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Working Paper No. 9604

Old Age Security and Intergenerational Transfer of Family Farms

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* Constructive comments were received form Israel Finkelshtain and Zvi Lerman. Inbar Grinstein calculated the solutions in Table 5.

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OLD AGE SECURITY AND INTERGENERATIONAL TRANSFER OF FAMILY FARMS

ABSTRACT

Old farmers often stay with their children on the farm and share its income while the succeeding family receives the farm together with the obligation to care for the parents in their retirement. Using an intrafamily insurance framework for old age security and a bargaining game to formulate the intergenerational contract, we offer assessments of the value of farm transfer in a cooperative village in Israel, both to the granting parents and to the receiving young family.

The majority of farms in most countries are transferred from parents to their children. In many cases, the parents then stay with the succeeding family on the farm and partake in its income. The two-generation family (sometimes a three-generation family) functions as an intergenerational insurance and enjoys other benefits of cooperative cultivation of the farm. In this paper we offer an assessment of the value of a transferred farm--both the value to the succeeding child, who receives productive assets, and often also a house, together with the obligation to care for the elder parents; and the value to the parents, who give up an asset for the explicit or implicit promise of provision for retirement. We are using the analytical framework proposed by Kotlikoff and Spivak, who termed intra-family sharing of saving for old age "incomplete annuity markets," and illustrate our approach with estimates of the value of transfer of family farms in a village in Israel. These values are endogenous in the sense that they depend on the outcome of bargaining on the division of the economic surpluses created by the transfer of the farms between overlapping generations. Focusing on inter-generational insurance, and since farm transfers are exempt from taxes in Israel, estate tax considerations are not incorporated into our analysis.

Intrafamily Insurance

This section presents the analytical framework suggested by Kotlikoff and Spivak and several extensions. The expected discounted utility of the individual is written as

$$EU = \sum_{t=0}^{T} P_t U(C_t) \alpha^t \tag{1}$$

where U stands for utility; C_t is consumption in year *t*; *T is the last year of the analysis,* for retirees it will be the last probable year of life; P_t is the probability of survival to year t conditioned on living in year 0 ($P_0=1$, $P_t<1$ for $t>0$, and $P_t=0$ for $t>T$); and α is the subjective time discount factor (in general, $0<\alpha<1$).

A single individual retiring at t=0 with wealth W_0, *in cash or in discounted future* receipts, allocates his or her wealth over time by maximizing *EU in (1) subject to the budget* constraint

$$\sum_{t=0}^{T} C_t R^{-t} = W_0 \tag{2}$$

where R is the relevant interest coefficient (R = 1+r, for interest rate r). A single individual will almost always not realize fully his or her planned consumption. If, alternatively, the individual is offered an actuarially fair annuity, the budget constraint becomes

$$\sum_{t=0}^{T} P_t C_t R^{-t} = W_0 \tag{3}$$

Since $P_t < 1$ for all t but t=0, eq. (3) is less constraining than (2). On average, an individual with a fair annuity consumes more than a single individual who has to provide for retirement solely on the basis of one's personal saving. Consequently, the maximum expected utility in eq. (1) is higher for a retiree with a fair annuity than for a single individual constrained by (2).

Due to mutual insurance of its members, a pension fund can operate as a fair annuity (disregarding administrative costs). Members dying early, leave part of their wealth in the fund, financing the retirement benefits of longer living members. (Optimal over-time consumption path of an individual with fair annuity may not be constant, while pension funds are usually committed to constant benefit payments, though sometimes only in nominal terms.)

A family of two--sharing wealth and consumption--functions as an incomplete annuity arrangement because of the positive probability that one of its members will die before the other.

The probable early death of one of a pair enables both to allocate more to consumption in the early retirement years than what they could have allocated as single individuals with the same amount of initial wealth divided between them.

For a pair, a plausible maximand is the family welfare function

$$EF = EU^H + \lambda EU^S \tag{4}$$

where H stands for the husband, S for the spouse, and λ is differential weight in the family function (of course, $\lambda=1$ is possible). The expected utility values on the right-hand-side of (4) are for individuals in a family, as detailed in eq. (8) below. The wealth constraint is now

$$\sum_{t=0}^{T} (C_t^H + C_t^S)R^{-t} = W_0 \tag{5}$$

where the wealth W_0 stands for the pooled resources of the couple.

