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THE CENTER FOR AGRICULTURAL ECONOMIC RESEARCH]

Working Paper No. 8213

COOPERATION, PART-TIME FARMING, CAPITAL AND VALUE-ADDED IN THE ISRAELI MOSHAV

by

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October, 1982

*Financial support from the Israel Foundations Trustees (Ford Foundation) is gratefully acknowledged. Valuable comments were received from participants in seminars at the University of Minnesota and at the Hebrew University (Rehovot).

Cooperation, Part-Time Farming, Capital and Value-Added in the Israeli Moshav

A simultaneous equations model of the Israeli moshav, in which the levels of cooperative marketing, part-time and full-time farming, value-added and capital stock are endogenous is developed and empirically estimated. In the process, hypotheses relating to the problem of voluntary collective action are tested.

I. Introduction

The determination of the level of cooperation in agricultural cooperative villages, and the connection between cooperation and efficiency, are receiving a growing amount of attention by economists. Most of the work to date, however, has been theoretical, with little attention to empirical analysis of cooperative villages.[1] This paper reports an attempt to fill this gap in the literature.

The subject of this investigation - the Israeli *moshav* - is of particular interest, not only to Israeli observers and planners, but also to development economists in the underdeveloped countries. The *moshav* has been studied by those who have set up cooperative villages in a number of LDC's. While our main interest is in the determination of the level of cooperation, the analysis is carried out as part of a five-equation model, in which the other endogenous variables are (a) the proportions of cooperative members working part-time and full-time on their farms, (b) the level of value-added per farm, and (c) the capital stock per farm.

Before modeling the relationships between these variables, it is worthwhile first to describe the *moshav* in general terms. The *moshav*, unlike the *kibbutz* (collective farm), is a cooperative village in which members farm individually, but market their produce collectively.[2] The *moshav* erects and maintains the collective infrastructure - e.g., central irrigation networks, supply stores, refrigeration and sorting facilities, schools, etc. - and, most importantly, acts as the main channel through which members can obtain credit from national financial institutions. This last aspect is most important, because the individual *moshav* farm is too small to be a feasible risk for most of the financial institutions. Thus these institutions prefer to lend through the *moshav*, which guarantees the loans through the institution of "mutual co-signing" - i.e., the members jointly take responsibility for eachother's debts. The moshav thus acts as a risk pool, making possible capital investments which would otherwise be uneconomic to lenders because of their riskiness.

In order to guarantee members' loans, the moshav maintains a capital pool by requiring members to market their produce through the moshav. It is here that a problem of voluntary collective action - also known as a free-rider problem - enters. While the moshav clearly benefits from its members' marketing solely through its own channels, the members individually may benefit from marketing their produce themselves or directly to some outside marketing agent. By marketing individually rather than collectively, the member (a) gains cash rather than a credit in the moshav's accounts which can be diminished if other members are in debt, (b) can avoid paying taxes, in many instances, and (c) can sometimes obtain a more favorable price. Thus a free-rider problem exists, and the success of the village in overcoming this problem presumably will determine, to a significant degree, the ability of its members to obtain loans and to adapt to technological change.

This paper reports an empirical investigation of the factors which determine the moshav's ability to solve the free-rider problem, as part of a larger investigation in which the levels of full-time and part-time farming, the value-added of the members' farms, and their capital stocks are also treated as endogenous variables.

II. Analytical Framework

1. Determination of the Level of Cooperation

The level of cooperation - i.e., of collective marketing - is determined by three broad classes of variables: (a) economic variables, which determine the individual farmer's relative payoff to collective marketing, and also affect the ability of the village to solve the free-rider problem, (b) technical variables, which determine the cost of private relative to collective marketing, and (c) sociological-ideological variables, which affect the member's subjective valuation of collective marketing as a characteristic of his social environment. We discuss these groups of variables in turn.

Previous work on the economics of cooperation in the moshav (Haruvi and Kislev, 1981) has emphasized the reciprocal interaction of the individual moshav farm's capital-labor ratio and the moshav's level of collective marketing. While we will emphasize other economic relationships, it is helpful first to explain this hypothesized interaction. It is argued that private marketing is a time-consuming activity, and therefore that moshav members with relatively high values of time will tend to prefer to market through the moshav. In a moshav composed of members with relatively high values of time, the resulting high level of collective marketing will strengthen the moshav as a risk pool and thus will stimulate loans to the village. Member farms of such a moshav will therefore have a relatively high capital-labor ratio; consequently the marginal productivity of labor, and thus the value of time, will be relatively high in such a moshav. The high value of time will further strengthen the preference for collective marketing, and thus the cycle repeats itself. This interaction, it has been claimed, will lead to a polarization of moshavim (plural of moshav) over time, in which initially "strong" moshavim will become continually stronger, and "weak" moshavim will become progressively weaker.

On closer inspection, this hypothesis is open to criticism for two reasons. First, it is not always true that an increase in the supply of capital to the moshav, by increasing the capital-labor ratio, will raise the value of time. If moshav members work outside the moshav, their value of time will be determined by the wage rate they obtain in off-farm work. An increase in the moshav member's capital stock, by causing an upward shift in his marginal-productivity-of-labor curve, will lend him to work less off-farm and to concentrate more of his time to work on the farm. But his value of time will not increase, unless he reaches (or initially was located at) the corner solution of zero off-farm work. This idea is illustrated in Figure 1. An upward shift in the farmer's on-farm MP curve does not affect his value of time, which remains equal to w_o, unless he has reached his maximum-hours constraint $\bar{H}$ (derived from the fact that the farmer's work day cannot exceed some maximum less than 24 hours).[3]

A second ground for criticizing the hypothesized positive interaction between the moshav farm's capital-labor ratio and the level of collective marketing is that a relatively high capital-labor ratio will be associated with "income effects" which tend to offset the value-of-time "substitution effect" (to the extent that the latter effect exists, i.e., to the extent that moshav members work only on the farm, as explained above). Since a larger capital stock[4] is associated with higher output:

1. If there are fixed costs associated with private marketing (e.g., making connections with dealers or buying a vehicle to market the produce), then higher capital stocks (and output levels) will be associated with a greater percentage of farmers for whom the benefits of private marketing exceed these fixed costs.

2. If tax levels increase with output, then the relative pay-off to private marketing will tend to increase with output, and thus with the capital stock, since private marketing often allows the avoiding of paying taxes.

