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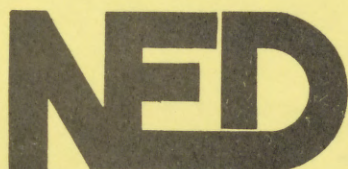
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GRADUATED TARGET PRICES BY SIZE
OF FARM OPERATION

John R. Groenewegen and James Johnson

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ABSTRACT

[A characteristic common to all agricultural commodity programs since their inception in the 1920's has been the provision of benefits based on volume of production. It has long been alleged that such programs provide relatively greater assistance to large producers. The increasing concentration of production among a small number of large producers has renewed this concern over the structure of commodity programs. This paper examines a fundamental change in the programs -- benefits inversely provided to volume of production -- through variable target schemes and payment limitations. The structure of such a program is discussed, with particular emphasis on the important issues that emerge with this target price scheme.]

Keywords: commodity programs, target prices, size of operation, policy issues.

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Graduated Target Prices by Size of Farm Operation

by

John R. Groenewegen and James Johnson

Economists

Introduction

The benefits of the agricultural commodity programs since their inception in the 1930's have been distributed to farmers on the basis of production volume. Direct benefits (price support and direct payments) have usually been provided on a unit of production (bushel, pound, or hundredweight) basis. Hence, the more units of production (volume), the more benefits received.

A result of this characteristic of the programs is that larger farms tend to receive a share of total payments disproportionate to their number; the much larger number of small farms receive a relatively small proportion of total payments. This unequal distribution of program payments has been documented in earlier studies (Bonnen [2] and Schultze [6]) and in a recent report to the Congress [7] on the status of the family farm. The relatively concentrated production and benefits from the 1978 commodity programs are illustrated in table 1.

The evidence on concentration coupled with the hypothesis that larger farms have significantly lower unit production costs than smaller farms leads to suggestions that the structure of the commodity programs may have contributed to increasing concentration in farm resource ownership and production. This result, of course, would be contrary to the rationale for the programs of promoting a family farm structure of agriculture. The growing concern over the future structure of the American farming sector and concern about the impact of the commodity programs have led to recent proposals for restructuring these programs.

Table 1--Distribution of 1978 commodity program payments

Commodity	Percentile of producers 1/							
	Smallest indicated percentage				Largest indicated percentage			
	10	20	30	50	50	30	20	10
	Percentage of payments							
Wheat	0.8	1.8	3.4	10.9	89.1	76.6	66.6	50.5
Cotton	.2	.9	1.4	6.2	93.8	83.3	72.5	53.3
Rice	.8	1.5	1.8	7.0	93.0	77.4	63.2	39.8
Feed grain	.5	2.5	4.1	13.3	86.7	70.0	57.1	39.5
U.S. total	.9	1.9	3.7	9.7	90.3	77.5	65.4	46.0

1/ The percentiles are rankings of producers by the size of their Normal Crop Acreages. For example, the smallest 10 percent refers to the 10 percent of producers having the smallest NCA.

Source: [7]

One such modification is to target the program benefits to specific groups of producers by varying the amount of income protection (i.e., the target price) extended to farmers on the basis of their production volume. The aim of such a modification is characterized by a resolution adopted in 1979 by the National Grange:

"Resolved, that the National Grange proposes a significant change in U.S. agricultural policy where an income maintenance program such as "deficiency payments" levels would be varied by volume of production to offset the comparative advantages that exist in the current program for the high volume producer [4]."

Implicit in such proposals is recognition that the basis for setting the amount of price and income support (historically, parity and currently, cost of production) has been geared to the "national average size producer." Some writers (Penn and Boehm [5]) have suggested that this results in inadequate assistance for the small volume producer while providing unnecessary support for the large volume producer. Therefore, providing higher unit payment rates to small volume producers would tend to direct proportionally more of the total benefits to the smaller-size operations, an important consideration to an increasingly urban dominated Congress and increasingly budget-conscious public officials.

The intent of this paper is three-fold. First, some of the policy options that can be considered for limiting payments and for providing proportionately more per-unit support to smaller producers are presented and discussed. Second, the proposals are evaluated by using cost concepts and these concepts are used to explore the implicit assumption that underlies these proposals: namely, that production costs decrease with farm size. Lastly, the policy issues that surround these proposals are highlighted and discussed.

Policy Options

The focus of this section is on mechanisms that can be adopted to vary payments by volume of production. Payment limitation, a feature of

current legislation, is a policy instrument which caps payments to a producer and hence limits payments to high volume producers. The proposed graduated payments schemes limits payments by linking target prices to volume of production.

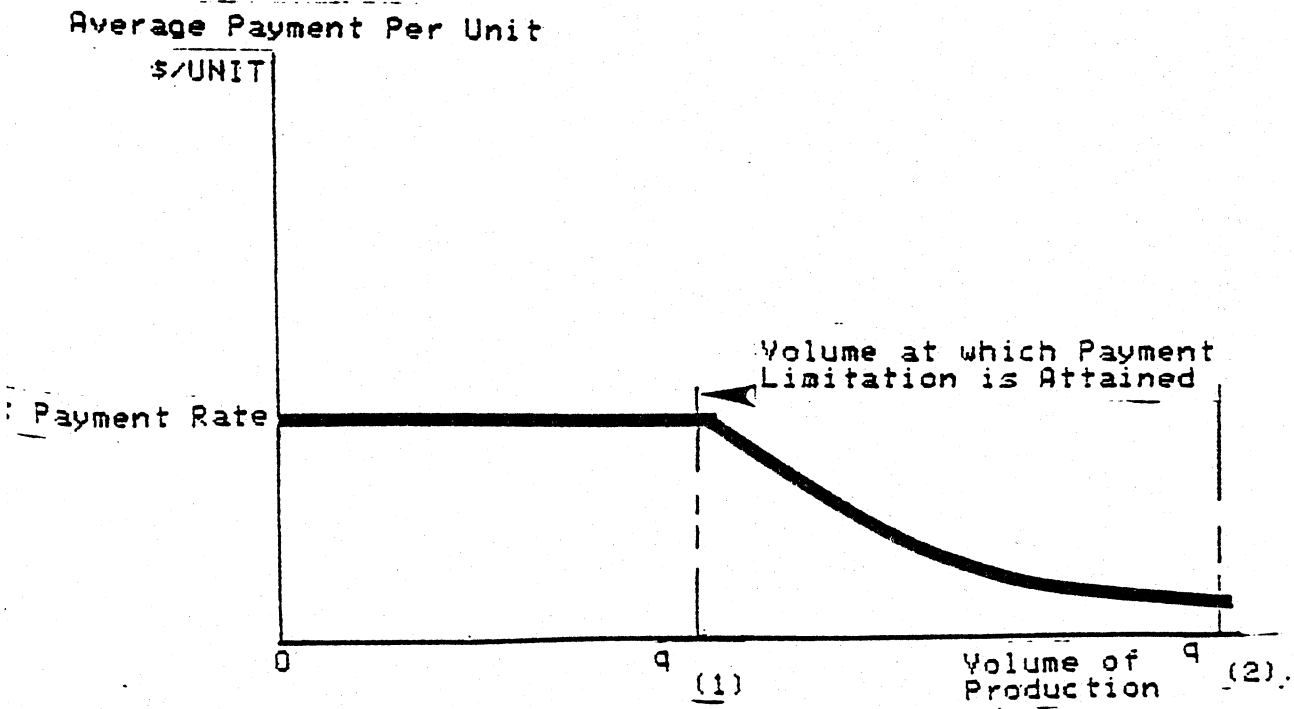
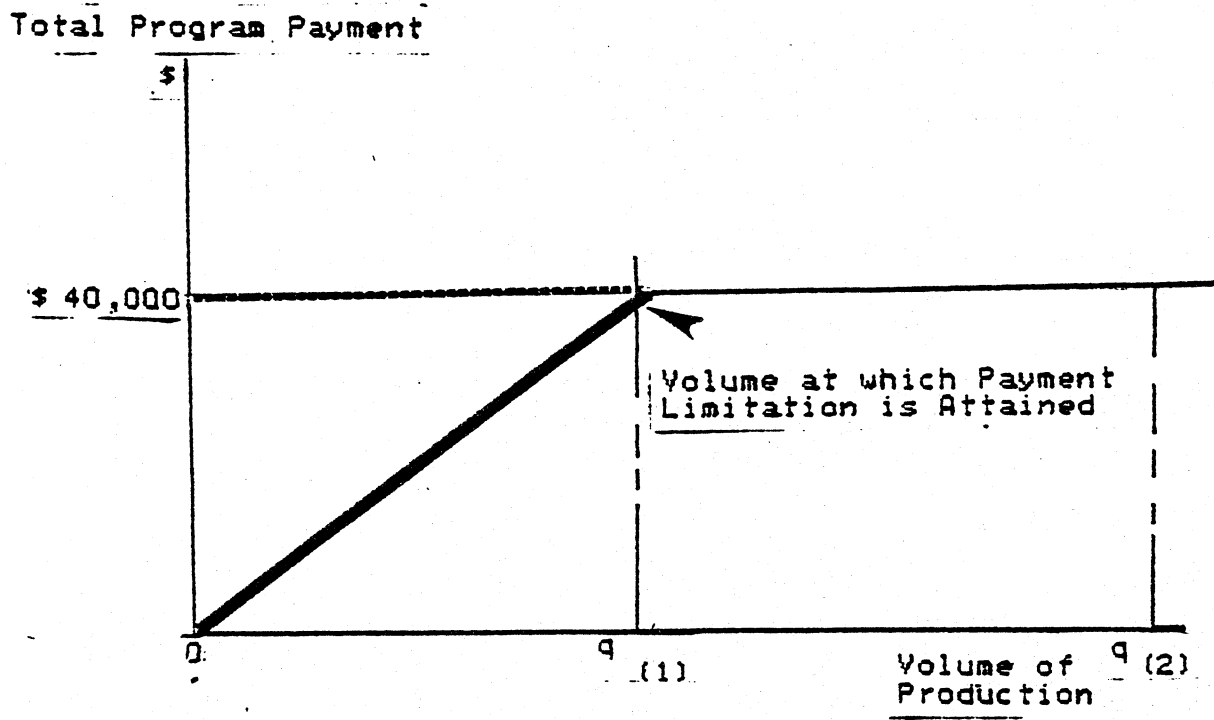
Payment Limitations

The operation of the current target price/deficiency payment program with a payment limitation is illustrated in figure 1. The top panel illustrates a farm's total payment increasing with volume of production until the limit is reached. For example, if the target price payment rate were 20 cents per bushel, the total payment would increase until a 200,000 bushel volume were attained. No further payments are received after the limit is reached, regardless of the volume of production beyond that level. The bottom panel illustrates that the unit payment rate remains constant for all production up to the limit. Beyond this point the marginal unit payment rate is zero, however, the average per unit payment rate begins to decline.