Given the model's parameters, an optimal consumption path can be calculated with dynamic programming. It is instructive to examine the Bellman Equation formulation of the maximization problem which, for a family of two, is

$$V_{t-1}(W_{t-1}) = \max[U^H(C_{t-1}^H) + \lambda U^S(C_{t-1}^S) + \alpha P_{t|t-1}^H P_{t|t-1}^S V_t(W_t) \tag{6}$$

$$+ \alpha P_{t|t-1}^H(1 - P_{t|t-1}^S)H_t(W_t) + \lambda\alpha P_{t|t-1}^S(1 - P_{t|t-1}^H)S_t(W_t)]$$

Equation (6) is maximized with respect to C^H_t, C^S_t and is subject to

$$W_t/R + C^H_{t-1} + C^S_{t-1} = W_{t-1} \tag{7}$$

$$V_T(W_T) = \max[U^H(C^H_T) + \lambda U^S(C^S_T)]$$

In the above, $V_t(W_t)$ is the t period expected utility for a pair with remaining wealth W_t; similarly, H_t and S_t are the period t expected present values of utility for a surviving single individual in a pair with remaining wealth W_t; [$H_0(W_0)$ is EU of eq. (1) subject to the constraint in (2)]; P^S_t is the survival probability for the spouse; and t/t-1 marks survival probability at t conditional on surviving to t-1.

The utility of an individual in a pair [a component of the right-hand-side of (4)] is exemplified here with the utility of the husband[1]

$$EU^H = \sum_{t=0}^{T+1} g_t^S \left(\sum_{j=0}^{t-1} U^H(C_j^H) P_j^H \alpha^j + P_t^H H_t(W_t)\right) \tag{8}$$

$$g_t^S = P^S_{t-1} - P^S_t$$

In (8), g^S_t is the probability of death of the spouse between age t-1 and t,[2] and EU^H is the expected utility of the husband in a pair, discounted to time t=0.

Parents living on the farm with a succeeding family, may share the income of the farm. Then, even if the two families keep separate households, they are together subject to the same budgetary constraints and the decisions on the consumption path of the parents and the young family are made simultaneously. In this way, the two families also mutually insure each other.

The economics of such a family can be represented as a direct extension of the above two-member family model. A welfare function will then represent the "social" welfare of the extended family with appropriate weights assigned to the utility of each of its members. But, consistent with modern trends in family economics (for example, Lundberg and Pollak), we preferred to formulate the determination of the succession parameters as a bargaining game, to be detailed below. By this we extend the theoretical framework of Kimhi (1994). We turn now to the empirical part of the paper.

The Setting

The analytical framework is applied to family farms in a moshav. The Israeli moshav is a cooperative village (Zusman) of 50 to 100 families, each running its own farm privately. The cooperative association of the village provides marketing, inputs, accounting, and other services.[3] By law and by the regulations of the cooperatives, only one child may succeed the parents on the farm (the legal term is "the continuing son"). Once a succeeding child was chosen and appropriately registered, he or she may build an additional house on the farm plot. Other adult children are not supposed to stay on the farm; in some cases they find a different farm in the same moshav, otherwise--they leave the village. Accordingly, our analysis is of parents transferring the farm to a single succeeding family.

Naturally, parents invest also in the other children. Farmers in moshavim sometimes draw on the financial savings they have accumulated to assist the non-succeeding children, it is also customary that these children receive whatever is left of the financial savings as their part of the inheritance after the parents' death. In this way the family capital is divided--even if not equally--between all children (this, needless to say, is in addition to investment in human capital). In special cases, the farm may be called to help youngsters who left it. Information on financial savings and transfers was, however, not available; the analysis is therefore limited to the farm transfer and is conducted for families for which the farm may be separated from other intrafamily transactions.

Farm succession with overlapping generations has been of particular importance in Israel since the country's pension funds accepted only hired workers; farmers, being independent operators, could not join. The situation is changing as insurance companies are now also offering pension programs, but private programs are expensive, they have to cover large marketing costs. We shall therefore disregard these possibilities in the analysis.

