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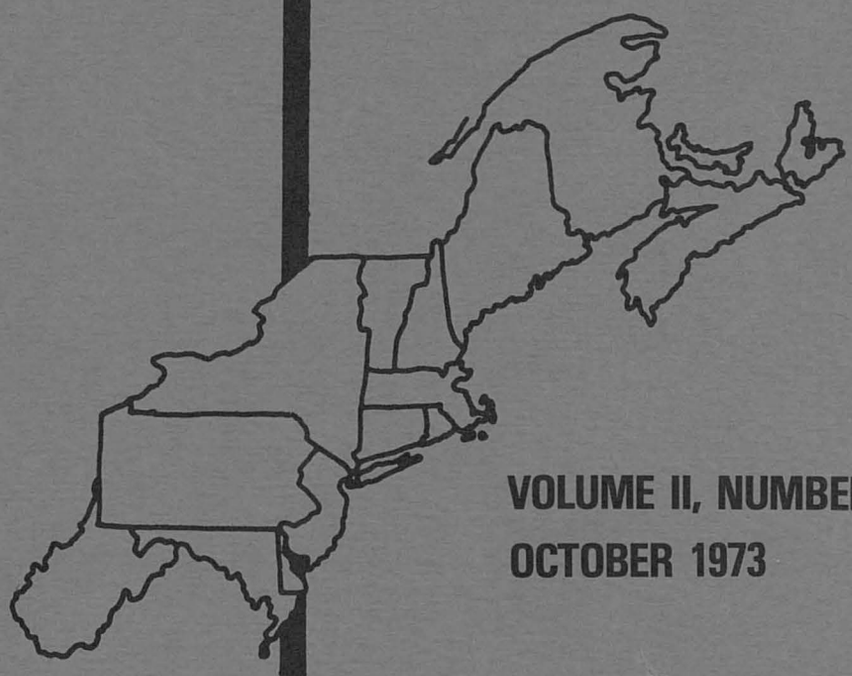

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SWEAT EQUITY IN NEW JERSEY

"Self-Help Housing"

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Introduction[2/]

Congress passed the Housing and Urban Development Act of 1968 and reaffirmed its national housing goal of 1948: "the realization as soon as feasible of the goal of a decent home and a suitable living environment for every American family." However, many states, and New Jersey in particular, have continually fallen short of this goal. The population in the past decade in New Jersey has grown by approximately 20 percent and yet housing has not kept pace with this growth. Current growth requires an additional 100,000 housing units a year, but only 40,000 are being built. In short, the inadequate supply of decent single and multi-family dwellings and increasing housing demand in New Jersey has raised the cost of existing housing out of the reach of many of its citizens.

One means of achieving safe, decent sanitary housing for some citizens has been to incorporate the idea of "sweat equity" to obtain housing; that is, the idea of individuals or groups of individuals building all or most of their houses.

In New Jersey, self-help housing was initiated to provide additional rural low and middle-income housing. The projects have involved individuals (or families) that participate in any or all phases of the construction or renovation of their own dwellings.[3/] New Jersey's

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1/ This paper has been condensed from a study on "Self-Help Housing in New Jersey," by Daymon W. Thatch and Robert Bartels in 1972.

2/ Ideas and facts in first paragraph of the introduction are taken from William T. Cahill's "A Blueprint for Housing in New Jersey," A Special Message to the New Jersey legislation, December 7, 1970.

3/ The Organization for Social and Technical Innovation, Inc. Self-Help Housing in the U.S.A., (Cambridge: Department of Housing and Urban Development Contract No. H-1057, June, 1969), p. 122. (The Organization for Social and Technical Innovation, Inc. is hereafter referred to as OSTI.)

individual houses have been financed through low-interest, self-help housing loans from the Farmers Home Administration, while administrative and technical assistance have been provided and financed through a government agency or local, nonprofit corporation of interested citizens. The program can be described as "do-it-yourself" in which hard work and personal pride can help provide quality housing to persons whose incomes would not normally permit them to own houses.