This can be further illustrated by considering the wheat program. The potential payment rate in 1979 was \$1.05--the difference between the target price (\$3.40/bu.) and the loan rate (\$2.35/bu.). The \$40,000 payment limit thus became effective at 38,095 bushels--for a farm with a yield of 30 bushels per acre, at 1,270 harvested acres. The average payment per bushel is \$1.05--the difference between the target price and the loan rate in our illustration. However, for a wheat farm of 2,540 harvested acres with the same yield, the average unit payment on all production is \$.525 per bushel.

Payment limitations are not crop specific. The present statutory payment limit is based on the combined payments received from the wheat, feed grains, upland cotton, and rice (beginning with the 1980 crop) programs.

Figure 1. Total and Average Payments with a Payment Limitation Scheme.



A Variable Target Price-Graduated Payment Plan

A variable target price would simply be a different unit payment rate varied according to the volume of production. As the volume increased, the target price would decrease. This basis for deficiency payment is predicated on the assumption that a firm's long run average cost curve is downward sloping and that need for income support is inversely proportional to output.

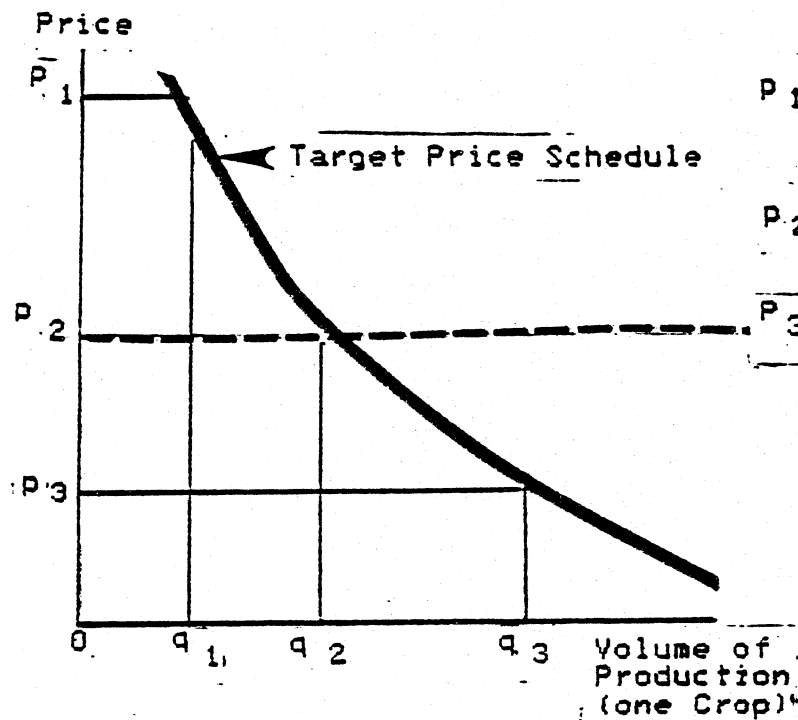
Two possible methods of varying target prices for a crop are illustrated in figure 2. The target price schedule in the left panel is a continuous function with the level of support declining as volume increases--target price p_1 is associated with production of q_1 , a lower target price of p_2 for production of q_2 , and so on. With a market price of p_2 , producers with production greater than q_2 are restricted from receiving any income support payments--even on their production below q_2 . However, producers with production at q_1 would have their production supported with a target price of p_1 . Their unit payment rate would be p_1 minus p_2 (the market price).

The target price schedule in panel b of figure 2 has the level of support set for several production intervals. For production up to q_1 , the target price is p_1 ; for production greater than q_1 , but less than q_2 , the target price is p_2 , and so on with the rate declining over successively greater production intervals. When production is between q_2 and q_3 and the market price is p_3^* , then the unit payment rate with the target price of p_2^* is p_2^* minus p_3^* . In both cases, the unit level of support provided to the "large volume producer" is reduced, while relatively more support is provided to the "small volume producer". The per unit payment rate for any production level is the positive difference between the target price at that production level and the market price.

Total and average per unit payments under a graduated payment plan are illustrated in figure 3. The volume of production, q_2 , corresponds to the production level q_2 in panel a figure 2 where the market price intersects the target price schedule. At this point, the graduated "target price" equals

FIGURE 2. ILLUSTRATION OF A VARIABLE TARGET PRICE SCHEDULE

(a)



(b)

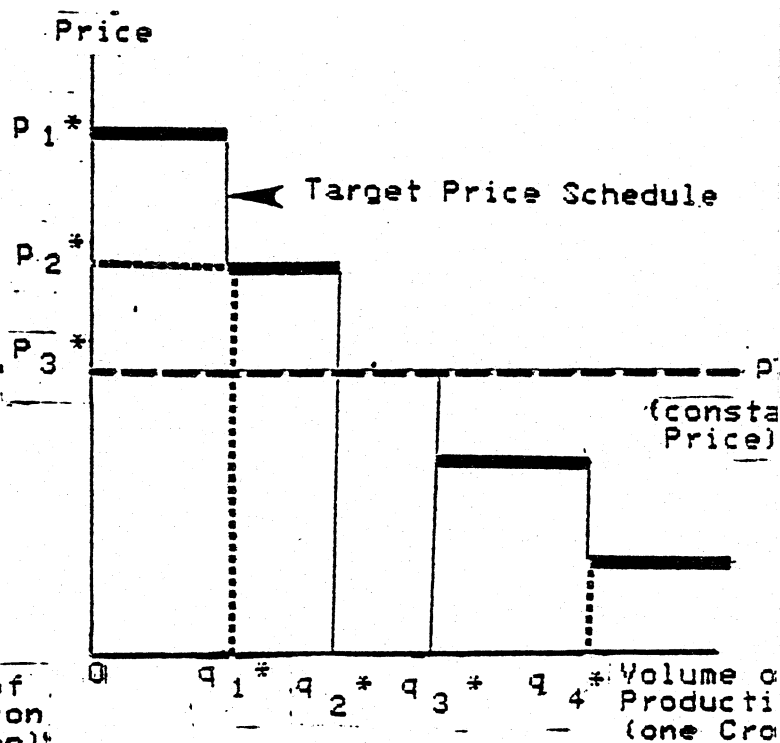
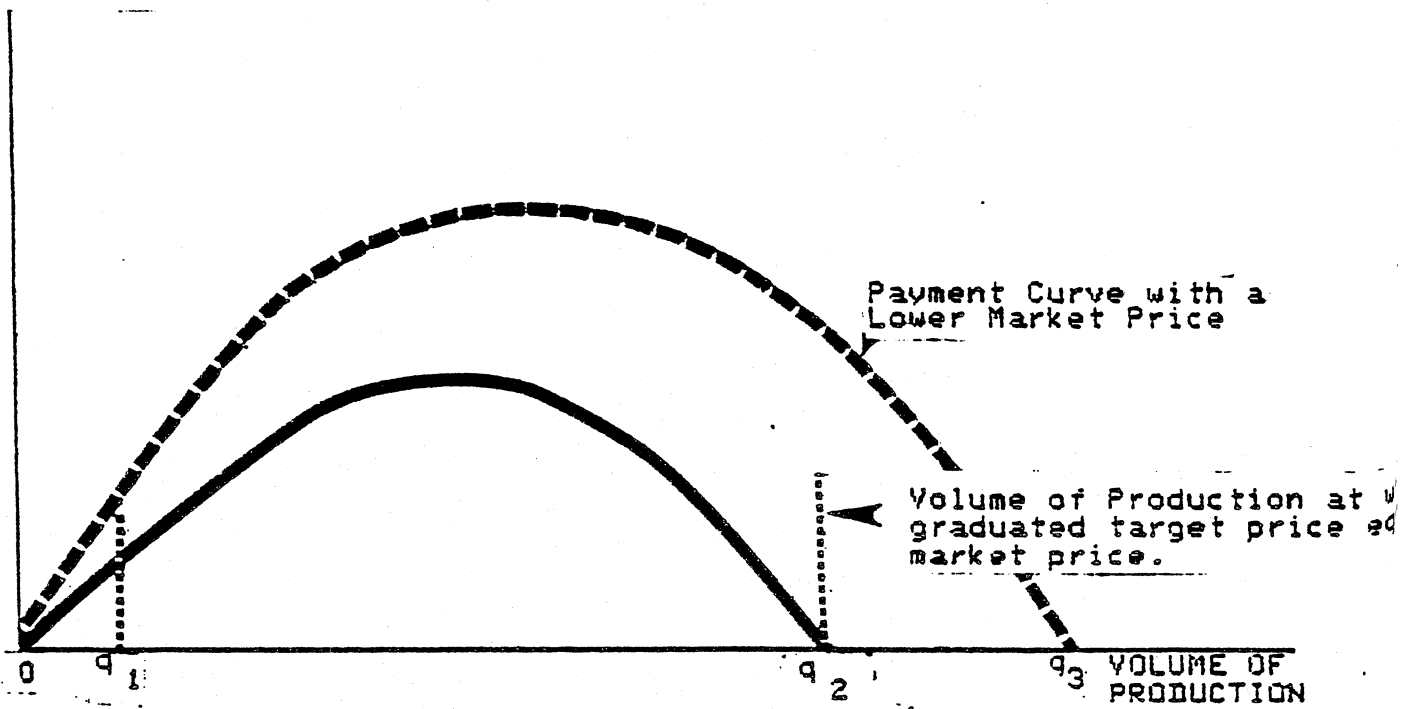
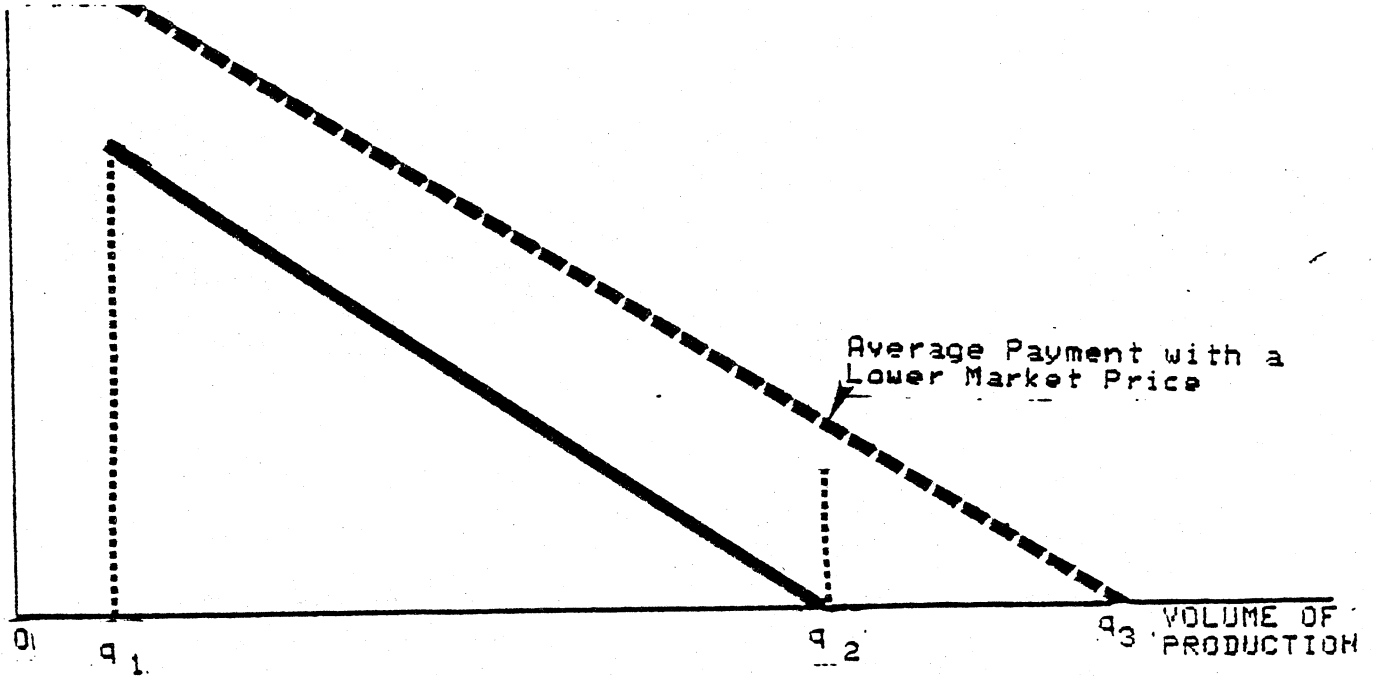