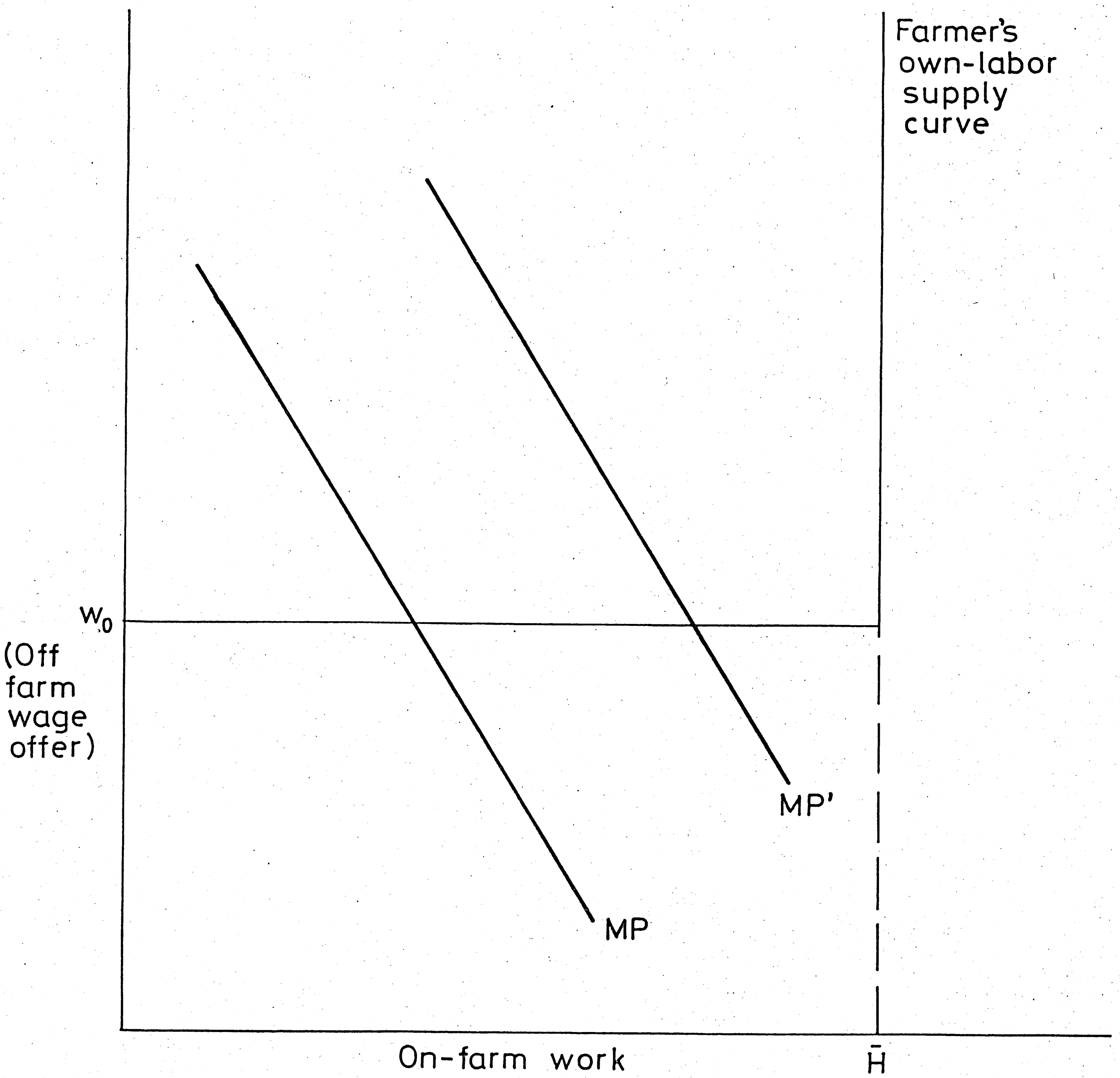

Figure 1: Farmer's Labor Supply Decision

3. Collective marketing is, for some products, aided by the fact that government subsidies can be obtained only by marketing through the moshav. But since these subsidies are often applicable to fixed quotas, farmers with higher output than these quotas will tend to market a relatively large fraction of their output privately.[5]

To a certain extent, we can separate the substitution effect emphasized by Haruvi and Kislev (1981) from these income effects if we include a measure of farm income (e.g., value-added) in addition to the farm's capital stock as explanatory variables in the equation determining the level of collective marketing. The effect of income (value-added) would then be negative, while that of the capital stock would be positive. The separation of the two effects, however, will be imperfect, since the capital stock only imperfectly will measure the marginal product of the farmer's time; it will also measure income. Value-added, also, will be correlated not only with income, but also the value of the farmer's time. Both variables' substitution (value-of-time) effects should be stronger, however, the greater the proportion of members working only on the farm. Thus (positive) interaction terms with this proportion can be expected. To sum up, if C is the level of cooperation of the moshav, K the capital stock and V the value-added of the average member farm in the moshav, and if L_1 is the proportion working only on the farm, then we hypothesize:

$$C = C(\underset{\substack{(+)\\?}}{K}, \underset{\substack{(-)\\?}}{V}, \underset{(+)}{L_1K}, \underset{(+)}{L_1V}),$$

where the signs in parentheses indicate the direction of the effects.

So far, the role of the proportion working only on the farm, L_1, was discussed only as an indirect effect, in interaction with the farm's capital stock K and value added V. The value of time argument made above, however, implies that L_1 will also have a direct effect. If, by controlling K and

V, we can control the position of the farmer's marginal productivity of labor curve, then the marginal product of his time (a point on this curve) will be determined by the height of the off-farm work wage offer curve, as in Figure 1. Exogenous factors which shift this offer curve upwards, such as better transportation links to neighboring towns, will raise the farmer's value of time and lead him to work more hours off the farm. Thus exogenous increases in the proportion of farmers working off the farm will be associated with increases in the value of time and thus increases in the profitability of collective marketing.

Transportation links to neighboring towns were just mentioned in connection with the proportions of farmers working full-time and part-time on the farm. Even when these proportions are controlled, however, the ease of access to nearby markets will affect the relative profitability of collective marketing. Individual marketing will become more profitable as such transportation links improve, while collective marketing, by reducing the number of individual journeys to the market, will be relatively profitable when the distance to the market is relatively large. Thus the distance to the nearest market (here represented by the nearest town of a population of 10,000 or more) will be positively related to the level of collective marketing.

The set of variables discussed above are related to the individual farmer's profitability of collective marketing. But, as we have pointed out, collective marketing is a public good for the <u>moshav</u>, and therefore a free-rider problem exists, providing an incentive for members to market privately rather than collectively. While the theory of voluntary collective action is still an underdeveloped field in economics, we can nevertheless derive the following hypotheses from the existing literature (see, e.g., Guttman, 1978, 1981):

1. The severity of the free-rider problem increases with the size of the group (Olson, 1965). The conventional reasoning underlying this hypothesis is that, as a group increases in size, each individual's effect on the provision of the public good diminishes, and thus his incentive to "free-ride" increases. While an analogous argument applies to the theory of the competitive industry, the applicability of this idea to a public good whose provision can be continuous rather than all-or-nothing is unclear. For a continuously variable public good such as the level of collective marketing in a *moshav*, the individual's effect on the provision of the good remains approximately constant as group size varies.[6] Only for a good having an all-or-nothing character can an individual's effect become negligible for a sufficiently large group.