Although actual self-help programs differ from project to project, all programs combine home ownership with family participation in the building process. Five variations of the technique have been applied in the United States; however, only organized mutual self-help has been used in New Jersey.[4/] In the organized, mutual self-help method, housing is sponsored or supervised or supported, or all three, by parties other than the participating group.[5/] The participant does not initiate any effort beyond the decision to join the program or project group.

The organized mutual self-help technique is a fairly slow and complicated process. Initially, a project is started by a governmental agency or a group of interested citizens in a community, which must convince families to commit themselves to joining a group. After four or five families have committed themselves to the project, the second step involves participation by the potential self-help builders. Participation starts with families attending preconstruction meetings which involve: formal group organization; legal, financial and technical requirements; group planning and construction decisions and basic training sessions. Upon completion of these meetings house construction begins with on-the-job training under technical construction supervision.

New Jersey's initial self-help project, located in Cumberland County, was organized in April of 1964 and consisted of 5 houses. Four additional projects followed: two more in Cumberland County of four houses each, five houses in Ocean County and five houses in Mercer County. In all, 24 self-help houses have been completed in New Jersey.

Although many projects have been organized, the actual cost of self-help housing in the United States and in New Jersey is uncertain. Indications are that the technique is an economical means of building individual housing for some rural poor; however, no economic justification for use of the self-help technique has yet been completed. Margolis states: "No one has done a satisfactory cost-accounting analysis of a self-help program and no one knows for certain how well the

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4/ The other types of self-help techniques are: employed self-help, independent self-help, mutual self-help and organized self-help. See OSTI study pages 9 and 10 for a complete description of each.

5/ OSTI, Ibid., p. 9.

technique, as it is currently being practiced, would stand up to an economist's scrutiny."[6/]

It is felt that an attempt should be made to fix an economic price on all social action programs so that society can more accurately evaluate alternatives.

This paper reports the findings of a study that determines whether self-help housing is an economical means of building individual housing for New Jersey's rural poor. It does not attempt to put a price tag on all the social-economic benefits of self-help housing in New Jersey. Specifically, the study is concerned only with the measurable construction costs associated with the projects.

Objectives of the Study

(1) To determine if self-help housing, as compared to similar contract-built housing, is a cost-saving means of obtaining housing for New Jersey's rural poor.

(2) To determine the imputed return per man-hour of labor for a self-help builder constructing a representative self-help house.

Procedure

A case study approach was used to examine each of the 24 homes built in New Jersey under the self-help program. Each home was evaluated as an individual observation unit.

The initial phase of analysis involved the collection of available data from the Farmers Home Administration and Self-Help Housing Program Association's records. Emphasis was placed upon obtaining construction cost data; specifically, the total construction cost for each house in addition to detailed allocations for each phase of the construction process. Additional data concerning the dimensions of the house, the dates constructed and the length of construction time for each house were collected.

Since the houses constructed were completed over a 6-year period, neither the construction cost categories nor the total construction costs per house could be compared without taking inflation into account. Consequently, all construction cost categories were expressed in 1971 prices, using the Wholesale Price Index as an inflator. Total adjusted construction cost was then calculated on a per-square-foot basis for each house.

In order to determine if the self-help housing technique was in

6/ Richard J. Margolis, Something to Build On (Washington, D. C.: International Self-Help Housing Associates and American Friends Service Committee, August, 1967).

fact a cost-saving means of obtaining housing, an average representative self-help house was contrasted to the cost of a contract-built house. Data on the construction cost of a contract-built house were obtained through a personal survey of private contractors in the south and central regions of New Jersey.[1]

The final task of the analysis was to determine the imputed return per man-hour of labor for a self-help builder constructing a representative self-help house. It was assumed that the difference between the market price and the cost of building materials (adjusted to a price level representative of the market price) would be the imputed return to labor for a self-help builder. The imputed return per man-hour of labor was determined by dividing the imputed return to labor by the total number of man-hours of labor required to construct the representative self-help house.