Figure 3. Total and Average Payments with a Graduated Deficiency Payment Scheme.

Total Payment



Average Payment Per Unit



the market price. Total payments are zero for producers whose production volume is beyond q_2 . That is, producers with production beyond this amount are ineligible for payment. Average payment per unit is highest with the lowest volume of production, yet total payments are greatest at some level between a low production volume and the production level which results in a zero payment rate. But when market price falls, some production beyond q_2 becomes eligible for target price support. For example, if the market price falls to p_3 in panel a of figure 2, then producers with production up to q_3 are eligible for payments. The total and average payments are illustrated by the dashed curves in figure 3 for this situation.

A hypothetical example of total payments and per unit payments to producers with various wheat acreages is constructed in table 2. The target price schedule declines from 5.01 with 100 wheat acres to \$4.00 when wheat acreage is greater than or equal to 1,200 acres. (The target price schedule could be based on production versus acreage). When the market price is \$4.25, then based on the target price schedule only producers with acreage less than 600 acres receive deficiency payments. The per unit payment is highest for the smallest producer, but total payments are greatest for the producer with 200 acres (based on 30 bushels of wheat to the acre). On the other hand, when the market price is \$3.90 (versus 4.25), all producers are eligible for a deficiency payment, since the target price schedule flattens out at \$4.00 per bushel. The per unit payment is \$1.11 per bushel for producers with 100 acres and levels out to \$.10 per bushel for producer with over 1,200 acres. (See table 2). With the lower market price, total payments are greatest in the 500 to 600 acreage range and decline as acreage increases. Although, after the 1,200 acreage level, payments are proportional to production level.

Table 2--Graduated Payments for Wheat Producers by Size of Operation

Producers Acreage	Target Price <u>1/</u>	Deficiency Payments			
		Market Price = 4.25		Market Price = 3.90	
		Per Bushel	Total <u>2/</u>	Per Bushel	Total <u>2/</u>
100	5.01	.76	2280	1.11	3330
200	4.70	.45	2700	.80	4800
300	4.53	.28	2520	.63	5670
400	4.41	.16	1920	.51	6120
500	4.32	.07	1050	.42	6300
600	4.25	0	0	.35	6300
700	4.19	0	0	.29	6090
800	4.14	0	0	.24	5760
900	4.10	0	0	.20	5400
1000	4.06	0	0	.16	4800
1100	4.03	0	0	.13	4290
1200	4.00	0	0	.10	3600
1300	4.00	0	0	.10	3900
1500	4.00	0	0	.10	4500
2000	4.00	0	0	.10	6000

1/ Based on Target Price Schedule of:

Target Price = \$7.62 (Acreage)^{.0912} when acreage \leq 1,200
 \$4.00 when acreage $>$ 1,200

2/ Deficiency Payments Based on per acre yield of 30 bushels.

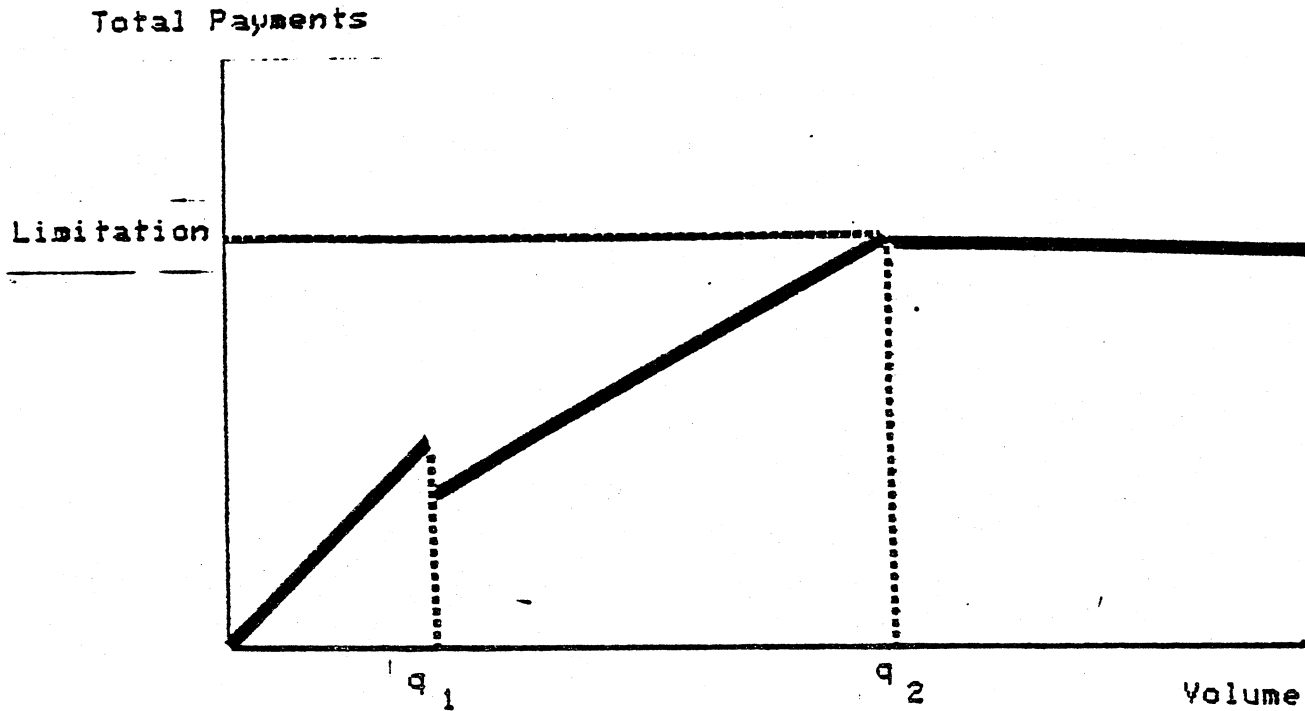
The total payment to small producers could also be increased by providing a constant level of payment and a payments limitation for all producers (as is currently done), and in addition a higher average per unit payment for small producers with production below some level (e.g., q_1 in figure 4). Similar procedures have been used in the past (e.g., for small cotton producers). There is a break in total payments for producers who produce just above or just below q_1 in figure 4.

Variable Target Price by Volume of Farm Production

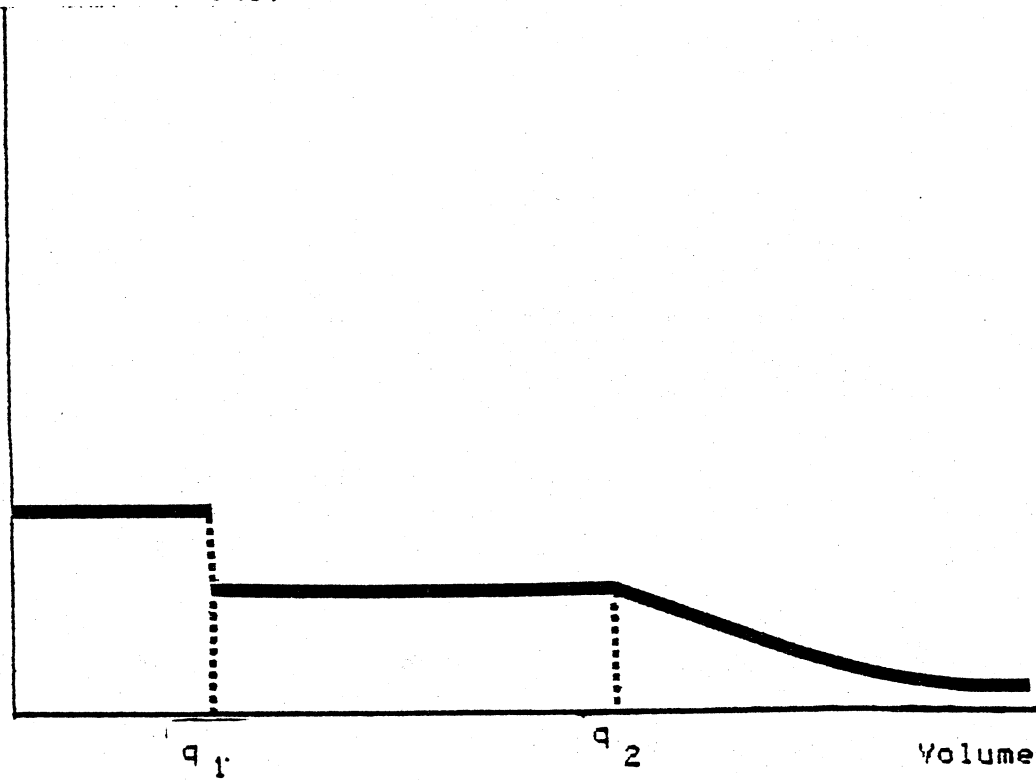
In the previous section variable target prices on a commodity basis were discussed. Problems exist with that concept since a farm can produce more than one crop. In fact, most farms are diversified to some degree. As a result, an alternative approach could be a graduated payment program through a variable target price which is based on farm size, or total farm production.