The group size hypothesis can be saved, albeit in a somewhat weakened form, if a more sophisticated model of collective action is developed. In this model, individuals match eachother's contributions to the provision of the public good in order to encourage other individuals to contribute. Just as in philanthropic fundraising, in which large contributors often make their contributions conditional on matching by other actors (i.e., the phenomenon of "challenge grants"), and in joint finance by the U.S. Federal government and the state governments, in which the Federal government's contribution often takes the form of a matching offer, so also in general one can envision actors implicitly or explicitly making their contributions conditional on the contributions of other actors. It has been shown (Guttman, 1982) that, with no income effects and perfect information, such "matching behavior" implies group-optimal provision of a continuously variable public good, regardless of group size. But, if either positive income effects or imperfect information are introduced, the individually optimal "matching rates" decline with group size and thus provision of the good becomes increasingly suboptimal as group size increases.

2. The incentive of actors to engage in matching behavior depends crucially on the public good "game" being repeated over time. Only in such a repeated game - and assuming that it continues without an endpoint or that its endpoint is unknown to the actors - will the individual members find it optimal to follow through on their matching commitments (Friedman, 1971). We employ two proxies for the stability over time of the moshav membership: (a) the rate of departures from the moshav over the previous 10 years, and (b) the age of the moshav. We hypothesize that (a) will be negatively related, and (b) positively related, to the level of collective marketing.

3. The severe informational requirements of matching behavior - members must know eachother's demands for the public good as well as their "matching rates" and actual contributions - increase with the members' heterogeneity. In a completely homogenous group, each actor knows his fellows' demands for the public good: they are identical to his own. Thus the matching behavior model, when applied to a world of imperfect information, would predict a decreasing level of collective marketing with increasing group heterogeneity, one proxy for which is income inequality in the moshav. Additionally, Zusman (1980) has shown that a marketing cooperative will find it increasingly difficult democratically to arrive at a group-optimal rule for taxing its

members as it becomes more heterogeneous. Both of these arguments lead us to expect the level of collective marketing to be negatively related to income inequality in the moshav.

To summarize the analysis, we hypothesize the following structural equation:

$$(1)\quad C = C(\underset{\substack{(+)\\?}}{K},\ \underset{\substack{(-)\\?}}{V},\ \underset{(+)}{L_1K},\ \underset{(+)}{L_1V},\ \underset{(-)}{L_1};\ \underset{(+)}{D_1},\ \underset{(-)}{N},\ \underset{(+)}{S},\ \underset{(-)}{I}),$$

where K, V, and L_1 are as defined previously, and D_1 is the distance to the nearest town, N is the number of members of the moshav, S the stability of the moshav membership, and I is income inequality.

In addition to the above economic effects, the product mix of the moshav will affect the relative profitability of collective marketing. Some products, particularly dairy products, require collective marketing for technical reasons: the tanker will collect only at the moshav station (Haruvi and Kislev, 1981). Other products, such as fruits and vegetables, can easily be marketed privately.

The ethnic origin of the moshav members will also affect their willingness to act collectively. The first moshavim were established by European immigrants who chose the moshav framework out of ideological commitment to the cooperative lifestyle. Later, after the establishment of the State of Israel, new moshavim were set up by the government (through the quasi-governmental Jewish Agency) for the settlement of immigrants from Asian and North African countries with no ideological commitment to the moshav concept. Therefore it has been hypothesized (Haruvi and Kislev, 1981) that moshavim populated by European immigrants will tend to have relatively high levels of collective marketing. Farmers of the second generation, i.e. Israeli-born farmers, who have received similar educational backgrounds, would be expected to have similar ideological commitments regardless of the origin of their parents.

Finally, the region in which the moshav is located is also included, as a further control on ideological differences between moshavim. The first moshavim, with the highest ideological commitments, were established in the Northern region of the country. Thus we may expect these moshavim to have relatively high levels of collective marketing. For completeness, a five-way regional classification was used to control this variable.

2. Determinants of the Level of Full- and Part-time Farming

A second endogenous variable, or rather pair of variables, is the level of full- and part-time farming. These variables are viewed as being endogenous because they are affected by the capital stocks of moshav farms and by their value-added, which are, in turn, affected by the level of collective marketing.

Our basic model of the determination of full- and part-time farming was presented above in the discussion of Figure 1. The central hypothesis is that (a) variables which are positively correlated with relatively high levels of farmers' on-farm productivity will be positively correlated with the proportion of farmers who work exclusively on the farm, while (b) variables that increase the wage obtainable off the farm (net of commuting costs and job search costs) will decrease this proportion.

Regarding the first part of this hypothesis, we expect that both the capital stocks of moshav farms and their value-added will be positively correlated with the productivity of the farmer's time on the farm. Marginal productivity theory leads us to presume that an increase in the size of the capital stock with which the farmer works will increase the marginal productivity of his time. And relatively high levels of value-added will reflect high levels of inputs which presumably are complementary to the farmer's own labor input - particularly land and, for part of our sample, hired labor (capital is already controlled). Both of these variables, especially value-added, will also have income effects, but since the choice here is not between leisure and work but between off-farm and on-farm work, we cannot predict the direction of these income effects. Thus, our presumption is that both variables will be positively related to the level of on-farm work.

The product mix of the moshav will also affect the marginal productivity of the farmer's time, some products having more labor-intensive technologies than others. Thus the proportions of the moshav's output originating in the various product "branches" are included as explanatory variables.

Regarding the second part of our basic hypothesis, we cannot observe the off-farm wage obtainable by the farmers whose villages constitute our sample. We can, however, measure the distance of the farm to nearby towns, which will be positively related to commuting costs as well as job search costs, and thus will reduce the net wage obtainable off the farm. Two distance measures are employed: the distance to the nearest town of a population of 10,000 or more, and the distance to the nearest major city (Tel-Aviv, Jerusalem, or Haifa). Additionally, we include the population density of the subdistrict as a measure of the availability of work opportunities in other villages or small towns in the immediate area.

The region in which the moshav is located is also included as an explanatory variable, because the distance and population density variables cannot be expected to capture completely the variation between regions in off-farm work opportunities and in the quality of transportation links. In addition, for the established moshavim, the Northern region has the special characteristic (indicated earlier) of being the site of the earliest, most ideological motivated moshav settlements. Since the moshav ideology is negatively predisposed to off-farm work, a positive regional effect for this region may be expected in the full-time farming equation.

The term "established" moshavim in the previous paragraph refers to moshavim generally set up by the members themselves, before the establishment of the State of Israel, and administratively connected to the Israel Ministry of Agriculture. These villages constitute one of two samples of moshavim to be analyzed in this paper. The second sample, composed of what we call "developing" moshavim, includes most of the settlements set up after the establishment of the State, usually for immigrants of Asian-African origin, and administratively supervised by the quasi-governmental Jewish Agency.

The age of the moshav also is related to the ideological commitment of its members. Among the established moshavim, the earliest settlements had the strongest ideological commitments; among the developing moshavim, if anything, the opposite may be the case, the most recent settlements being founded by settlers with a degree of "pioneering" commitment. Accordingly, the age of the moshav will have opposite effects for these two samples: among the established moshavim, the age of the village will negatively affect part-time farming relative to full-time farming, while among the developing villages, the opposite effect is expected.