Presentation of Data and Results

An examination of the cost data from individual self-help houses revealed the following facts: first, detailed cost descriptions for houses by each construction cost category were not available. Costs by construction categories were usually available for each project. Second, Table 1. indicates only 21 self-help houses rather than the 24 that were constructed were included in the survey. A review of housing architectural plans showed that three houses were considerably different from the 21 others constructed under the program. Third, the analysis of the adjusted construction cost figures (Table 1) also revealed large variation both within individual housing projects and between the five projects under the various construction cost categories. These inconsistencies were attributed to the facts that construction categories were not always carried in the same way between different projects and in some cases subcontracting to private contractors was used.

In brief, the major variables that affect the construction costs of self-help housing in New Jersey were identified and measured by the data in the FHA records. Although construction categories were averaged by project as well as for the regions and the state, they were not very representative because job categories were not always listed the same way and because some of the houses used more contracted labor than others. Adjusted construction cost data from Table 1. also showed that an average self-help house costs approximately $2,900 more in Central Jersey than one in South Jersey, mainly as a result of a larger amount of subcontracting (hired labor) in the Ocean County project.

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[1] Southern and central regions were defined as the following N. J. counties. Southern: Atlantic, Camden, Cape May, Cumberland, Gloucester and Salem. Central: Burlington, Mercer, Middlesex, Monmouth and Ocean.

Table 1
Adjusted Construction Cost Figures for 21 Self-Help Houses
Built in New Jersey from 1969-1971, in 1971 Dollars [a]

	PROJECTS					
	Cumberland County A	Cumberland County B	Cumberland County C	Ocean County D	Mercer County E	Southern N.J. Average A,B,C, [b]
Number of houses built	5	4	4	5	3	13
Months to complete	21.00	13.75	18.50	14.00	24.00	18.00
Square feet	963.20	976.00	976.00	1,056.00	1,029.00	971.10
Construction Cost Categories						
Building fees	322.28	259.56	240.94	537.46	225.83	277.95
Cabinets and range	605.18	584.81	469.69	---	224.14	557.22
Doors and windows	786.74	264.11	183.65	78.58	534.52	440.36
Electric and heating	858.29	1,185.75	774.07	446.37	1,201.15	933.13
Excavation	261.56	262.94	377.46	70.43	571.53	297.65
Labor hired	---	4.08	41.90	7,807.02	341.90	[e]
Masonry	711.58	887.36	1,079.13	565.13	1,275.37	878.76
Misc. building materials	4,573.06	4,499.07	4,794.42	2,696.40	4,705.75	4,618.40
Paint	147.54	117.04	140.57	81.61	280.73	136.01
Plumbing	1,075.01	979.51	326.74	2.10	1,904.91	[e]
Tile	119.22	61.06	108.98	---	165.00	98.17
Total cost	9,460.46	9,105.29	8,537.55	12,285.10	11,430.83	9,067.20
Cost per Square Ft.	9.82	9.33	8.75	11.64	11.10	9.34

(table, continued next page)

Table I.(continued)

	PROJECTS	
	Central N.J. Average D,E [b]	State Average [b]
Number of houses built	8	21
Months to complete	17.75	17.90
Square feet	1,045.90	999.60
Construction Cost Categories		
Building fees	420.60	332.29
Cabinets and range	224.14 [c]	494.77 [d]
Doors and windows	249.56	367.67
Electric and heating	729.41	855.53
Excavation	258.34	282.67
Labor hired	[e]	[e]
Masonry	831.47	860.74
Misc. building materials	3,449.91	4,173.26
Paint	156.28	143.73
Plumbing	[e]	[e]
Tile	165.00 [c]	110.70 [d]
Total cost	11,964.75	10,171.02
Cost per square ft.	11.44	10.14

[a] All data represent averages from number of houses in given area.
[b] Regional and state averages are calculated on all houses built in respective areas.
[c] Based only on 3 houses in this area.
[d] Based only on 17 houses.
[e] Due to a wide variation in data, no averages were calculated.

Housing Costs

Since the construction of the 21 self-help houses was based upon almost identical architectural floor plans, the representative self-help house was based upon this same plan.[8] It averaged 999 square feet of living area and cost $10,171 to build. With the architectural plans and the cost as constructed by the self-help builder, the next step was to determine the cost of a contract-built representative house.