A farm production volume basis for a graduated target price program can be implemented by pro rating the volume of production for each crop to the total farm production level. For example, if a producer grew corn, sorghum, and wheat, then in terms of figure 2, if wheat production was at q_1 and wheat plus corn plus sorghum production equalled q_3 , then the wheat target price based on the wheat target price schedule would be p_3 , not p_1 . This is because the target price schedule is based on whole farm production, not specific crop volumes. In other words, a producer with 100 acres of wheat and 500 acres of crop production would have his wheat target price based on 500 acres, not 100 acres of production.

Figure 4. Payments Differential on the Basis of Farm Size.



AVERAGE PAYMENT PER UNIT



Similarly, the corn target price would be based on the corn target price schedule at 500 acres, regardless of the acreage planted. With this scheme, the target price for wheat for a producer with 100 acres of wheat on 150 acres of cropland could be above the market price. Yet, the target price could be below the market price for a producer with 100 acres of wheat and 400 acres of other crops.

An Evaluation of Graduated Target Price Proposals

In this section of the paper, the graduated target price proposals are assessed. This evaluation is composed of two parts. The first part concerns a paradigm of production cost composition, and how this composition varies by farm size. This conceptual framework is used in the second part of the analysis as the basis for addressing the policy issues of graduated payment proposals.

Cost Concepts

For illustrative purposes, production costs are segmented into two cost classification schemes. First, total costs are decomposed into cash and non-cash costs. Cash costs are the direct payments to fixed and variable factors of production. This includes the variable expenses (such as fertilizer, fuel, repairs, and hired labor), some overhead costs, land rents, land taxes, and basic living expenses for the family unit that are apportioned to the production unit in terms of total family activity in that activity and other farm and non-farm activities. Non-cash costs are those costs that are incurred in the production period but can be postponed to subsequent periods (e.g., depreciation on capital equipment), and current returns to fixed resources (land and operator-management services) that are not classified as a cash expense. These definitions of cash and non-cash costs allow total costs (cash plus non-cash) to equal total receipts. This classification will be used later in the analysis.

Second, total costs are also segmented into purchased factor costs and economic rents. Purchased factor costs, as the label suggests, are costs associated with those factors that are purchased off the farm, except for land.

This includes variable costs as well as non-land physical capital (e.g., buildings and machinery). Economic rent is the residual return to specialized factors of production, which are land and operator-management services. This residual return is equal to the difference between total market receipts and purchased factor costs.

These two cost concepts are not mutually exclusive. Economic rent, for example, has a cash as well as a non-cash component. The cash component of economic rent includes land rent, land taxes, land mortgage, and basic family living costs that are apportioned to the production activity in question. The remaining portion of economic rent which does not have an immediate cash obligation is the non-cash component. These cost concepts are illustrated in table 3.

During periods when market prices declines and/or purchased factor costs increase, then economic rent decreases (since it is a residual). In this instance, it is entirely conceivable that the cash component of economic rent can exceed the prevailing economic rent. Non-cash costs will be negative and consequently the production unit is in a tight financial squeeze.

Viability of the production unit and continuation of an enterprise requires that over time receipts cover the costs that are assigned to the production unit. These assigned costs are the purchased factor costs and the cash portion of economic rent. The difference between total cost (receipts) and assigned costs is the non-cash component of economic rent. This can be referred to as unassigned economic rent since management can assign this residual component in a discretionary fashion to either savings, family consumption, firm growth, or any combination thereof.

Table 3 Composition of Cost Components

Purchased Factor Costs	Cost Component	Preception by Firm's Management	
	Variable	-Cash	-Assigned
	Machinery	-Cash -Non-Cash	-Assigned -Assigned
	Overhead	-Cash	-Assigned

Economic Rent			
	-Land	-Cash -Non-Cash	-Assigned -Unassigned
	-Management:	-Cash -Non-Cash	-Assigned -Unassigned

TOTAL COSTS			

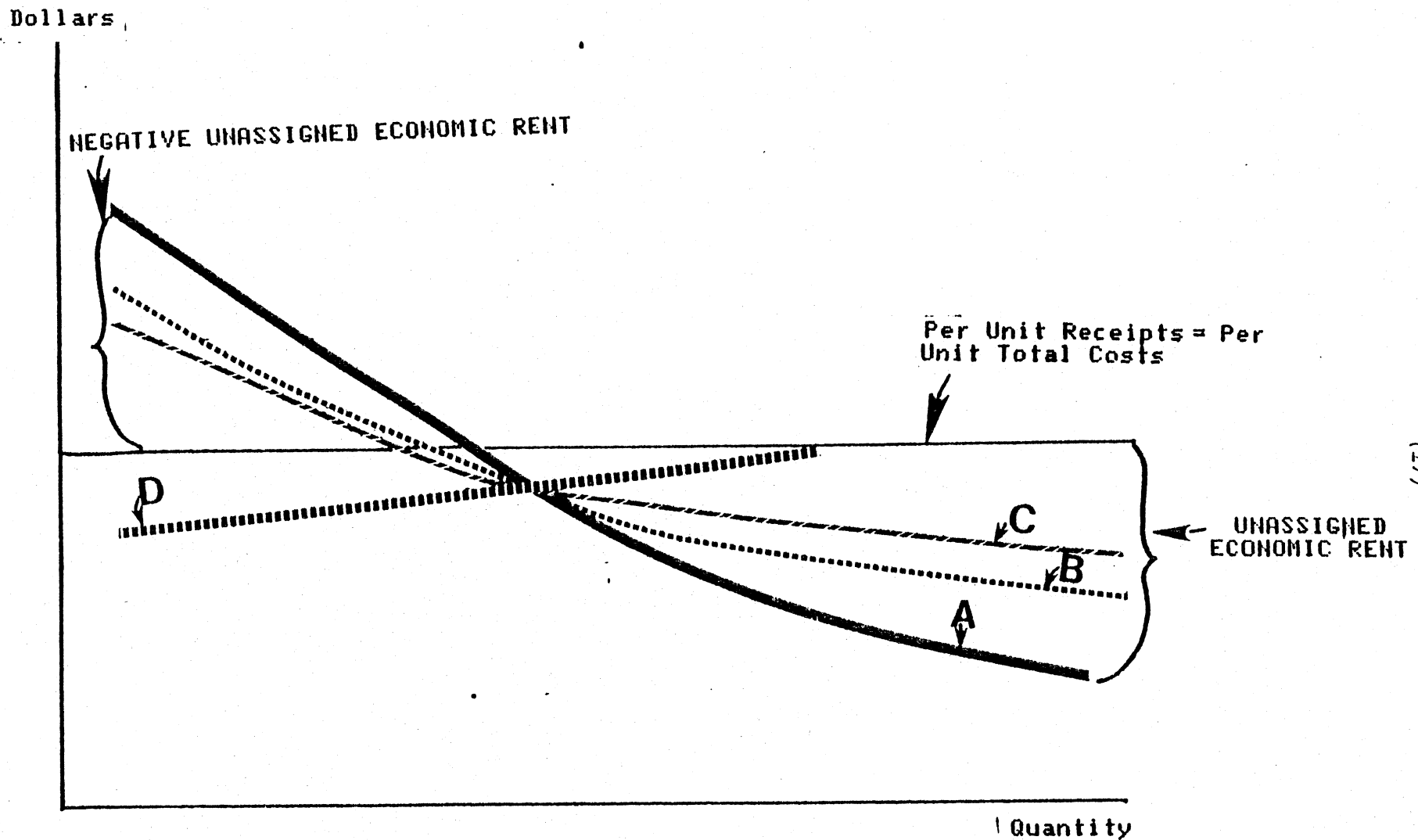
Distribution of Cost Components by Farm Size

The composition of cash cost, assigned costs, and unassigned economic rent is not constant over the farm size spectrum. Although, given constant yields, total per unit costs (e.g., cash plus non-cash, or purchased factor costs plus economic rents) are the same for each size of farm since gross per acre receipts are defined to equal per acre costs. However, the composition of cost can vary across farm size for many reasons. The reasons, which are discussed below, include: (1) economies of size, (2) land tenure arrangements, and (3) off-farm income sources.

Economies to Size -- Total per unit assigned costs decrease when volume increases because fixed costs, which are assigned, are spread over more units of production. This reduction in per unit fixed costs is due to more efficient use of machinery, own labor, etc. As a result of economies to size in assigned costs, larger producers are more apt to receive positive unassigned economic rents. Smaller sized operations, on the other hand, may be more prone to not be able to meet all of the assigned costs. This is shown in figure 5 with the assigned cost curve represented by curve A. Economies to size, specifically technical economies, is one of the bases for graduated payment programs.

Land Tenure Arrangements -- The cash cost component of total costs varies by tenure status. The reasoning is as follows. The cash cost on rented land is significantly higher than the cash cost on owned land that is relatively debt free. The cash cost on the owned land is the real estate tax and outstanding principal and interest payments. Accepting the assumption that the cash cost for rented land exceeds the cash cost on the renters' owned land indicates that the cash cost component of economic rent is higher for part owner operators than for full owner operators. The former group in this case has more assigned costs per dollar of sales than the latter group.

FIGURE 5. ASSIGNED COSTS BY FARM SIZE.



- A - ONLY ECONOMIES TO SIZE ARE CONSIDERED.
- B - TENURE STATUS IS ALSO CONSIDERED.
- C - OFF-FARM INCOME ADJUSTMENTS ARE CONSIDERED.
- D - AN INCREASING ASSIGNED COST STRUCTURE.