The analysis is conducted for a pair of farmers (the parents) both aged 65 who are expected, by a simplifying assumption, to live to the maximum age of 95. The parents are succeeded by a young family aged 35. For simplicity, we take the young family as one unit and assume that it will survive to the planning horizon, 30 years, with probability one. The survival probabilities of the parents are the regular age specific probabilities (modified slightly to end at 95). With these assumptions, the only family members to enjoy old age insurance in the 30 years period are the parents, for them farm succession is identical financially to joining a pension fund at the age of 65. The young family will enjoy similar benefits when it transfers the farm to its offspring. In this way we disregard, for simplicity, the possibility that the young family may run into difficulties and the parents will help them.

The Cooperative Surplus

Intrafamily old age insurance is a form of cooperation (not to be confused with the cooperative association of the moshav), so also is farm succession with cohabitation of overlapping generations. Successful cooperation creates surplus and the welfare of the cooperating parties increases. A central question is then the distribution of the benefits of cooperation, the division of the surplus. This question can be viewed as a being solved in a cooperative game.[4]

The solution to the game depends on the relative power of the cooperating parties which in turn is a function of their alternatives; that is, of the opportunity cost of cooperation. The parents can sell the farm on the market and live of the proceeds, the succeeding family may move elsewhere and earn its living from other sources. These alternatives--which may vary in detail from one family to another--set the threat points of the cooperative bargaining game.

Accordingly, we shall illustrate with three solutions to the surplus division problem:

a. The parents receive their reservation utility and the succeeding family collects all the surplus;

b. The succeeding family receives its reservation utility and the parents enjoy the surplus;

c. The midway Nash solution.

Since intrafamily insurance for old age is a major source of cooperative surplus in our analysis, it will be useful to demonstrate, again following Kotilikoff and Spivak, the value of such an insurance. Consider an individual about to retire with wealth W_0, contemplating future consumption streams. Mark the maximum expected utility of eq. (1) as $EU(S, W_0)$ under the constraint in (2), and as $EU(F, W_0)$ under the constraint in (3), where S and F stand for self reliance and fair annuity. The monetary value of the difference in utility is measured as the magnitude M that satisfies $EU(S, W_0+M) = EU(F, W_0)$. In words, initial wealth W_0+M for a person without a pension plan is equivalent to the inial wealth W_0 for the same person with an access to a fair annuity. The surplus created by the insurance component of the farm succession can be measured in a similar manner. Other sources of cooperative surplus will be taken up below.

Income Generating Functions

As in most cooperative villages, land in the sample moshav is equally distributed; every family has an area of 5.5 hectares of land, used for farm, fields, and dwellings. In comparison with many other moshavim, the sample village is well to do. Average annual sales per farm are 220,000 US dollars in December 1992 values. The main source of income is the dairy enterprise, which together with cattle (mostly male dairy calves) comprises 75 percent of farm income in the village (Table 1). Sixty percent of the farms in the moshav produce milk or beef. Dairy is the only line of agricultural production in Israel that has remained subject to effective "planning:" milk is produced under a quota system and local beef competes with imports which are controlled by the government. Consequently, the enterprise is comparatively profitable and stable. Poultry enterprises are second in importance, and many of the growers produce breeding material. A small number of farmers do not operate a dairy enterprise and in the last decade their income has been relatively low and unstable, suffering from market vagaries.

Data were collected in the cooperative's accounting office, complete sets were available for 30 family farms for the 6 year period 1987-1992. The information we used was on income (net of purchased inputs and cost of hired labor) and on enterprise size measured by land area or by units of livestock. Dairy income was reported in the accounts together with income from the cattle enterprise and the contribution to income and to its variance of each of these two lines, as well as of the other lines, was estimated by the procedure suggested by Just and Pope with the income generating function for farm i and year t formulated as

$$Y_{it} = \alpha_0 + \sum_{k=1}^{K} \alpha_k X_{kit} + e_{it}^* \tag{9}$$

$$e_{it}^* = (B\Pi_{k=1}^{K} x_{kit}^{\beta k})^{1/2} e_{it}$$

where k indexes the enterprise, α_k is the constant income coefficient, and X_{kit} is the size of the enterprise k in farm i year t.