To summarize, let L_1 be, as before, the proportion of moshav members working exclusively on the farm and L_2 be the proportion working part-time on the farm (there is also a small proportion working exclusively off the farm). Let D_1 be, as before, the distance to the nearest town (population at least 10,000), and D_2 be the distance to the nearest city (Jerusalem, Tel-Aviv, or Haifa). Let P be the population density of the subdistrict, A the age of the moshav, Q be the product mix (a vector of proportions) and R be the region (a vector of dummy variables). Then, we hypothesize that

(2) $(L_1, L_2) = L(K, V; D_1, D_2, P, A, Q, R);$

with the directions of the effects as specified in the preceding discussion.

3. Determination of Capital Stock and Value-Added

It was hypothesized above that the level of collective marketing and the levels of full- and part-time farming are affected by the capital stocks and value-added of *moshav* farms. It was also indicated that the level of collective marketing, in turn, affects the capital stock because of the *moshav* farmer's dependence on the *moshav* as a guarantor of his loans. It remains to specify the determination of the capital stock and value-added in detail.

Turning first to the capital stock, our working hypothesis is that the greater the quantities of the labor and land inputs, the greater will be the marginal productivity of capital, and thus, the capital stock would be expected to be relatively large. But while this relationship is strongly expected to exist "overall" for all inputs taken together, the relationship of the capital stock to the quantities of individual inputs may be negative. In our empirical work, we use measures of three land inputs: (a) "courtyards", i.e, the areas surrounding the farmer's house which are used for chicken coops, barns, hothouses for flowers, etc., (b) land devoted generally to field crops, and (c) orchards. The combined land areas of each village are, to a considerable degree, exogenously determined by the government. While the division between these three types is somewhat more flexible, it, too, is slow to change from the division created by government-sponsored land reclamation activities. These land areas are also "interacted" with the proportions of *moshav* output originating in the relevant product classes. As for the labor input, we must content ourselves with using the proportions of *moshav* members working full- and part-time on their farms, which are, as already indicated, endogenous variables.

In addition, we include the following explanatory variables: (1) The product mix of the moshav is included as an explanatory variable (actually a set of variables), because of the fact that different product technologies have different capital-intensities. (2) The ethnic origin of the moshav's members is also taken into account, since European, Asian-African, and Israeli-born farmers may have different amounts of initial wealth which can be invested, as well as different abilities to obtain loans in the (highly institutionalized and government-subsidized) capital "market". (3) The region in which the moshav is located will affect the supply of government-subsidized finance because the overall development plans of the government favor certain areas. (4) The age of the moshav will positively affect the capital stock since adjustment to the long-run equilibrium capital stock is gradual, not instantaneous (older moshavim have had more time to invest). (5) As already indicated, the level of collective marketing is included because of its influence on the availability of credit to the moshav.

To summarize the above discussion, let K be the capital stock per moshav farm, let Z be a vector of land areas and ZQ be a vector of interaction terms between land areas and proportions of moshav output originating in the relevant product classes (to be specified in the next section). Moreover, let E be the ethnic origin of the moshav's members (a vector of dummy variables), and A, C, L_1, L_2, Q, and R be as defined previously. Then

$$K = K(\underset{(+)}{C},\ \underset{(+)}{L_1},\ \underset{(-)}{L_2};\ \underset{(+)}{A},\ E,\ Z,\ ZQ,\ Q,\ R), \tag{3}$$

where, as before, the signs in parentheses indicate the expected direction of the effects. Regarding Z and ZQ, which are vectors, our expectation, overall, is for a set of positive effects, though in individual cases negative affects are not ruled out. Q (product mix) is also a vector.

Our equation for the determination of value-added is very similar to the capital equation (3). Value-added is the sum of the returns to land, labor, and capital plus any residual of the value of output over these returns and over purchased inputs. By including K as an explanatory variable, we can hope to control the return to capital, while by including Z and ZQ, we can control the return to land. (Neither will be precisely marginal returns because purchased inputs (seed, water, etc.) and hired labor[7] are not controlled.) By including L_1 and L_2, the proportions working part-time and full-time on the farm, the own-labor input is also partially controlled.

In addition to the above variables, we also include the product mix, since different products have differing relative intensities of purchased and non-purchased inputs. The age of the *moshav* is also included, because of the positive effect this variable may have on the managerial and entrepreneurial capacities of the *moshav* and its members, which may lead the *moshav* to use techniques which are relatively intensive in the managerial and own-labor inputs. Finally, the ethnic origin of the members is included, because different ethnic origins may be correlated with different levels of entrepreneurial capacity (and education) which may generate preferences for technologies having different relative intensities of purchased and non-purchased inputs.

To sum up, we hypothesize an equation of the form:

$$V = V(\underset{(+)}{K},\ \underset{(+)}{L_1},\ \underset{(-)}{L_2};\ \underset{(+)}{A},\ E,\ Z,\ ZQ,\ Q). \tag{4}$$

III. Empirical Analysis

1. Data and Statistical Procedure

As we have indicated above, the model presented in the previous section was tested using two samples of *moshavim*, one "developing" and the other "developed", the data generally referring to the year 1975-1976. The data were collected from several sources:

1. The level of collective marketing, i.e, the proportion of the output of the members' farms which was marketed through the *moshav*, is taken from a survey of extension officers conducted by the quasi-governmental Jewish Agency for the villages under its supervision, the developing *moshavim*. For the developed *moshavim*, this proportion was estimated using calculations of *moshav* output based on land areas and livestock quantities, together with regional production norms. This provided the denominator of the relevant proportion; the numerator (output marketed through the *moshav*) was taken directly from reports of the centralized public credit agency.

It should be noted that this proportion excludes output originating in *collective* production activities of the villages, which exist to a small extent (10-20 percent of gross output on the average) in *moshavim*. These collective production activities, which are more extensive in the developing *moshavim* than in the developed *moshavim*, do not reflect "cooperation" so much as government-sponsored attempts to supplement *moshav* income.

2. The data sources for capital and value-added similarly differ for the developing and the developed *moshavim*. While both are calculated on the basis of land areas and livestock quantities using regional norms, the data for the developing villages were already calculated by the Jewish Agency, while the data for the developed villages were calculated by Haruvi using raw data provided by the Israel Ministry of Agriculture.[8]

3. The proportion of members leaving the *moshav* in the last ten years, and the ethnic origin of the members, are from a study undertaken by the Settlement Study Center of the Jewish Agency (Weitz, et. al., 1979).

4. Income inequality is the coefficient of variation of value-added, estimated by Haruvi from data originating from a survey of the Jewish Agency (1975). These data were available for the "developing" *moshavim* only.

5. Population density of the subdistrict was taken from the Statistical Abstract of Israel (1976). Distances to towns and cities were estimated using standard road maps.

6. The rest of the variables were taken from data of the Agricultural Ministry and of the Jewish Agency (see Haruvi, 1980, for details).

