflecting the small difference between farm household income and this safety net threshold during the 1993-97 period.

The share of farms below the expenditure safety net threshold ranged from 21 percent in the Heartland to 37 percent in the Southern Seaboard region. The Heartland and Northern Crescent regions had the high-

est 5-year historical costs, at \$5.4 billion each (appendix fig. 3 and appendix table 3). Most of the costs in the Heartland region were accumulated by farm households classified as *farming, low sales*. In the Northern

Figure 4

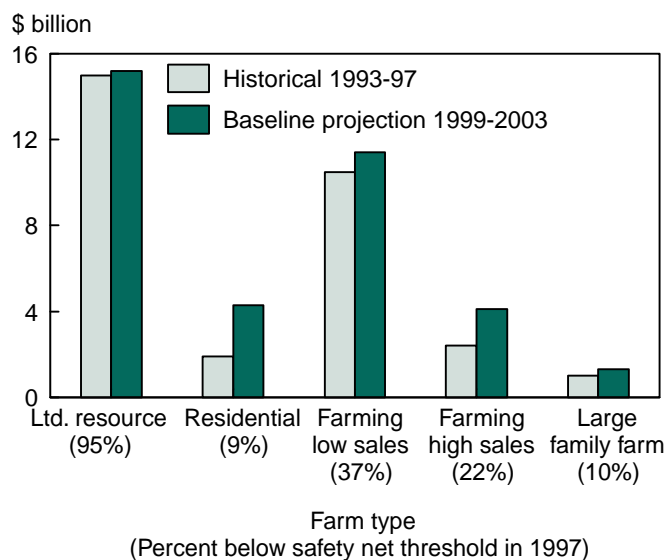
Scenario 4—Average adjusted expenditures costs by farm type

Table 7—Results for adjusted expenditure income safety net by farm typology

	Limited resource	Residential lifestyle	Farming, low sales	Farming, high sales	Large family	Total
1993						
Number of farm households	290,710	689,842	506,207	204,149	68,113	1,759,021
Households below threshold	265,790	41,666	198,871	37,632	8,155	552,114
Cost (\$million)	2,954	270	2,149	473	102	5,947
1994						
Number of farm households	281,404	717,581	484,969	193,436	69,802	1,747,192
Households below threshold	259,940	59,911	183,808	42,117	7,667	553,443
Cost (\$million)	3,342	417	2,187	536	114	6,595
1995						
Number of farm households	244,902	718,020	507,370	195,027	71,609	1,736,928
Households below threshold	223,544	49,356	188,019	39,236	7,958	508,113
Cost (\$million)	2,725	320	2,288	477	122	5,931
1996						
Number of farm households	291,655	537,178	524,847	192,266	95,483	1,641,429
Households below threshold	274,918	50,416	220,617	30,195	11,383	587,529
Cost (\$million)	3,276	292	2,101	362	194	6,225
1997						
Number of farm households	195,571	811,751	396,697	178,210	79,240	1,661,469
Households below threshold	186,021	73,425	144,948	39,278	8,264	451,936
Cost (\$million)	2,663	632	1,791	548	456	6,091
Program costs 1993-97 (\$million)	14,960	1,931	10,515	2,395	988	30,790
Estimated costs 1999-2003 (USDA Baseline)	15,171	4,346	11,429	4,146	1,323	36,415

Source: Calculated by ERS using data from the ARMS and forecasts from the USDA baseline.

Crescent region, *limited resource* farms accounted for two-thirds of the 1993-97 cost. In the Fruitful Rim region, which is characterized by relatively large specialty-crop farms, cost per qualifying household, \$23,000, was nearly twice as high as for other regions.

**Scenario 4:
Median Hourly Earnings of Nonfarm Self-Employed**

Median hourly earnings of nonfarm self-employed individuals (those who worked at no other job) were \$10 per hour in 1997, based on data from the Current Population Survey. This safety net measure focuses more specifically on the ability of farm businesses to provide an adequate return to the owners/operators. In addition, the safety net scenario based on wage rate concepts is limited to operators of farm businesses who identified farming as their primary occupation and were organized as sole proprietorships. This group includes just over 700,000 farm businesses (36 percent of the total). Median hourly earnings of nonfarm self-employed is denoted by $NFHEARN_t$ and the estimated hourly earnings of farm operators who identify their

primary occupation as farming is denoted by $FHEARN_{t,i}$. Let $HOUR_{t,i}$ be the number of hours worked by farmer i . The income gaps by farm typology and region are then

$$Gap_{typ,t} = \sum_{i=1}^{n_{typ,t}} (NFHEARN_t - FHEARN_{t,i}) HOUR_{t,i}, typ = 1, \dots, 5$$

$$Gap_{r,t} = \sum_{i=1}^{n_{r,t}} (NFHEARN_t - FHEARN_{t,i}) HOUR_{t,i}, r = 1, \dots, 9$$

where $n_{typ,t}$ and $n_{r,t}$ are the number of farm households with wages below $NFHEARN_t$ for each type of farm and region.