As suggested by Just and Pope, the estimates were conducted in three stages (Table 2): 1. Expected income (first line of eqs. (9)); 2. Contribution of farm enterprises to variance of income (second line); 3. Second estimate of expected income with correction for heteroscedasticity. Year dummy variables were included in the regression for the first and the third stage but the year effects were disregarded in the calculation of the residuals for the second stage (the regression explaining e^*_{it}), implying the assumption that these effects are part of the risk creating variability in income.

Income Streams

Expected income streams determine consumption plans and the value of the transferred farm. Three farm types were defined in the illustration to represent the major groups in the village (Table 3). The estimated coefficients reported in Table 2 were utilized to calculate annual income and its standard deviation. Table 3 further reports opportunity cost of labor--in Farms A and C for a single operator, and in Farm B for an operator and an assistant. By assumption, assistance is provided by family members: the parents contribute half a day on the farm for the first 10 years after transfer, and then the children of the succeeding family join the farm labor force. Income tax calculation is reported in detail since its components are capitalized below at different discount rates (in Table 4). For simplicity, it was assumed that investment for replacement capital is done once every 20 years, in year 10 and in year 30. In year 30, the cost of replacement is shared with the next generation on the farm; that is, with the grandchild of those who are now the parents. Net income reported in Table 3 is calculated as value added minus depreciations, implied cost of labor, income tax, and debt service--where applicable.

Table 3 reveals substantial differences between the farm types. Farms A and B enjoy secured income thanks to the dairy enterprise. The types differ in labor requirement and returns. Farm A is typically operated by a single elderly farmer, often with some help from the spouse. A succeeding child, if such was designated, will in most cases be found working off the farm, expecting to join it when the parents retire. For the elders this is a risky situation--the child may develop a career elsewhere and not be available when the need arises. We do not consider this risk explicitly here (it is treated elsewhere). Other activities are added to dairy in farm of Type

B. As indicated, the farm provides employment for one and a half workers.

Type C is a relatively poor farm, representing non-dairy units; many of those farms have realized in the last decade significant reductions in income and in their economic standing due to worsening terms of trade in most agricultural activities and a severe financial crisis. The crisis erupted in wake of policies to halt inflation. These policies were implemented in mid 1980s and were realized in a severe financial squeeze and sky rising interest rates; they harmed cooperative agriculture more than most other sectors of the economy. Farms of type C in the sample moshav and many other farms throughout the country carry now large debts. Typical to the sample moshav was a debt of 450,00 NIS (New Israeli Sheqels) and interest charges of 9%; that is, annual charges of 40,500 NIS. This is the value in Table 3. Farm C, loosing money, will not be able to accept a succeeding family. It was introduced here for the completion of the illustration but will be dropped from the presentation at this point.

Value of Assets

The assets transferred to the succeeding family consist of the farm, land, and dwellings. The value of the farm was calculated as the capitalized stream of income and the value of the land was constructed from market valuations.

In capitalizing the value of the farm, we have assumed that it will be operated by the succeeding family for a period of 30 years after which it will be transferred again to the then succeeding child--to a grandchild of the present operators. Since Farms A and B had no business debts, future income was capitalized using the cost of equity capital as the discounting factor. This cost was calculated in two stages. In the first, the rate of return on equity was estimated from aggregate industry level data in the equation

$$k_i = \alpha + \tau(sd/V)_i \tag{10}$$

in which k_i is cost of equity and $(sd/V)_i$ the coefficient of variation of income in industry i.[5] The estimated τ was 0.2592 (t=2.22); α was estimated as -1.64 (t=-0.21) which may well have reflected negative real interest rates in the period of accelerating inflation for which the data were available (Kislev, Lerman, and Zusman). It was therefore replaced in equation (11) below by the average real yield on index-linked government bonds: 0.035 (3.5%).

In (10), V is the capitalized value of the firms in the industry. This value is calculated as V = E/k, where E is the annual net earning stream, assumed constant. Substituting into (10) yields

$$k = \frac{\alpha}{1 - \tau SD/E} \tag{11}$$

The cost of equity capital, k in (11), was calculated for the farm types from the earning and variability data in Table 3 using the estimated τ parameter of eq. (10), with α set to 0.035. The resulting k values for farms A and B are reported in the first line of Table 4.