The statistical procedure used was two-stage least squares. This was used in conjunction with the following procedures:

a. Because the dependent variable in the cases of equations (1) and (2) varies between zero and unity, problems of heteroscedacity are encountered unless a tranformation of these variables is made. The transformation we used is the logistic transformation (see Theil, 1972). Instead of regressing, say, the proportion p(x) on the various explanatory variables, one regresses instead log [p(x)/(1-p(x))] on those variables. This transformed) variable, called the <u>logit</u> of p(x), has the properties desired of the dependent variable in regression analysis: its error term will be approximately normally distributed. Its form implies that the explanatory variables' marginal effects on p(x) diminish as p(x) approaches either zero or unity.

b. The resulting non-linearity of the dependent variable in two (actually three) of our equations, together with the fact that K, V, L_1 and L_2 enter both linearly and in interaction terms in equation (1), lead to further complications. We employ the method suggested by Kelejian (1971) by including the squares of the exogenous variables as additional instrumental variables in the first stage of the two-stage estimation procedure, in order to make the estimation more efficient.[9]

c. Because of the large number of explanatory variables, multicollinearity problems can be expected. Therefore we used a method recently developed by Mundlak (1980) to reduce the number of variables actually used in the regressions to a number more appropriate to the informational content of the data set. This method employs principal components analysis to estimate a set of uncorrelated regression coefficients, and then eliminates a subset of coefficients which do not contribute to the explanation of the dependent variable, at a given level of statistical significance. The original regression coefficients are then obtained by chain differentiation. The procedure thus efficiently extracts the information contained in the data set. Information is not lost by the implied restrictions on the model, because of the statistical insignificance of the rejected principal components.

More specifically, the procedure ranks the principal components according to the t^2-statistics of their regression coefficients, and then computes an "accumulated F" statistic,

$$F_s = \frac{1}{k_2} \sum_{j \varepsilon K_2} t_j^2 \quad ,$$

where k_2 is the number of principal components with lowest t^2-statistics in a trial where a set (K_2) of principal components are being considered for rejection. F_s is first computed for the principal component with the lowest t^2-statistic ($k_2 = 1$), then for the two principal components with the lowest t^2-statistics ($k_2 = 2$), etc., and at each step is compared with the critical F-statistics, F_α, for a given level of significance α , with k_2 and n-k degrees of freedom (where n is the number of observations and k the number of variables). When $F_s > F_\alpha$, the relevant set of principal components is rejected (with the exception of the last principal component, which caused F_α to be exceeded). The dependent variable is then regressed on the remaining principal components, and the coefficients on the original variables are obtained by chain differentiation, as indicated above. In our work α is set equal to .10. Sensitivity tests, setting $\alpha = .05$, also were employed. The resulting estimated coefficients had higher t-statistics and were different in magnitude than those obtained by the conventional

Table 1

Means and Standard Deviations of the Variables

	Developing Moshavim		Developed Moshavim	
	Mean	Standard Deviation	Mean	Standard Deviation
Endogenous Variables				
Prop. collective marketing	.636	.261	.742	.188
Capital/Farm				
Indiv. farms	$27,800	$ 7,880	$35,200*	$37,200*
Incl. collective prodn.	$36,300	$ 9,470	$38,200	$39,500
Value-added/Farm				
Indiv. farms	$ 5,200	$ 2,210	$ 9,640*	$ 6,980*
Incl. collective prodn.	$ 6,280	$ 2,270	$10,500	$ 7,470
Prop. Members Working:				
Full-time on farm	.430	.196	.605	.174
Part-time on farm	.301	.168	.311	.164
Exogenous Variables				
Prop. leaving *moshav* in last 10 years	.369	.273	.221	.180
Age of settlement (yr.)	27.0	3.55	33.3	9.20
Number of member farms	61	16	77	24
Distance to Nearest:				
Town (10,000 pop.)	11.2 km	5.74 km	10.1km	5.91km
City (Tel-Aviv, Haifa, Jerusalem)	43.4 km	23.7 km	37.7km	15.7km
Income Inequality	.916	.386	—	—

	Developing Moshavim		Developed Moshavim	
	Mean	Standard Deviation	Mean	Standard Deviation
Pop. density of sub-district (/km^2)	372.	226.	363.	240.
Ethnic Origin				
(Prop. of moshavim in sample)				
European-American	.134	—	.542	—
Asian-African	.670	—	.248	—
Israel	.010	—	.086	—
Mixed	.186	—	.124	—
Region				
(Prop. of moshavim in sample)				
Coastal Plain	.330	—	.419	—
Jerusalem	.268	—	.067	—
North	.165	—	.390	—
Galilee	.237	—	.010	—
Negev	.000	—	.114	—
Pct. of moshav output in:				
Orchards	.20	.17	.20	.16
Flowers	.02	.05	.06	.09
Field Crops	.18	.20	.13	.13
Dairy	.16	.23	.23	.24
Poultry	.41	.31	.35	.22
Land per farm (hectares, including collective plots):				
"Courtyards"	4.08	2.52	4.66	2.94

	Developing Moshavim		Developed Moshavim	
	Mean	Standard Deviation	Mean	Standard Deviation
Field-crops, unirrigated	6.30	7.66	15.9	28.3
Field-crops, irrigated	18.7	12.5	20.4	13.9
Orchards (irrigated)**	8.67	4.65	12.4	7.49
Number of Observations	97		105	

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* Estimated using percentage of total *moshav* output generated by collective *moshav* enterprises.

** Unirrigated orchard hectares, zero in most villages, counted as 1/4 irrigated orchard hectares, following Mundlak (1964).

	Developing Moshavim	Established Moshavim
Region		
Coastal plain	-.9978 (-4.965)**	-.1209 (-1.243)
Jerusalem	.8818 (4.668)**	-.08691 (.2646)
North	-.2069 (-3.669)**	.1985 (2.486)**
Galilee	—	-.03468 (-.08936)
Ethnic Origin		
Non-Western	.1599 (3.766)**	-.4029 (-3.456)**
Israel-born	.6611 (2.211)*	1.271 (3.886)**
Mixed	.3295 (2.448)**	.1505 (1.181)
Constant	5.294	-.1001
R^2	.2320	.02893
d.f.	92	100

Notes

Values in parentheses are t-statistics; variables in brackets are endogenous.

* Significant at .025 level, one-tailed test, or .05 level, two-tailed test.

** Significant at .01 level, one-tailed test, or .02 level, two-tailed test.

All explanatory variables enter linearly.

member with the proportion of farmers working only on the farm (L_1V and L_1K) are both positive and statistically significant, as predicted. Our interpretation of these results is that, to the extent that farmers do not work off the farm, exogenous increases in the value-added and capital stocks of moshav members increase their value of time and lead them to prefer to market their produce collectively. For the developing moshavim, these interaction terms do not receive statistically significant coefficients. The direct effect of value-added, however, is positive and significant, which may indicate that the negative "income effects" discussed above may be outweighed by the value-of-time substitution effect (even when K is controlled), or may support Haruvi and Kislev's (1981) conjecture that higher income is associated with greater understanding of, and trust in, the moshav.