A summary of the data obtained in the survey of private contractors conducted during August, 1971, is presented in Table 2. The market price, which did not include cost of land and real estate fees, is the cost of the representative house to a prospective self-help builder if he elected not to construct the house himself.

In short, defining the imputed return to labor as the difference between the market price of the house and the cost of building materials and assuming that material costs are approximately the same for the two builders; then, a self-help builder as compared to a contractor-builder can save on the average $6,396 ($16,567 minus $10,171) in obtaining the standard self-help house in New Jersey.

Imputed Return to Labor

Regional differences exist among the estimated market prices for the self-help houses (See Table 2). The mean market prices in South and Central Jersey are $15,599 and $17,244, respectively. A t-test was performed to test if the regional market means were statistically significant, i.e., whether they come from two separate populations. At a 5 percent level of significance the results showed that the means were from separate populations.[9]

In a similar manner, a t-test at the .05 level showed that there was no significant difference in the man-hours of labor required to construct the hypothesized house by contractors in the different regions.

8/ See Robert Bartels' master's thesis (in progress), Department of Agricultural Economics and Marketing, Rutgers University, New Brunswick, N.J., Appendix D and E for questionnaire and architectural plans used.

9/ Although the exact reasons for the regional differences are not known, several builders attributed the differences to more expensive construction needs, labor costs and institutional restraints.

Table 2
Survey Data Concerning the Market Price, Number of Hours, and Percent of Cost of Building Materials, Labor, Profit, and Overhead Involved in the Construction of the Representative Contract-Built House in South and Central Jersey, 1971

Region	Market price	Man-hours of labor	Cost percentage of			
			Building materials	Labor	Profit	Overhead
South						
1	15,350	600	.50	.35	.10	.05
2	14,750	624	.45	.40	.10	.05
3	15,350	-	-	-	-	-
4	15,000	720	.40	.45	.10	.05
5	17,247	-	.51	.29	.08	.12
6	14,500	680	.42	.38	.15	.05
7	17,000	620	.40	.35	.15	.10
MEAN	15,599	648	.447	.370	.113	.07
STANDARD DEVIATION	1,087	49	.049	.054	.029	.032
Central						
1	18,000	-	.30	.50	.15	.05
2	17,000	720	.45	.40	.10	.05
3	16,745	640	.60	.25	.10	.05
4	18,000	650	.40	.45	.10	.05
5	15,000	608	.45	.37	.13	.05
6	17,500	-	.40	.40	.15	.05
7	14,900	600	.50	.35	.10	.05
8	18,500	-	.48	.32	.15	.05
9	18,500	-	.40	.30	.18	.12
10	18,300	640	.75	.14	.06	.05
MEAN	17,244	643	.47	.35	.12	.057
STANDARD DEVIATION	1,346	42	.125	.103	.036	.022
NEW JERSEY MEAN	16,567	646	.460	.356	.119	.062
STANDARD DEVIATION	1,469	43	.102	.090	.033	.026

NOTE: Individual mean percentages do not necessarily add to total market percentages since means are means of their respective groups independent of the totals.

Since the regional differences in market price were significant, it was decided to conduct the analysis both by regions and for the state. For labor hours the mean figure of 646 man-hours was used for contract-built houses.

Because of inexperience in construction techniques, the self-help builder, as compared to the private contractor, would be expected to employ considerable more man-hours of labor to complete construction of a similar-quality house. Accordingly, the imputed return per man-hour of labor for a self-help builder would be considerably less than that of a contractor; the exact amount dependent upon the number of hours required by the self-help builder to construct the representative self-help house.

Because data were not available to indicate the approximate number of hours required by the self-help builder to complete the construction of his house, the contractor's average survey figure of 646 man-hours times an adjustment constant was used to calculate the self-help builder's hours.

The imputed returns per man-hour of labor for the self-help builder were computed to represent a constant decrease in production, i.e., an increase needed in labor hours for completion, with 646 man-hours of labor equated to the maximum production of 100 percent. For example, if the self-help builder required twice the number of man-hours of labor to construct the house, 1,292 hours (646 x 2) as compared to 646 hours for the private contractor, his completion time would be increased by 100 percent, while his imputed return per man-hour of labor would be decreased by 50 percent.