A few comments on the entries in Table 4 are in order. The data are all in present value terms in NIS calculated over a 30 year period; that is, they are the capitalized values to the day of transfer. The discounting factors were the cost of equity capital by farm type and the rate of return on government bonds (3.5%). Annual values of gross income and cost of operator labor and help on the farm were those reported in Table 3. The residual value of the farm was computed under the assumption that the farm will continue, after t=30, with the same net income for perpetuity. The value of land is the current value of farm land in the region, amended for expected future appreciation. This correction was done to reflect imperfection of the land market.

Consumption and the Division of the Surplus

As indicated, the transfer of the farm to a succeeding family is an act of cooperation, or better--a process of cooperation. The parents contribute the farm and their labor on it for ten years, the succeeding family cultivates the farm with the assistance of its youngsters and maintains the elderly couple. Cooperation creates income that can be used for consumption during the 30 year planning period, the capitalized value of the income stream is termed in Table 5 Initial Wealth. The value of this Initial Wealth differs from the Total Value of the farm as an asset in Table 4 as W_0 includes earning of farm self-labor and does not include the residual value of the farm. The cooperative surplus is the difference between W_0 and the opportunity cost--the aggregate reservation wealth of the parties to the farm. The reservation wealth of the parents is the amount they may get by selling the farm, that of the succeeding family is their alternative earning if not taking the farm. These values are the threat points of the bargaining game.

Three alternative solutions are examined in Table 5 for the bargaining game. The utility function in the illustration was the same function for the husband, the spouse, and the young family

$$U(C_t) = \frac{C_t^{1-\gamma}}{1-\gamma} \tag{12}$$

The values of the parameters in planning the consumption streams were R = 1.035; α = 0.99; and two alternatives for the utility parameter: γ=0.75 and γ=1.25. The probabilities of survival were calculated from demographic tables in the **Statistical Abstract of Israel 1993**. Identical survival probabilities were assumed for the husband and the spouse (adapted to reflect a 30 year horizon). The succeeding family was assumed to survive for the planning period with probability 1. With these assumptions, if the parents sell the farm, they mutually insure each other and maximize a welfare function such as (4) (with λ=1) subject to (5). If they do transfer the farm to a succeeding family, they receive a fair annuity; the young family acts as a pension fund. On its part, the young family faces, with our simplifying assumptions, no consumption risk; it maximizes EU in (1) subject to (2) with P_t = 1.

By the first solution to the bargaining game, the succeeding family takes all the surplus. In utility terms, the parents receive the threat point utility level. In monetary terms they receive less than the sale value of the farm. The difference is the value of the insurance, M in EU(S, W_0+M) in the section The Cooperative Surplus, above. By the second solution, the succeeding family receives just its opportunity cost and the parents receive the rest. The third is the Nash solution to the bargaining game maximizing the product of the surplus utilities of the parties.

The utility function parameter, γ, is the coefficient of relative risk aversion. With the higher aversion ($\gamma=1.25$) a fair annuity is worth to the parents more, and they receive in the solution in Table 5 comparatively less than with $\gamma=0.75$.

Conclusions

A succeeding family receives an operating business, the farm, plus land and dwellings together with the obligation--explicit or implicit--to provide the parents with secured income for the rest of their lives. In the farms we analyzed, and with a Nash Solution, the standard of living--here the present value of future consumption--is more than 22% and 40% (Farm A and B) higher than what mere labor earning could provide. This additional income is due to intra-family cooperation: old age insurance of the parents, labor contributed by the parents for 10 years (off the farm they cannot be expected to find income generating employment), the transfer of the farm to a son or daughter who grew on it and understands its functioning better than an outside buyer.

The illustration should be qualified in several ways. Less than 10% of the farmers in the moshavim operate dairy enterprises. Not all the others are in as bad a situation as our type C farm, but income from agriculture in the majority of them is lower than in our farms A and B. There exists in Israel, however, another group of farmers who are in a very good shape indeed. These are members in moshavim close to metropolitan areas where demand for residential land has spilled over to the rural area. The value of their property has in many cases increased substantially in the last several years and, even if today's income from the farm is low, they expect to be able to retire in comfortable conditions and their children are already joining them on the valued property.