This value-of-time effect, however, seems to be outweighed by other (perhaps ideologically related) forces when we examine the direct effects of the proportions of farmers working full-time and part-time on the farm. Here our expectation was that a higher percentage of members working part-time off the farm is an indication of a higher net wage off the farm, and thus of a higher value of time, when on-farm productivity is held constant. Thus, where this percentage is relatively large, a relatively high level of collective marketing was hypothesized. In fact the opposite is observed, and the negative coefficient for L_2 is statistically significant for the developing moshavim, and nearly so for the developed moshavim. One interpretation of this result is that high levels of part-time farming cause low involvement by moshav members with the operation of the cooperative, as Sadan (1979, p.4) has suggested.

Distance to the nearest town, expected to be positively related to the relative cost of private marketing, is, as hypothesized, positively related to the level of collective marketing, receiving a significantly positive coefficient for the developed moshavim.

Turning now to the second class of variables, relating to the ability of the village to solve the free-rider problem, the two variables included to measure the stability of the moshav membership have their expected effects, where they are statistically significant. The age of the settlement receives a significantly positive coefficient for the established moshavim, while the percentage leaving the moshav has a significantly negative coefficient for the developing moshavim. It should be noted, however, that self-selection biases are at work here which may be causing these results.[11]

The number of moshav members, hypothesized to be negatively related to the ability to solve the free-rider problem, is indeed negatively related to the level of collective marketing in the sample of developing moshavim. But in the developed villages, the relationship, somewhat surprisingly, is positive. This result, like the (expected) results for the previous two variables discussed, may be due to a self-selection bias: more successful moshavim may, over time, be able to attract and absorb more members without encountering difficulties deriving from the free-rider problem. Such a bias may be expected to be relatively strong for the developed moshavim, since they have had more time to grow from their original number of members.

Income inequality, on which data were available only for the developing moshavim, receives the expected negative (and significant) coefficient.[12]

Regarding the product mix variables, we find that the percentage of output deriving from dairy production is positively related to the level of collective marketing, as expected. The percentages of output in orchards, flowers, and field crops production have negative effects, where those effects are statistically significant, reflecting the low relative cost of private marketing for these commodities. The base for comparison here is the percentage of poultry production.

Among the regional effects, it is noteworthy that the Northern region dummy variable receives a negative coefficient for the developing moshavim, but a positive coefficient for the developed moshavim. The positive coefficient may be attributed to the influence of the historically greater ideological identification of the first moshavim, which are located predominantly in the Northern region, as noted earlier. The base for the comparison of regional effects is the Negev (desert region) for the developed villages, and the Galilee for the developing villages.

Finally, the observed effect of ethnic origin does not consistently support the conventional view that the immigrants of Asian-African origin have a relatively low propensity to cooperate due to lack of understanding or appreciation of "cooperative ideals". While the "non-Western" dummy does receive a negative and significant coefficient for the sample of established moshavim, its coefficient is positive and significant for the developing moshavim. The base for comparison here is the dummy variable for Western origin. Thus, among the developed moshavim, the Western farmers do seem to have a greater ideological commitment than their non-Western counterparts, presumably because of the ideological background of the first moshavim. But, among the developing moshavim, which were generally established "from above" by the government, the mere existence of a European origin has no effect - or even a negative effect - on the propensity to cooperate. Thus it is not European origin per se, but the ideological commitment of the first moshav settlers (who happened to be of European origin) that seems to make a difference. It is interesting to note, moreover, that heterogeneity of ethnic origin (represented by the "mixed" dummy variable) does not seem to affect cooperation adversely, as others (e.g., Weintraub, 1971) have hypothesized. The "mixed" dummy variable receives positive coefficients in both samples, and the coefficient is statistically significant for the developing villages.

Regarding the R^2 values for these regressions, it should be noted, first, that the interpretation of R^2 as the percentage of variation explained by the regression is not valid for second-stage equations in two-stage least squares. Second, the number of principal components used (4 in both regressions) is quite small, and the data are of a disaggregated nature, both of which tend to reduce the R^2.

b. The Levels of Full- and Part-Time Farming

Our central hypothesis was, in brief, that farmers choose to work full-time or part-time on the farm as a function of the marginal productivity of their time on the farm relative to the wage obtainable off the farm. Referring to Table 3, we find, firstly, that the capital stocks and value-added of moshav farms in both samples are positively and significantly related to the proportion of moshav members working full-time on the farm, and negatively (where significantly) related to the proportion working only part-time on the farm. These results support our hypothesis.

Regarding the second part of the hypothesis, we find that the distance to the nearest major city is positively and significantly related to the proportion of full-time farmers in both samples, while negatively related (where the relationship is statistically significant, i.e., in the sample of developed moshavim) to the proportion of part-time farmers. The population density of the subdistrict, measuring off-farm work opportunities, has precisely the opposite effects. These results, as well, support our basic hypothesis.

An unexpected result was obtained, however, regarding the distance to the nearest town (D_1). Our expectation was that it would receive coefficients identical to those obtained by the distance-to-nearest-city variable. But the result obtained for both samples is that not only does D_1 receive negative and significant coefficients in the equations pre-

Table 3

Full- and Part-time Farming

	Developing Moshavim		Established Moshavim	
	Pct. Full-time	Pct. Part-time	Pct. Full-time	Pct. Part-time
[Capital/member]	.001479 (2.959)**	-.002284 (-4.572)**	.0001956 (1.844)	-.0003095 (-4.183)**
[Value-added member]	.008595 (3.594)**	.003321 (.9593)	.001161 (2.393)**	-.001555 (-4.183)**
Distance to nearest town	-.02091 (-2.068)*	-.0002466 (-2.272)*	-.01500 (-2.418)**	-.001199 (-4.183)**
Distance to nearest city	.009389 (3.602)**	.003572 (.8990)	.005759 (4.202)**	-.002956 (-4.183)**
Pop. density of subdistrict	-.0003930 (-2.491)**	.0005346 (2.141)*	-.0003455 (-3.858)**	.0003173 (4.183)**
Age of moshav	-.06353 (-3.035)**	.04134 (3.402)**	.001840 (1.825)	-.001507 (-4.183)**
Region				
Coastal plain	-.1191 (-2.715)**	1.262 (2.343)*	-.2148 (-2.712)**	.1656 (4.183)**
Jerusalem	.01887 (.2334)	1.779 (3.915)**	-.4088 (-4.033)**	.1019 (4.183)**
North	.2435 (2.645)**	1.281 (2.909)**	.2313 (2.653)**	-.1759 (-4.183)**
Galilee	—	—	.005354 (.01914)	.1287 (4.183)**
Pct. output in:				
Orchards	-.3765 (-1.920)	-.1076 (-.4611)	.3295 (1.652)	.3432 (4.183)**
Flowers	-2.356 (-1.607)	-1.418 (-2.913)**	1.603 (3.102)**	.08436 (4.183)**
Field Crops	.9441 (4.031)**	-.9419 (-2.499)**	-.4921 (-1.183)	-.4904 (-4.183)**
Dairy	.3356 (1.848)	-.7093 (-3.396)**	-.2861 (-2.547)**	-.1451 (-4.183)**

	Developing Moshavim		Established Moshavim	
	Pct. Full-time	Pct. Part-time	Pct. Full-time	Pct. Part-time
Constant	.5802	-2.923	.3850	-.6841
R^2	.2297	.3844	.1944	.1613
d.f.	93	93	101	103

Notes

Values in parentheses are t-statistics; variables in brackets are endogenous.