The number of farms renting additional land is proportional to farm size. Data in table 4 from the 1974 Census of Agriculture indicates that over 50 percent of the farms under 259 acres in size were operated by full owners. In contrast, 39.3 percent of the farms in the 260-499 acre size were operated by full owners, and approximately 25 percent of the farms with acreage exceeding 1,000 acres were operated by full owners. Part owners farmed 33 percent or less of the farms in the under 259 acre categories. This group operated over 60 percent of the farms greater than 1000 acres in size. These data plus the assumption on cash costs for land by tenure status indicate that the cash cost component of economic rent would be a higher proportion of total costs on average for the larger producer. As a result, the assigned cost curve in figure 5 rotates from curve A to curve B because of the higher cash costs arising from the average tenure status of larger farms. The curve rotates through a interior point verses a point on the price axis because the assigned cost curve A reflects average tenure status, regardless of farm size.

Off-farm Income -- Off-farm income on a per farm basis varies by farm size and the percentage of farms with off-farm income sources also varies by farm size. The data reported in table 5 is tabulated from the 1974 Census of Agriculture and illustrate the above phenomena. First, the percentage of farms receiving more than \$5,000 from off-farm income sources in 1974 declines as farm sales increases. In the \$10,000-19,999 sales class 35 percent of the farms had off-farm income greater than \$5,000. In contrast, less than 18 percent of the farms with sales over \$100,000 had off-farm income.

Tenure
StatFull
OwnerPart
Owner

Tenant

All F
Opera

Source

Table 4--Tenure Status by Sales Class, 1974

Tenure Status	Size of Farm (No. of Acres)								Total
	1-49	50-99	100-179	180-259	260-499	500-999	1000-1999	2000	
	-----Percent-----								
Full Owners	77.1	73.2	65.7	52.9	39.3	29.3	25.3	24.9	53.4
Part Owners	9.6	15.9	21.4	33.1	45.3	57.1	63.3	64.9	33.3
Tenants	13.3	10.9	12.9	14.0	15.4	13.9	11.4	10.2	13.3
All Farm Operator	100	100	100	100	100	100	100	100	100

Source (8)

Table 5—Distribution of Off-Farm Income by Sales Class, 1974

Off-Farm Income \$	Farm Sales							
	Total	>500,000	200,000- 499,999	100,000- 199,999	40,000- 99,999	20,000- 39,999	10,000- 19,999	2,500 9,999
	-----Percent-----							
0	.4265	.7836	.6445	.5639	.5174	.4706	.4070	.3167
1-4,999	.2438	.0835	.1846	.2573	.2913	.2718	.2407	.2048
>5,000	.3297	.1329	.1709	.1788	.1913	.2576	.3523	.4785
Average Off-farm Income	\$5,239	\$4,838	\$4,285	\$3,509	\$3,239	\$3,996	\$5,435	\$7,287

Source (8)

The other phenomenon concerns the level of off-farm income for those farms that had off-farm income in 1974. The 1974 Census indicates that the average level of off-farm income decreases for all farms as the value of sales increases until sales of \$100,000 and then increases slightly in the higher sales classes (table 5).

Conventional wisdom usually assumes that a one-to-one relationship exists between the production unit and the family that operates and manages the production unit. And, as a result, all of the family living costs at a maintenance level are charged to the production unit. On a per bushel or per acre basis, the smaller production units have a higher basic family living cash cost than the larger production units, as represented by assigned cost curve A in figure 5. The data in table 5, however, suggest that the cash costs for living which are apportioned to the production unit are not as great for smaller farms as for larger farms. This is a result of smaller farms having more off-farm income that can be allocated to basic living costs than the larger farms with less off-farm income. Consequently, the assigned cost curve rotates to curve C in figure 5. The rotation of the assigned cost curve from B to C is on the basis of a downward shift in the assigned cost curve for farms with off-farm income greater than the all farm average and an upward shift for those farms in the sales classes with off-farm income below average. The rotation occurs since average off-farm income is implicitly contained in assigned cost curves A and B.

Income Support Needs by Farm Size

The assigned cost curve may be increasing after the tenure and off-farm income adjustments are made to the assigned cost relationship. This phenomenon is illustrated by curve D in figure 5. When the assigned cost curve is increasing by farm size, this indicates that the cash and non-cash portions

of economic rent are changing. In particular, a larger portion of per unit economic rent is a cash cost for the larger producer relative to the smaller producers for the reasons given above. Consequently, unassigned economic rent, on a per unit basis, can decline as farm size increases.

Income support requirements, therefore, may not be inversely related to production if assigned cost curve D in figure 5 represents the real world situation. This would occur exclusively as a result of the ownership status of land and the off-farm, on-farm interface over farm sizes. On the other hand, if curve C prevails, then support needs are inverse to output. These assertions raise two fundamental questions: first, what is the policy objective behind the target price mechanism; and second, does any data exist that reveals the assigned cost structure as it relates to volume to determine if income support needs are proportional to, or inverse to, farm size?

We argue that the cost concept underlying the assigned cost curve, or some portion thereof (assigned non-management costs as defined below), is the parameter on which income support needs should be based. If receipts do not match at least the assigned costs of the production unit, uncertainty is cast over continued viability in the agricultural sector.

Data tabulated from the 1974 Census of Agriculture (table 6) indicate that assigned non-management costs (i.e., assigned costs without the basic family living cost component of economic rent) on a per dollar of sales basis increases after the \$20,000 sales volume. The cost curve in figure 6 illustrates this relationship. Assigned costs by farm size which reflect the relationship of the family-management unit between the farm and non-farm sector and basic family living costs is calculated using 1974 Census data in table 6. On a per unit basis the family living cash cost apportioned to the farm decreases from \$.20 per dollar sales at \$20,000 sales to \$.04 per dollar sales in the \$100,000 sales class. Adding this to assigned non-management costs produces an assigned

Table 6--Calculation of Assigned Costs by Farm Size, 1974

	Farm Sales							
	2,500- 4,999	5,000- 9,999	10,000- 19,999	20,000- 39,999	40,000- 99,999	100,000- 199,999	200,000- 499,999	>500,000
Assigned Non-Mangement Cost Per Dollar Sales <u>a/</u>	1.30	.81	.71	.67	.67	.70	.73	.87
Average Off-Farm Income <u>b/</u>	\$7,814	\$6,772	\$5,453	\$3,996	\$3,239	\$3,509	\$4,285	\$4,838
Assumed Subsistence Living Cost	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Family Living Expense Contributions Required From Agriculture <u>c/</u>	\$2,186	\$3,220	\$4,547	\$6,004	\$6,761	\$6,491	\$5,715	\$5,162
Required Family Living Agricultural Contribution As a Percent of Sales in The Mid-Range of the Sales Class	.58	.43	.30	.20	.10	.04	.02	.01
Assigned Costs Per Dollar Sales <u>d/</u>	1.88	1.24	1.01	.87	.77	.74	.75	.88

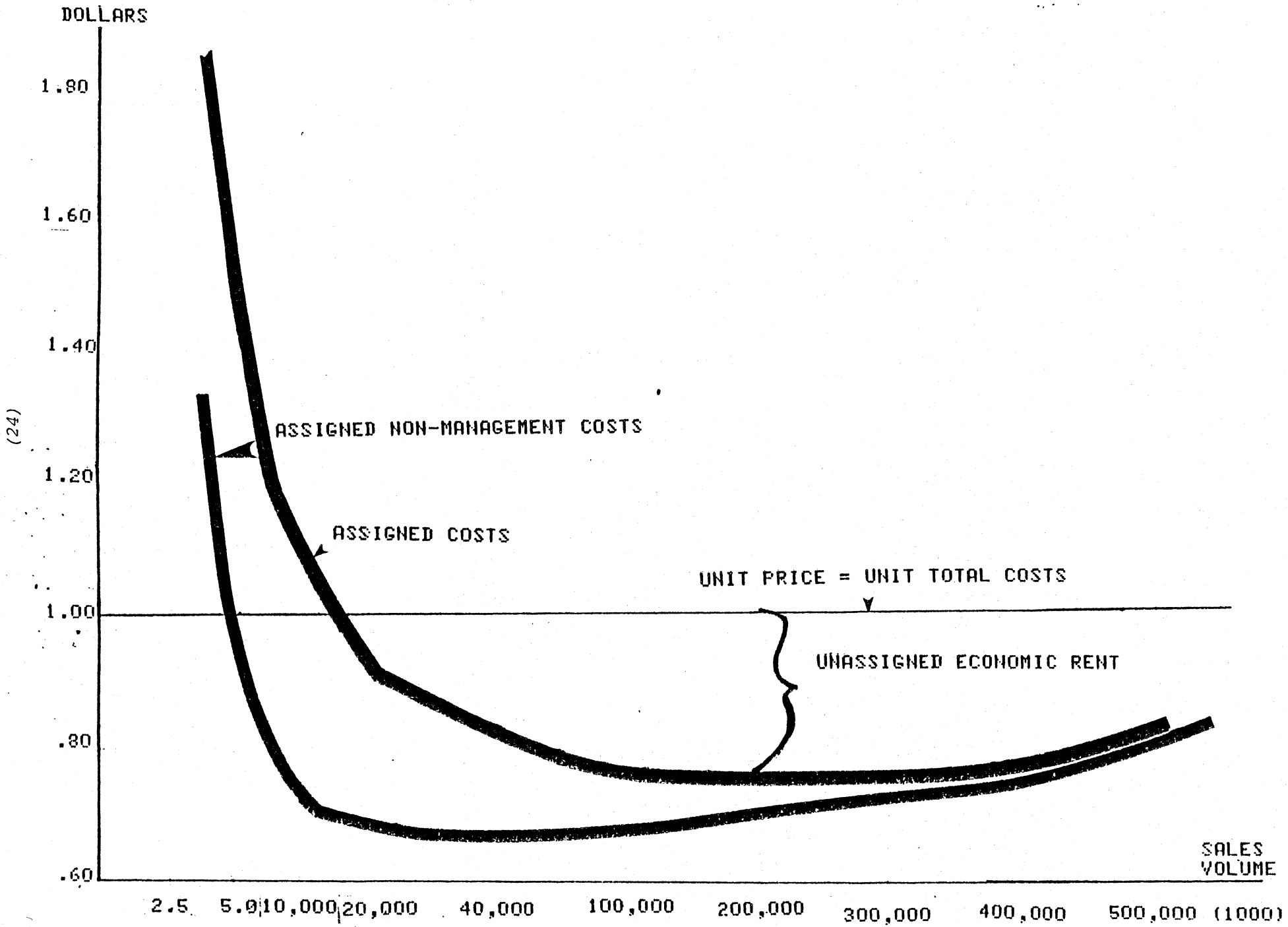
a/ Based on the 1974 Census of Agriculture (8) with production expenses (cash costs plus depreciation) divided by sales.

b/ From the 1974 Census of Agriculture (8)

c/ Subsistence living cost minus average off-farm income.

d/ Assigned cost per dollar sales equals assigned non-management costs plus the family living contribution required from agriculture.