Finally, it was assumed that a participant would devote at least 20 man-hours of labor a week to the construction project. This average work load could be maintained 52 weeks in a year, plus 80 hours of full-time construction work during a 2-week vacation period, in addition to working his full-time occupation--8 hours a day, 5 days a week. On a daily, hourly basis, this would be a minimum of 8 hours a day on week-ends and a total of 4 hours spread over the evenings of the 5 week days --in total, 1,120 man-hours of labor per year.

In summary, using the average completion time of 17.9 months (Table 1) or 1.49 years for the self-help houses built in New Jersey and an assumed 1,120 man-hours of labor a year; this would mean 1,668.8 man-hours of labor were used to build the average self-help house in New Jersey (1.49 x 1,120 = 1,668.8). This could also be expressed as a 158 percent increase over the time required by a contractor to construct a similar house.

The imputed return to labor by regions under the assumption that it will take a self-help builder 2.58 times as long to build a house as a contractor-builder (1,668.9 ÷ 646 = 2.58) are summarized in Table 3. The average value product curve for labor under various completion times

Table 3
Summary of State and Regional Cost Components for Self-Help Houses in New Jersey, 1971

Area	Market price	Building materials	Labor	Profit[a]	Overhead[a]	Imputed return to labor [b]
Southern region						
Percent		45%	37%	11%	7%	
Dollar value	15,599	7,019	5,771	1,715	1,091	5.14
Central region						
Percent		47%	35%	12%	6%	
Dollar value	17,244	8,104	6,035	2,069	1,034	5.48
New Jersey						
Percent		46%	36%	12%	6%	
Dollar value	16,567	7,620	5,964	1,988	994	5.36

[a] Profit and overhead were defined as entrepreneurship.

[b] Calculated using 1,668.8 hours per house divided into total imputed return to labor (market price - materials).

for the state is illustrated in Graph I. For example, if it took a worker 3.5 times as long to complete a house as a contractor-builder, completion time would be 2,261 man-hours and the rate of return would be approximately $3.95 per hour.

Summary and Conclusions

Contrasting the construction cost of a representative self-help house and the cost of a contract-built house for New Jersey (south and central regions combined), indicated that the self-help construction technique as compared to contract-built housing can save an individual an average of about $6,400 in obtaining housing in New Jersey.