* Significant at .025 level, one-tailed test, or .05 level, two-tailed test.

** Significant at .01 level, one-tailed test, or .02 level, two-tailed test.

T-Statistics for part-time farming equation for developed villages are identical because only one principal component was employed.

All explanatory variables enter linearly.

dicting the proportion of part-time farmers, it also receives negative coefficients in the equations predicting the proportion of full-time farmers, and the point estimates of these coefficients are an order of magnitude larger in absolute value than the coefficients in the part-time farming regressions. A possible explanation is that nearness to a town confers advantages to private purchase of inputs and marketing of output which raise the marginal product of the farmer's time on the farm, leading to a higher level of full-time farming. It will be recalled that our estimates of equation (1), in Table 2, support the hypothesis that proximity to a town increases the relative profitability of private marketing.

The age of the moshav was included as a measure of the ideological commitment of its members, since the moshav ideology militates against off-farm work. Among the established moshavim, as expected, a greater proportion of members work full-time on the farm, and a smaller proportion work part-time on the farm, in the older, more ideologically oriented villages. Among the developing moshavim, on the other hand, where precisely the youngest moshavim have more identification with the moshav ideology, the opposite result is obtained.

The regional dummy and product mix variables were introduced as control variables, without expectations regarding the signs of their effects. Once again, however, we may note the influence of the Northern region among the established moshavim: in that region, there is a tendency for a greater proportion of the moshav members to work full-time on their farms, and a smaller proportion to work part-time on their farms, than in the other regions. That this is a result of the presence of the "classic" moshavim in this region can be seen by the absence of the same regional effect in the sample of developing villages.

C. Value-Added and Capital[13]

In the equations predicting the levels of value-added and capital per worker, we were able to make fewer a priori statements regarding the signs of individual coefficients. But we were able to hypothesize that the higher the level of collective marketing ("cooperation" in Table 4), the larger will be the capital stock of the average *moshav* member, and this prediction is supported in both samples. The capital stock, moreover, was expected to affect positively the level of value-added, which is also observed quite strongly in both samples.

The proportions of members working full-time and part-time in their farms do not appear to affect the capital stock and value-added significantly, except in the case of the capital stock equation for developing *moshavim*, where a positive effect for the proportion of full-time farmers is observed.

The effect of the age of the *moshav* on both capital and value-added is found to be positive (where it is significant), as expected.

Regarding the land variables and their interactions with the product mix variables, a simple count of the significant coefficients reveals that most of their signs are positive, as expected, but there are many exceptions. In most cases of significant negative effects, however, we can detect consistency with the results for the product mix variables that suggest that certain product classes are relatively unintensive in capital. Specifically, the coefficient for the percentage of output deriving from field crops production in the developing *moshavim* capital equation suggests that, for these *moshavim*, such production is relatively unintensive in the capital input. Thus it is not surprising that the area under field crops (unirrigated) receives a negative coefficient in the same equation. Similarly, the coefficient for the percentage of output in orchards production in the same equation is significantly negative, which is consistent with the negative

Table 4

Value-Added and Capital

	Developing Moshavim		Established Moshavim	
	Value Added/Member	Capital/Member	Value Added/Member	Capital/Member
[Cooperation]	—	25.41 (4.580)**	—	43.12 (1.988)*
[Capital/member]	.1610 (5.467)**	—	.1144 (7.618)**	—
[Pct. working:]				
[Full-time on farm]	-4.981 (-1.599)	31.18 (3.321)**	12.50 (1.698)	159.3 (1.345)
[Part-time on farm]	2.109 (1.116)	2.275 (.3458)	-5.700 (-1.343)	-24.49 (-1.327)
Age of Moshav	1.050 (3.186)**	-1.646 (-1.019)	1.531 (7.157)**	9.753 (4.471)**
Land (hectares)				
"Courtyards"	-.7121 (-1.338)	1.997 (1.246)	2.030 (2.846)**	25.98 (2.472)**
Field-crops, unirrigated	-.6841 (-3.613)**	-3.245 (-4.377)**	.008627 (.09445)	.2166 (-.1773)
Field-crops, irrigated	-.5454 (-3.382)**	.1453 (.4174)	1.323 (5.614)**	8.090 (3.151)**
Orchards	.2960 (.7958)	5.288 (4.705)**	-.9598 (-2.722)**	-5.989 (-1.171)
Orchards x pct. orchards prod.	3.180 (1.590)	-3.655 (-2.227)*	.7863 (2.707)**	35.59 (1.700)
"Courtyards" x pct. flowers prod.	11.01 (.9179)	19.26 (.9911)	11.65 (1.359)	-90.63 (-2.250)**
Field crops, irr. x pct. flowers prod.	3.890 (2.326)*	-8.111 (-1.723)	-2.921 (-2.047)*	6.393 (1.971)
Field crops, irr. x pct. field crops	.4970 (3.419)**	-.06460 (-.1352)	1.030 (2.774)**	-10.67 (-.8088)
Field crops, unirr. x pct. field crops prod.	.2205 (4.527)**	.9211 (.4512)	-.7548 (-3.110)**	6.886 (2.226)*

	Developing Moshavim		Established Moshavim	
	Value Added/Member	Capital/Member	Value Added/Member	Capital/Member
Region				
Coastal plain	—	-68.22 (-3.266)**	—	-35.78 (-1.191)
Jerusalem	—	19.75 (1.435)	—	-200.0 (-2.463)**
North	—	-49.05 (-2.037)*	—	-77.66 (-1.159)
Ethnic Origin				
Non-Western	-14.69 (-3.994)**	-6.345 (-.5551)	1.375 (.4540)	-102.1 (-3.726)**
Israel-born	19.71 (1.167)	-13.84 (-.1843)	32.50 (3.978)**	143.0 (1.833)
Mixed	-4.023 (-1.046)	-17.11 (-1.560)	13.01 (1.675)	28.83 (.4483)
Pct. output in:				
Orchards	-68.49 (-3.188)**	-75.17 (-2.390)**	49.76 (3.693)**	-586.8 (-1.299)
Flowers	-66.84 (-.9005)	-5.342 (-.06831)	16.27 (.6321)	-175.3 (-1.616)
Field crops	28.98 (3.128)**	-40.04 (-1.921)	35.83 (2.733)**	464.5 (1.449)
Dairy	-6.178 (-.8616)	63.54 (2.099)*	-52.15 (-5.956)**	-297.5 (-2.953)**
Constant	-3.235	341.2	-48.86	-289.3
R^2	.4709	.4882	.7930	.2641
d.f.	86	87	94	95

Notes

Values in parentheses are t-statistics; variables in brackets are endogenous.