BY FARM SIZE, 1979.



cost curve which is substantially above receipts in the under \$10,000 sales class, which is equal to receipts in the \$10,000-\$19,000 sales class and is relatively constant in the \$40,000 sales class to \$500,000 sales class, and which increases for larger producers. These data suggest that the assigned cost curve is relatively constant in the size ranges where commercial agriculture operates and increases for the very largest producers. One would expect assigned costs to increase by size of farm since larger producers need less per unit unassigned economic rent than larger producers. However, this assigned cost structure has implications for limiting payments on the basis of farm size when the target price equals assigned costs for the average sized producer.

Using assigned costs as the basis for target prices and the higher assigned costs for the largest farms (as suggested by the Census data,) an important question that needs to be addressed is the following: does the largest producer require the benefits of the commodity program more than the smaller producer in order to survive in the sector because of possible increasing assigned costs, or does the commodity program promote the increasing assigned cost relationship? The answer to this question also brings into focus the desirability of payment limitation and graduated payment schemes.

Data from a recent survey on the grain reserve program can be used to explore the participation-nonparticipation dimension in the commodity programs on the farm size spectrum. ^{1/} Table 7 reports the distribution of participants and nonparticipants in the 1978 wheat program by cropland size. The survey indicates that 45 percent of the nonparticipants had cropland bases of less than 200 acres, whereas only 19 percent of the participants were in this size category. Similarly, 40 percent of the participants had cropland bases larger than 600 acres, versus 19 percent for the nonparticipants. This data

^{1/} From the North Central Regional Research Project NC-152, Subproject 4, An Analysis and Appraisal of the Grain Reserve Program under the 1977 Act.

Table 7—Participation in the 1978 Wheat Program by
Cropland Acreage, Northern Plains

Acreage	1978 Wheat Program			
	Participants		Nonparticipants	
	Percent	Cummulative	Percent	Cummulative
0-199	18.6	18.6	45.1	45.1
200-599	41.9	60.5	36.1	81.2
600-999	19.7	80.2	11.5	92.7
1000-1599	11.9	92.1	4.5	97.2
>1600	7.8	99.9	2.9	99.9
Sample Size	1599		740	

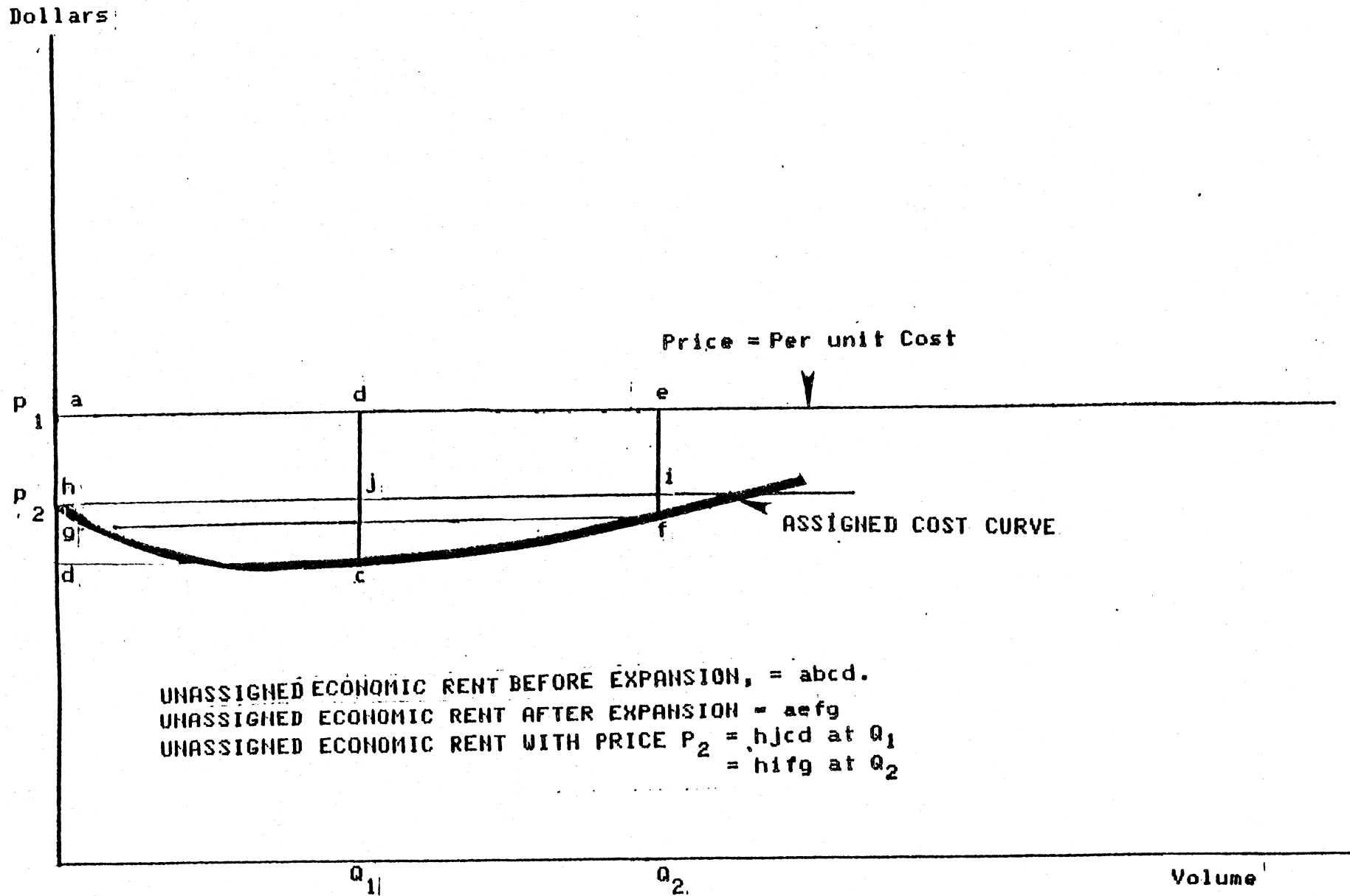
Source: [1]

indicates that participants in commodity programs have larger cropland bases than nonparticipants. However, these data do not resolve the issue of whether larger producers have a greater need for wheat program provisions than do the smaller producers; or do larger producers receive more benefits relative to smaller producers, and, hence foster the increasing assigned cost structure? This issue remains unresolved. Further research is necessary to fully address issues relating to benefits by farm size.

Arguments can be made on each side of the issue. For example, past commodity programs promoted an increasing assigned cost structure since benefits were proportional to output. As a result, today the larger producers may participate in the program because the benefits are needed by these producers.

An argument for the other position it as follows. Market forces dictated that farm families totally dependent on agriculture for their well-being must expand their operation to provide a viable level of family income. Expansion usually implies land expansion which is in the form of land purchase or land rental arrangements. Land expansion plus capital expansion increases the cash component of economic rent and, hence, per unit assigned costs increase from firm growth. In terms of figure 7, at market price P_1 unassigned economic rent increases from area abcd to area aefg as a result of expansion, even though per unit assigned cost increases as production moves from Q_1 to Q_2 . However, when price declines to P_2 in figure 7 due to changes in foreign demand or domestic supply, total residual income--i.e., unassigned economic rent--is less for the firm which expanded (Q_2) relative to the firm which did not expand (Q_1). Compare area hjcd to hifg in figure 7. Consequently, the larger firm which has recently expanded is in a tighter cash flow situation. Therefore, the larger firm is more likely to participate in commodity programs than smaller firms because target prices (and grain reserve prices) truncate the lower end of the price distribution.

Figure 7. Costs and Returns from Expansion



The program can require land retirement, and the less productive lands on a farm is usually idled. Idling of this land on a larger farm represents a smaller opportunity cost than idling land on a smaller farm. The smaller producers, even though they may participate, receive a smaller benefit when participating relative to not participating than do the larger producers. Tables 8 and 9 from the Status of the Family Farm (7) illustrate that larger producers receive more benefits than smaller producers in total and in terms of per unit of production. The per unit benefits in table 9 suggest that even though the above occurs--i.e., larger producers require the program benefits--the benefits on a per unit basis may also contribute to the higher cash component of economic rent,--i.e., assigned costs increase by size.

Distortion of Incentives

A graduated payment concept or a limitation on payments may result in a different price received for each volume of production. These schemes will distort the incentive structure facing farmers away from market place incentives. In particular, graduated target price schemes on a crop basis would tend to promote more diversification on farms in order to receive the higher per unit payment associated with lower volumes of production. Such a situation may not promote the most efficient allocation of agricultural resources. Substitute crops that can be grown without substantial cost or foregone revenue will be promoted if the resulting total net income received by the production unit is greater with the diversification. Table 10 indicates that sufficient opportunity exists for wheat producers to diversify. As a result, output composition may change which may enhance or detract from policy goals underlying the program. In any event, budget costs would increase if the program encouraged more production on smaller units.

Table 8 --Impact of 1978 farm program on participant's cash flow, by size of farm

Impact	NCA acres										Total/ average all producers
	Less than: 70	70- 139	140- 219	220- 259	260- 499	500- 999	1,000- 1,499	1,500- 1,999	2,000- 2,499	2,500 & over	
	<u>Million dollars</u>										
Changes in receipts, all participants:											
Payments <u>1/</u>	105.9	163.0	185.0	85.9	408.6	414.4	177.1	88.2	46.3	79.1	1,753.5
Plus indirect price benefits	56.8	85.0	94.4	44.0	210.7	216.1	90.0	44.0	23.0	48.4	912.4
Minus income foregone on set- aside acres	85.5	144.8	162.2	71.8	301.2	231.7	77.6	35.9	17.4	30.1	1,158.2
Net increase <u>2/</u>	77.2	103.2	117.2	58.1	318.1	398.8	189.5	96.3	51.9	97.4	1,507.7
	<u>Dollars</u>										
Changes in receipts, per participant:											
Payments	365	1,109	1,972	2,684	4,058	7,819	14,282	21,000	27,235	35,955	2,372
Plus indirect price benefits	195	578	1,012	1,375	2,092	4,077	7,258	10,476	13,529	22,000	1,235
Minus income foregone on set- aside acres	293	985	1,729	2,244	2,991	4,370	6,235	8,743	10,012	13,694	1,567
Net increase	267	702	1,255	1,815	3,159	7,526	15,305	22,733	30,752	44,261	2,040

1/ Based upon February 1979 data. The total level has since increased to \$2 billion due to additional farm receiving payments. The pattern of distribution remains valid although the absolute amounts are understated.