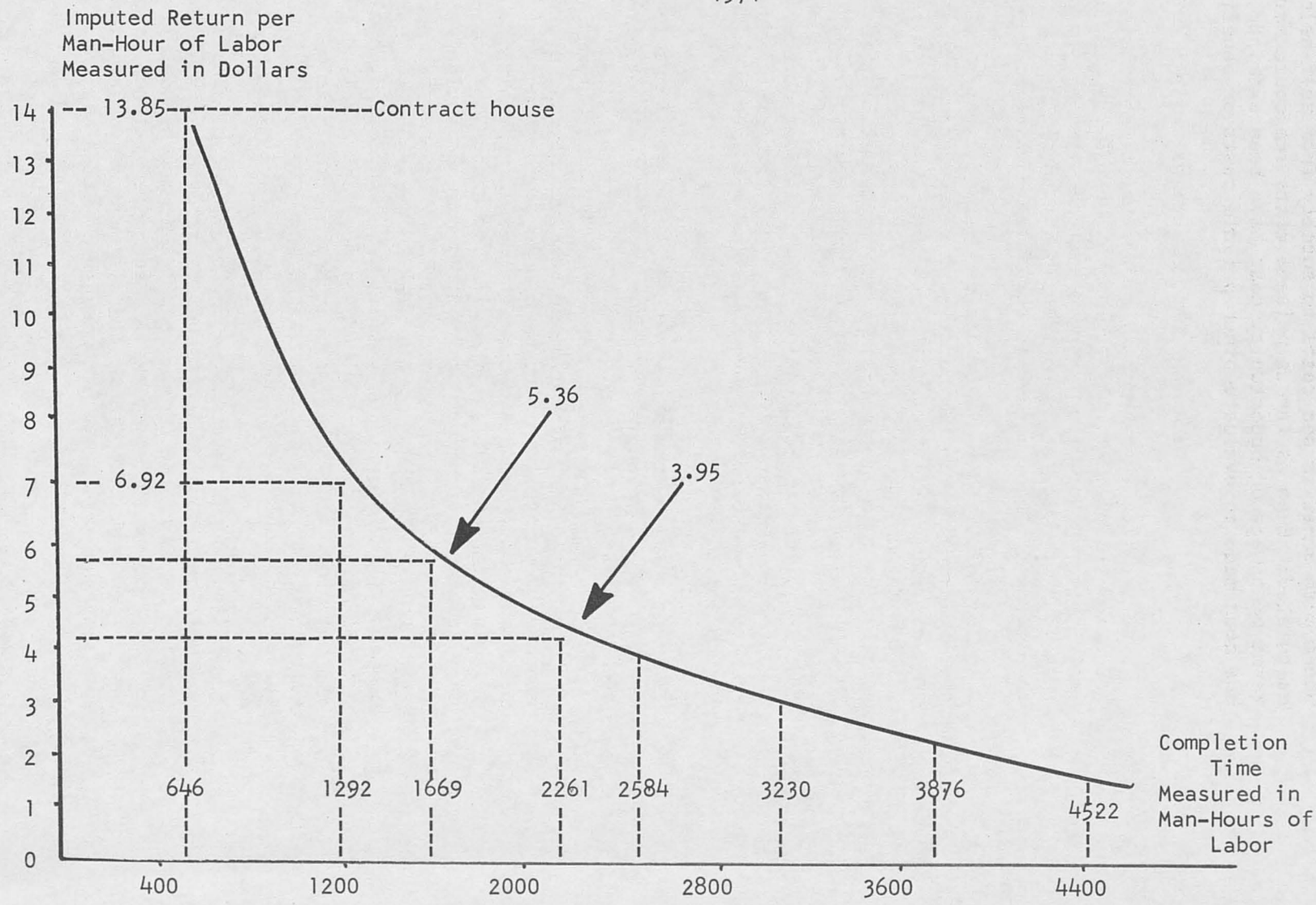
The computation of the imputed return per man-hour of labor for a self-help builder in New Jersey was based upon a completion of time of 1.49 years. Assuming that a self-help builder could devote at least 1,120 man-hours of labor per year, 1,669 man-hours of labor would represent the total man-hours of labor required by a self-help builder to construct a representative self-help house. Using 646 man-hours of labor as a "yardstick" to measure the amount of time employed by a contractor-builder to construct a representative house, the completion time for an average self-help builder in the state was calculated to be increased by 158 percent over the time required by a contractor to construct a similar house.

The imputed return per man-hour of labor for a self-help builder constructing a house in New Jersey was found to be $5.36 based upon an average market price of $16,567.

In conclusion, almost 39 percent of the cost of a contract-built representative self-help house can be saved through participation in a self-help project. Based upon the preceding analysis, and the underlying assumption that the individual's desire for housing is his primary leisure time objective (and, if not, he wouldn't build a house in the first place) it seems reasonable to assume that a prospective self-help builder could not earn a wage in excess of $5.36 per hour. Consequently, as long as individuals have the desire, health, and means to provide housing for themselves through participation in a self-help project, they should be encouraged to do so. The self-help housing technique hopefully can act as one means to bridge the gap between poor, substandard housing and adequate rural housing.

Although one alternative for providing housing in New Jersey is the self-help housing technique, it is by no means a panacea for the housing needs of the rural poor, let alone the poor living in urban areas. In addition to a minimum skill needed, persistence, sacrifice, and the ability to work with others are all necessary qualities. Participant families must also have a good credit rating and the ability to repay the loan.

Graph 1
Average Value Product Curve for the Construction of a Representative Self-Help House in New Jersey (South and Central Regions Combined), 1971



Finally, no total social balance sheet has been attempted, i.e., where both benefits and costs to society from self-help housing are calculated. Even as far as private costs are concerned, only those in terms of a wage or opportunity cost have been examined. No attempt has been made to evaluate other private costs or benefits.