* Significant at .025 level, one-tailed test, or .05 level, two-tailed test.

** Significant at .01 level, one-tailed test, or .02 level, two-tailed test.

All explanatory variables enter linearly.

interaction term of the same percentage with the area under orchards. (The significantly positive direct effect of the area under orchards in the same equation suggests that to the extent that orchard land is used for other production purposes, the capital stock tends to be larger.) A similar consistency can be detected for the developed moshavim capital equation between the percentage of output deriving from flowers production (negative coefficient, though not quite significant) and the negative interaction between that percentage and land in "courtyards". (Flowers production on irrigated open fields seems to be more capital-intensive, as is evidenced by the positive, and nearly significant coefficient for the relevant interaction term.)

The negative coefficients for many of the land variables in the value-added equations, aside from being evidence of substitution between land and capital for some product classes, may be due to the fact that the product mix is controlled in these regressions, which restrains the otherwise positive effect of the land variables on output to the extent that the land variables are specific to certain product classes. For example, an increase in the area under field crops is "allowed" by the specification to affect value-added only to the extent that the product mix does not change. But the same increase in land under field crops will be correlated with an increase in purchased inputs used on that land (e.g., water and seed), which are subtracted from output to obtain value-added. Thus it is not surprising that negative coefficients for the land variables in the value-added equations are often observed.

Regional effects were specified in the capital equations, because of differing priorities of the various regions in the development plans of the public lending institutions. The coefficients for these dummy variables suggest that the highest priority is given to the Jerusalem and Galilee regions, for the developing villages, and to the Negev region, for the established villages.

Finally, the ethnic origin variables indicate relatively few significant differences between the Western and non-Western *moshavim*. There is an indication, however, that farms operated by non-Western farmers among the developing villages tend to have less value-added, and among the established villages, smaller capital stocks, than those operated by farmers of Western origin. Among the established *moshavim*, moreover, farms operated by Israeli-born farmers seem to have relatively high value-added.

IV. Concluding Remarks

In this paper we have developed an econometric model of the Israeli *moshav*, designed to predict levels of collective marketing, full- and part-time farming, capital, and value-added. The empirical results, on the whole, support the implications of the model.

Among the major results emerging from the analysis is the identification of a two-way positive interaction between the level of collective marketing and the capital stock, for those *moshavim* where a relatively large proportion of the farmers work only on the farm. While this supports the suggestion of a polarization of "weak" and "strong" *moshavim* made by Haruvi and Kislev (1981), the fact that a falling capital stock lowers the percentage of *moshav* members working full-time on the farm (as shown in Table 3) implies that the *direct* interaction of capital and cooperation has a corrective "built in." As the level of part-time farming increases (which, in fact, has occurred in recent years), the capital-cooperation causal link weakens. This increase in part-time farming, however, itself will reduce the level of cooperation, if our empirical results are valid. And, as the level of cooperation falls, the capital stock tends to fall through the weakening of the *moshav* as a risk pooling device. This, in turn, will tend to further increase the level of part-time farming. This circular process may explain the observed higher levels of full-time farming in the established, usually "stronger" *moshavim*. The implication is that there is, indeed, a two-way interaction between cooperation and the capital stock, but the interaction involves an intervening variable, the level of part-time farming.

FOOTNOTES

1 For a discussion of this literature, see Putterman (1981).

2 This paper analyzes only the main type of moshav, the moshav ovdim. A second type of the moshav, the moshav shitufi, in which production is also collective, does not form part of this investigation.

3 A qualification, however, is in order, due to the institutional fact that off-farm work is not usually on an hourly basis, but rather on the basis of either full- or half-time appointments. This introduces a discontinuous element into the simple picture depicted in Figure 1, which will cause the value of time for many part-time farmers to rise with the capital-labor ratio, at least over a certain range. It should also be pointed out that increases in the capital-labor ratio will sometimes be associated with labor-saving technological changes so extreme that they reduce the marginal productivity of labor. We assume that technology is the same between moshavim, or that this labor-saving effect is outweighed, on the average, by the effect of complementarity of capital and labor.

4 Since the full-time farmer's work day is strictly limited, the capital-to-own-labor ratio will be directly correlated to the capital stock of the farm. Own labor, and not hired labor, is relevant to the farmer's value of time, whether the farmer hires workers and thus is a manager, or whether he farms without hired help.

5 We are indebted to Y. Mundlak for pointing out the first two effects.

6 This is the reason why formalizations of Olson's (1965) theory, such as those of Chamberlin (1974) and McGuire (1974), obtain increasing provision of the public good with group size, as long as congestion effects are absent. In our case, if the factor determining the ability of the village to obtain loans from outside institutions is the proportion of collective marketing in total marketing, then the individual's absolute effect will indeed decrease with total marketing, and thus with group size.

[7] For the "developing" moshavim, hired labor is not included in value-added (it is considered as a purchased input).

[8] For details, see Haruvi (1980). The fact that these variables are normatively calculated using land areas and livestock quantities does not invalidate our attempt to predict their values on the basis of a different set of variables, which include land areas but exclude livestock quantities (which we considered endogenous). Both the livestock quantities and the norms used in the estimation of these variables will be functions of the explanatory variables in our model, so that the estimated values for capital and value-added themselves, like the real-world values to which they correspond, will be functions of those explanatory variables. It should also be noted that our land variables aggregate across product classes, while the land areas used to calculate capital and value-added are extremely disaggregate in this respect.

[9] Kelejian (1971) also suggested including higher-order terms and interactions between the exogenous variables. This, however, was not feasible because of the large number of original exogenous variables. The interactions specified in the structural equations (ZQ) were, of course, included.

[10] L_2 is included in these regressions for the sake of completeness, though only L_1 is specified in equation (1) above.

[11] The more successful moshavim will outlast less successful villages and thus tend to have greater "ages" and fewer percentages leaving the village. (We are indebted to J. Hirshleifer for this point.) The positive coefficient for the age of settlement may also reflect greater ideological commitment among the older moshavim, particularly in the established moshav sample, which is the sample in which this effect is observed.

[12] Haruvi (1980) has suggested a type of "reverse causality" here as well: collective marketing, by equalizing marketing opportunities, may have an equalizing effect on the income distribution within the village.

13 It should be noted that the dependent variables in these regressions refer to the whole *moshav*, including collective production activities, in order to correspond to the land variables, which were available only on this basis. The predicted values of the capital and value-added variables entering into equations (1) and (2), however, refer only to the farms of the *moshav* members, and exclude capital and value-added associated with collective production of the *moshavim*. The role of these variables in equations (1) and (2) is primarily to measure the value of the farmer's time, and capital and value-added associated with collective production are largely irrelevant to the marginal product of the farmer's time since most of the labor input in collective production is hired labor from outside the *moshav*.

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