2/ Understated by a total of about \$250 million, as indicated in above footnote.

Source (7)

Table 9 —Distribution of 1978 farm program net benefits and participants' production

Item	Percentile of producers ^{1/}					
	Smallest indicated percentage:		Largest indicated percentage			
	10	30	50	50	30	10
	<u>Percentage of net benefits</u>					
Programs net benefits	0.80	3.40	8.50	91.50	82.00	55.50
Commodity production	1.00	4.00	9.50	90.50	76.50	47.00
Ratio = share of net benefits to share of production	.80	.85	.89	1.01	1.07	1.18

^{1/} The percentiles are ranked by size of recipients' NCA. For example, the smallest 10 percent of producers simply refers to 10 percent of participants who had the smallest NCA.

Source (7)

Table 10 Number of Producers Growing Wheat Participating in the 1978 Commodity Programs by Enterprise Combination and Size of Farm, United States 1/

Enterprise Mix	Size of Farm						Total
	Less than: 499	500-999	1,000-1,499	1,500-1,999	2,000-2,499	Over 2,500	
	-----Number of Producers-----						
Wheat 2/	125,264	8,554	1,986	677	261	342	137,084
Wh-Ri	235	74	23	18	3	9	362
Wh-Cn	7,581	1,110	336	118	57	62	9,264
Wh-Cn-Ri	35	30	14	7	2	11	99
Wh-Ba	35,171	8,464	2,253	803	314	362	47,367
Wh-Cn-Ba	160	49	18	7	4	6	239
Wh-Gs	56,876	4,367	1,058	340	147	168	62,956
Wh-Gs-Ri	43	31	2	4	-	3	83
Wh-Cn-Gs	2,720	674	276	115	52	66	3,903
Wh-Cn-Gs-Ri	20	14	9	1	3	4	51
Wh-Gs-Ba	1,082	234	60	23	8	16	1,423
Wh-Cn-Gs-Ba	13	29	12	10	4	3	121
Wh-Co	73,795	7,540	1,435	411	160	182	83,525
Wh-Co-Ri	8	4	1	-	-	-	13
Wh-Cn-Co	826	207	99	41	9	11	1,193
Wh-Cn-Co-Ri	-	1	4	1	1	1	8
Wh-Co-Ga	9,456	2,792	597	186	73	117	13,221
Wh-Cn-Co-Ba	24	17	15	3	1	1	66
Wh-Co-Gs	20,336	2,938	787	281	108	154	24,604
Wh-Co-Gs-Ri	3	1	1	1	-	-	6
Wh-Cn-Co-Gs	385	132	80	32	16	44	689
Wh-Cn-Co-Bs-							
Ri	2	2	2	-	-	2	8
Wh-Co-Gs-Ba	654	201	55	34	22	36	1,002
Wh-Cn-Co-Gs-							
Ba	22	8	3	2	2	11	48
Wh-Cn-Co-Gs-							
Ri-Ba	-	-	-	-	-	1	1
Total	334,766	37,468	9,128	3,115	1,247	1,612	387,336

1/ Farm size intervals are measured by the farm's normal crop
2/ Wh, Ri, Cn, Ba, Gs, and Co refer to program crops grown by participants in the 1978 commodity programs where Wh: Wheat, Ri=Rice; Cn=Cotton; Ba=Barley, Gs=Sorghum, and Co=Corn.

Another distortion emanating from a graduated per commodity payment program is the resulting revaluation of specialized factors. If a substantial portion of the production is on smaller acreage due to diversification, then residual income or unassigned economic rent increases for the farm. Conceivably, this additional income can be used to expand the farm operation and would increase assigned costs for those producers that expanded. There is the distinct possibility that a graduated payment plan on a commodity basis could increase land prices.

Considering the above, the preferred graduated payment plan is the per farm graduated payment plan. This type of scheme would not distort the allocation of resources on a farm. However, the issue still remains as to whether income needs are inversely proportional to output, as discussed above. If they are, a graduated payment concept poses numerous administrative concerns. These are addressed below.

Administrative Concerns

Graduating payments on the basis of volume presents some thorny administrative concerns. Assuming that the farm is used as the basis for graduating payments, important issues emerge; namely: how is the farm defined by the administering agency (ASCS), how can it be defined, and what is the basis for establishing a relation between the production unit and the family unit? In particular, is a production unit defined on the basis of history? Can a production unit be assembled for each member of an immediate family or, is a production unit defined in terms of a family unit? That is to say, sales associated with a family become the base for establishing a payment limitation or a graduated payments schedule.

Once an administrative production unit is defined, the issue still remains on how the concept of graduated payments is transformed into a variable target price scheme. More information is required on the shape of the assigned cost curve over farm size. Cleaner breakdowns of Census data and the use of

survey data will improve estimates of an assigned cost curve.

Determination of farm size is another administrative issue; NCA acreage, total cropland and pastureland, cash receipts of NCA crops, and total farm cash receipts are all indicators of farm size. Utilizing acreage instead of cash receipts and/or marketings as a basis for size results in skewing the benefits to those production units that produce more output on a given acreage base (i.e., higher yields). This would be contrary to the stated goals of a graduated income payment plan. A marketings and/or cash receipts base appears to be more equitable since income needs are most likely linked to volume and volume is more closely linked to sales than acreage.

Another administrative issue involves the assigned (or cash) cost relationships for different commodities and for the same crops over regions of country. Data documenting characteristics of the assigned cost curve must be available to determine income support needs for alternative crops in the same region, in other regions and by farm size.

Payment Limitation and Graduated Target Prices

With a varying target price scheme the payments are not skewed to the larger producers. Instead the mid-sized producers receive on a per farm basis the largest payment. This outcome is illustrated in the total payment curve in figure 8. However, if a payment limitation is also in effect, then the mid-size producers, not the largest producers, will be first affected by the payment limitation. The limitation ensures that producers producing between Q_a and Q_b , in figure 8, will receive the same total payment. The limitation affects the average per unit payment received as shown in the top part of figure 8. The mid-sized producers will receive less than their per unit needs (as defined in the graduated target price schedule) than either small producers or large producers. This analysis suggests that a payment limitation imposed on top of a graduated target price scheme would likely be inconsistent with the objectives underlying the varying target price concept.

Another issue related to limiting payments surfaces when the target price schedule is above the market price for all levels of production. Figure 9 illustrates this phenomenon. As a result, total payments are as in figure 8, except payments increase after production volume exceeds Q_a . At this point the target price schedule and the market price are parallel in the top portion of figure 8. When this phenomenon occurs, large producers receive more payments. But their income needs are also greater since the target price schedule flattens out. In this situation then, it is necessary that total payments increase once farm size exceeds Q_a in figure 9.

A Summary of the Policy Issues Concerning Varying Target Prices

On the basis of the evidence supporting the concept of assigned costs and on the basis of graduating payments, target prices should be graduated up to the \$40,000 sales class. After this level assigned costs to producers are relatively constant until the sales volume reaches half a million dollars. However, given that assigned costs are higher for the under \$40,000 sales class, the appropriate solution may be to recognize the human capital and limited resource problems of this class of producers. The concept of graduating payments on the basis of farm size and some cost concept indicates that this approach is really a limitation on per unit of production payments based on farm size and not a total payment limitation. It should be noted that providing support above assigned costs will result in benefits proportional to production when assigned costs are relatively constant.

In addressing the policy proposal of varying target prices on the basis of volume several key issues were raised. These issues are:

- ° Is the policy objective underlying a varying target price scheme best represented by cost concepts such as assigned costs which recognizes the cash component of economic rent versus full economic rent as the basis for income support?

- ° What is the shape of the assigned cost curve over volume of production? Assigned costs (purchased factor costs plus the cash component of economic rent) are influenced by tenure arrangements and off-farm income. The former is proportional to farm size and increases cash costs. The latter is inversely related to farm size and decreases cash costs. Data documenting these relationships are necessary to effectively administer the program.
- ° What is the definition of the farm for administrative purposes, and what is the relationship between the family unit and the production unit in this definition?
- ° Finally, information on the causality between participation in commodity programs and farm size is required. That is, what is the causal link: large farms participate because of a greater relative need, or large farms participate because they derive more benefit than smaller farms? If the latter, does the benefit today translate into a need tomorrow?

Figure 8. Payment Limitations with a Varying Target Price.