This scenario allows us to illustrate two aspects of farm households not illuminated by the other three scenarios. First, the number of hours per week worked by farmers is about 20 percent higher than the number worked by nonfarm proprietors. According to the CPS, the average number of hours worked was 47.3 hours for farmers and 39.6 hours for nonfarm proprietors. Using the ARMS, for farms where farming appears to be the main occupation as judged by the number of annual

hours, the hours are substantially higher than the average in the CPS. For example, the farm operator in *farming, high sales* farms averaged 59.7 hours a week.

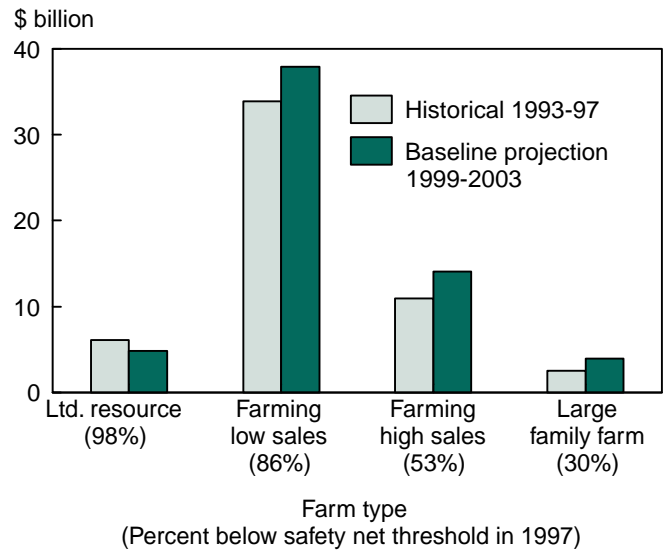
Second, this scenario demonstrates the low wages earned by many farmers in comparison to what they might earn in nonfarm professions. Possible reasons for this choice to farm rather than engage in nonfarm activities include the nonpecuniary intrinsic values associated with farming; the lack of better-paying jobs located nearby; and a possible nontransferability of the farming skills to nonfarm professions. One potential criticism of a farm safety net is that government support goes to persons who could earn more in alternative occupations.

Historical costs for the earnings safety net were \$53.5 billion, and nearly three in four farm businesses qualified for assistance. Projected costs of this safety net for the 1999-2003 period were \$60.8 billion.

Among the farm typology groups, *farming, low sales* farm businesses had the largest historical cost at \$34 billion under this scenario (fig. 5 and table 8). Most farms in this classification (86 percent) qualified for assistance, second only to the 98 percent of *limited resource* operators who earned less than \$10 per hour. Average costs per recipient ranged from \$13,000 for *limited resource* farms to nearly \$24,000 for the *farming, high sales* category.

Figure 5

Scenario 4—Median hourly earnings of nonfarm self-employed costs by farm type



Two regions, the Heartland and Northern Crescent, accounted for nearly half of the earnings rate safety net costs for the 1993-97 period (appendix fig. 4 and appendix table 4). These regions had 36 percent of *farming, low sales* farm businesses in 1997. Costs per recipient ranged from \$15,000 in the Eastern Uplands to over \$23,000 in both the Northern Great Plains and Basin and Range regions. The Eastern Uplands region had the highest share of farm businesses that qualified for assistance, at 88 percent.

Table 8—Results for median wage rate income safety net by farm typology

	Limited resource	Farming, low sales	Farming, high sales	Large family	Total
1993					
Number of farm households	99,048	509,703	206,455	65,804	881,010
Households below threshold	93,720	452,092	141,149	34,428	721,389
Cost (\$million)	1,392	7,754	3,173	806	13,125
1994					
Number of farm households	110,203	487,400	302,435	67,783	967,821
Households below threshold	103,412	391,309	101,783	15,365	609,582
Cost (\$million)	1,549	5,845	2,107	346	9,847
1995					
Number of farm households	95,861	504,725	195,547	67,932	864,065
Households below threshold	87,618	421,388	95,274	21,199	625,479
Cost (\$million)	1,353	7,328	2,006	478	11,165
1996					
Number of farm households	87,826	455,650	142,442	64,633	750,551
Households below threshold	87,587	393,196	68,683	18,335	567,801
Cost (\$million)	959	6,248	1,365	381	8,953
1997					
Number of farm households	67,103	396,698	178,210	71,239	713,250
Households below threshold	66,005	340,320	94,690	21,446	522,461
Cost (\$million)	897	6,754	2,258	496	10,405
Program costs 1993-97 (\$million)	6,150	33,928	10,909	2,508	53,494
Estimated costs 1999-2003 (USDA Baseline)	4,828	37,936	14,095	3,895	60,755

Source: Calculated by ERS using data from the ARMS and forecasts from the USDA baseline.