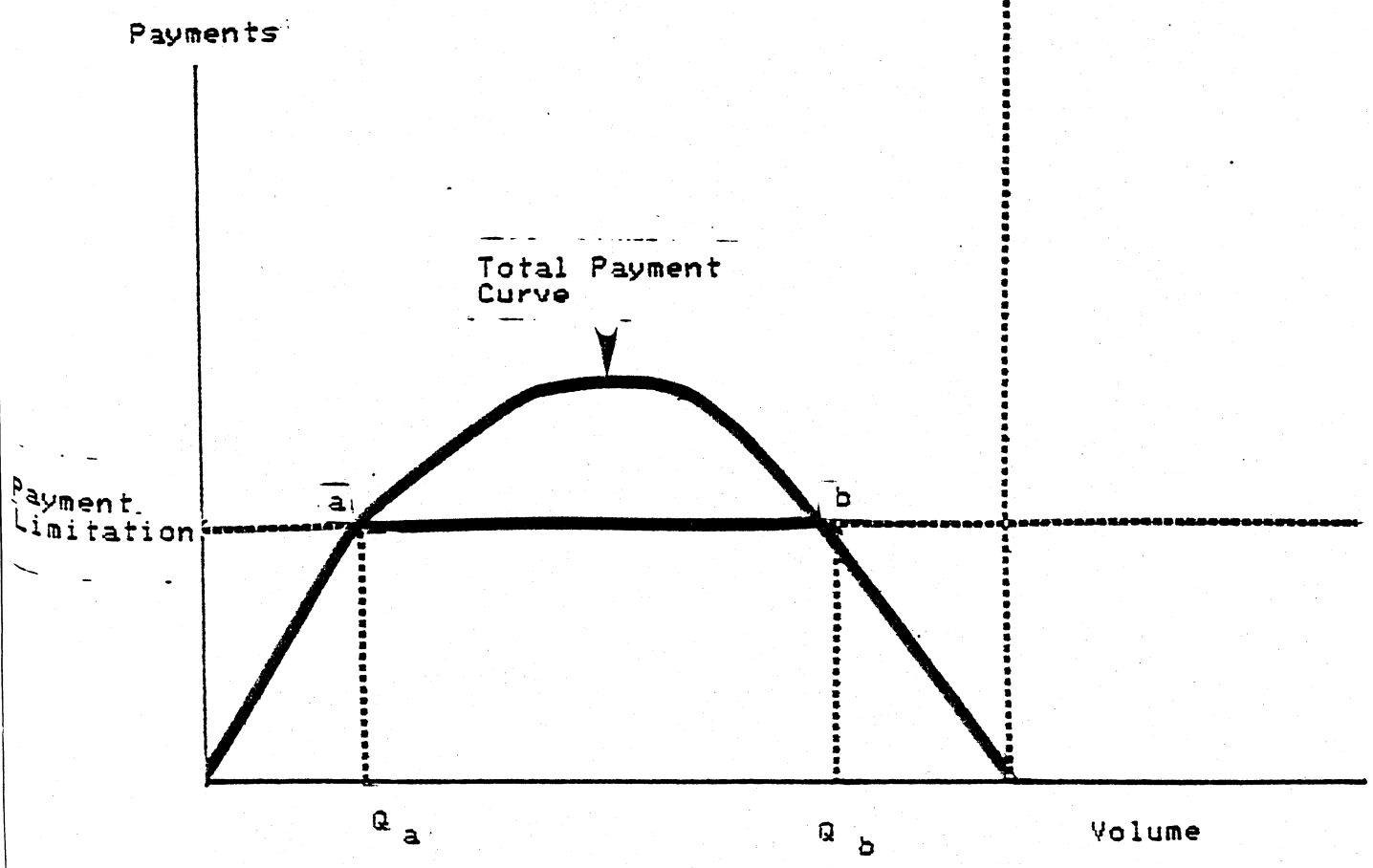
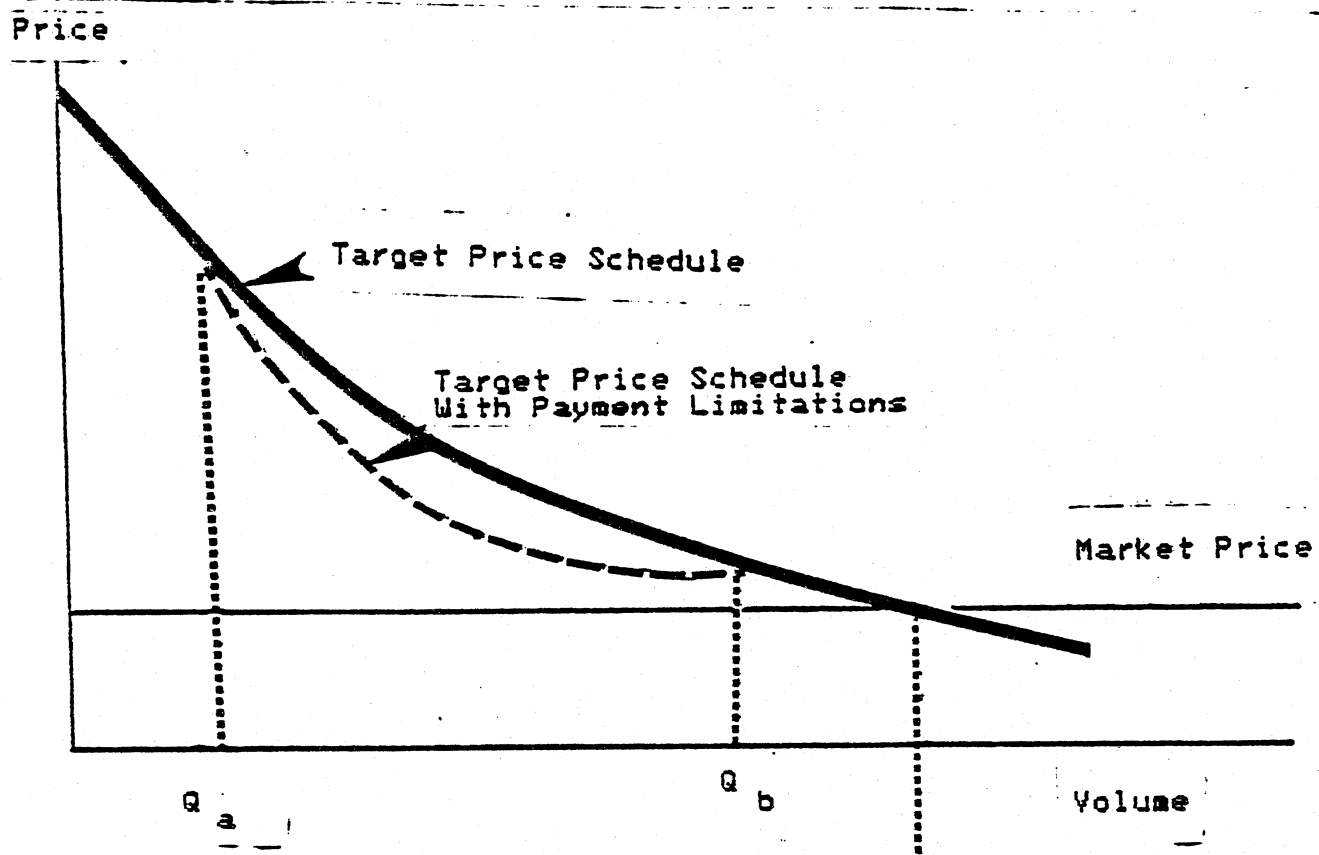
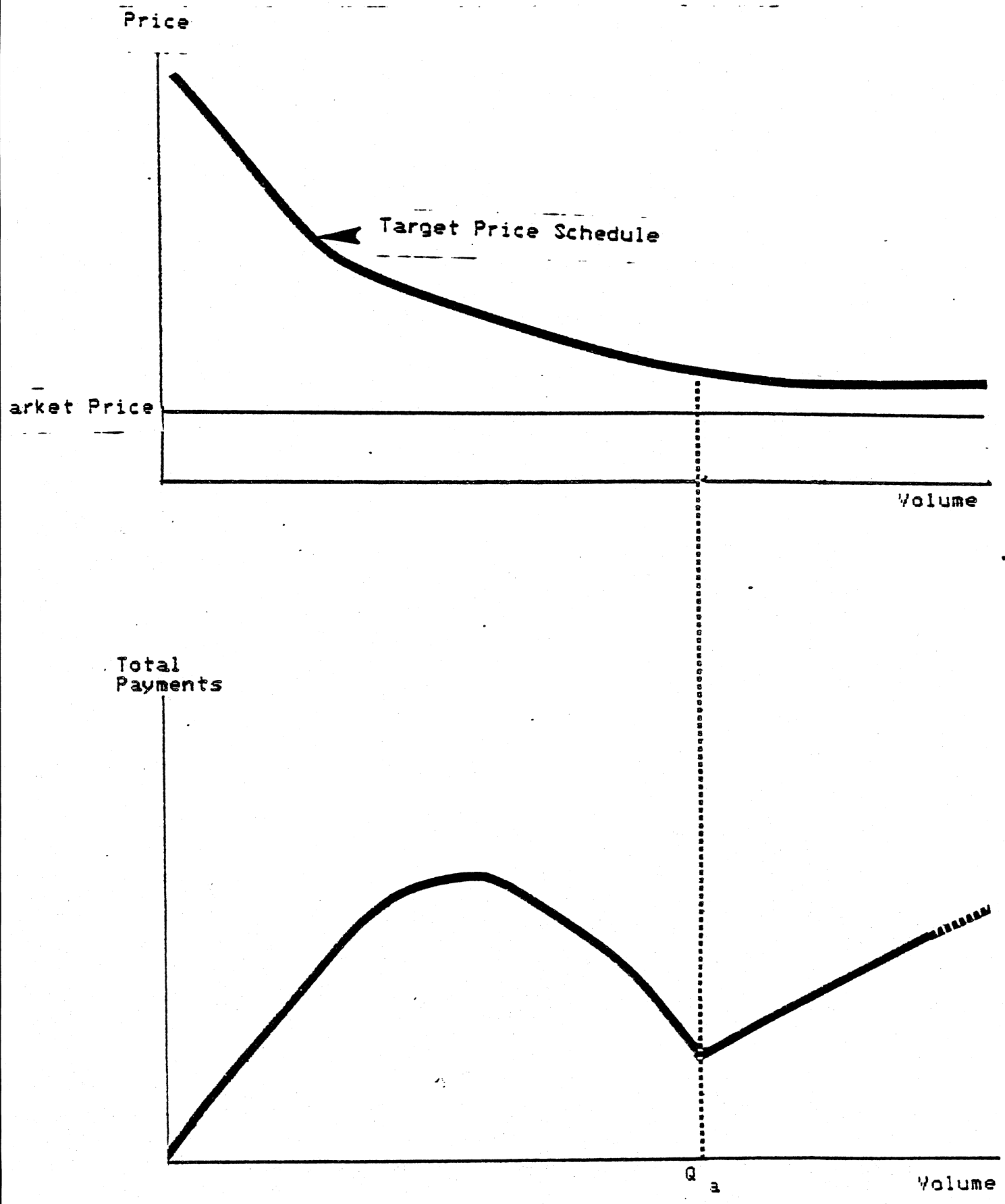


Figure 3. Payments when the Market Price is Below the Target Price Schedule for All Farm Size.



REFERENCES

- [1] Betterly, Susan, Ken Eckhardt, and John R. Groenewegen, "Characteristics of Participants in Commodity Programs" ESCS, USDA (unpublished paper). Oct. 1980.
- [2] Bonnen, James, T. "The Distribution of Benefits from Selected U.S. Farm Programs," Rural Poverty in the United States, A Report by the President's National Advisory Commission on Rural Poverty, Washington, D.C., May 1968, Chapter 26.
- [3] Lin, William, James Johnson, and Linda Calvin. "Distribution of Farm Program Payments: Do Payment Limitations Make Any Difference?," USDA (paper presented to AAEA annual meetings), July 28, 1980.
- [4] The National Grange, "Graduate Deficiency Payments to Support Family Farm Policy," 111th Annual National Grange Convention, November 1977.
- [5] Penn, J.B. and William T. Boehm. Research Issues Reemphasized by 1977 Food Policy Legislation, ESCS, USDA, ESCS-10, March 1978.
- [6] Schultze, Charles L. The Distribution of Farm Subsidies: Who Gets the Benefits? Brookings Institution, Washington, D.C., 1971.
- [7] U.S. Department of Agriculture, Status of the Family Farm, Second Annual Report to the Congress, ESCS, AER-434, Sept. 1979
- [8] U.S. Department of Commerce, 1974 Census of Agriculture, Bureau of the Census.

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