Another qualification concerns the basic premises of the analysis. Of particular significance is the assumption that the parents do not assign any weight in their utility to the bequest which may be left to their heirs should they die relatively early. It is this assumption that cuts a sharp distinction between self insurance for old age and a fair annuity arrangement. It is hard to accept that all parents are as selfish, but even benevolent parents have to draw the line someplace and--explicitly or implicitly--mark a certain sum for their own old age.

It is perhaps needless to reiterate that we chose to present our approach in terms of an illustration with its particular characteristics. Application to other families may require modification of assumptions and parameters.

Notes

1. This expression is not presented explicitly in Kotlikoff and Spivak.

2. The probability of death, $g^S{}_t$, is calculated with respect to $t=0$ in the same way that P_t is the probability of a person living at $t = 0$ to survive to the year t. The upper limit of the sum in (8) is T+1 since if $P^S{}_T > 0$, $g^S{}_{T+1} > 0$, even if $P^S{}_{T+1} = 0$.

3. Cooperation has diminished markedly in the moshav sector in the last several years, the legal framework remained however intact.

4. Surplus allocation rules may be determined jointly with the choice of successor and timing of succession (Kimhi 1995). We abstract from these issues here.

5. The data are from Lieberman; they cover 8 non-agricultural industries and the observations are annual averages, for the period 1977-88, of returns and their variability by industry in Israel.

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Table 1. Distribution of Farm Revenue by Enterprise (six-year averages)

Enterprise	Percent of Farm Revenue
Dairy	39.2
Cattle	35.2
Fruits	8.2
Vegetables	3.9
Field Crops	2.2
Flowers	0.8
Hatching Eggs	3.5
Table Eggs	0.8
Poultry	3.7
Turkeys	1.2
Sheep	1.2
Misc.	0.1
======	==
Total	100

Table 2. Production Function Coefficients

	First Stage	Second Stage	Third Stage
Dependent variable	Income	Residuals	Income
Intercept	-14786 (0.930)	9.067 (21.057)	-0.321 (0.435)
Dairy	2470 (9.300)	-0.253 (1.552)	2136 (9.189)
Cattle	152 (1.554)	0.295 (1.595)	175 (1.684)
Layers	-3.530 (0.494)		-2.309 (0.384)
Hatching Eggs	3.992 (.926)		6.010 (1.546)
Field Crops	99 (0.419)	0.420 (2.110)	252 (0.944)
Fruits	1322 (3.109)	0.371 (2.649)	1354 (2.230)
Vegetables	1307 (1.552)		877 (1.276)
Flowers	-75 (0.053)		875 (0.623)
Adj. R^2	0.599	0.064	0.557
F-statistic	23.242	4.046	19.769

Continued on next page

Notes:

a. Units: dairy and cattle--heads; poultry--1000 heads; field crops, fruits, vegetables, and flowers--1 dunnam (1/10 of a hectare). Income is gross value added per farm in December 1992 New Israeli Sheqels (NIS 2.764 = $1.00).

b. The estimated regressions were eqs. (9) with 180 observation (30 farms for 6 years). Year dummy variables were included in the regression for the first and the third stage (not reported).

c. The coefficients of the first and the third stage were estimated in linear regressions, the second stage regression was double log (the reported intercept is ln B).

d. Variables with insignificant coefficients were excluded from the second stage regression.

e. The number of observation was 180 (30 farms for 6 years); year-dummy variables were included in the regression of the first stage.

f. In parenthesis, t values.

Table 3. **Annual Income and Outlays by Farm Type**

	Type A (Milk)	Type B (Mixed)	Type C (Poultry)
Farm Enterprise			
Dairy	45	45	
Cattle	50	100	
Hatching Eggs		1500	1500
Field Crops	35	15	10
Fruits		20	40
Flowers		10	
Income and Outlays			
Standard deviation	20,092	35,510	27,862
Income	107,334	152,363	56,740
Depreciation	(20,000)	(30,000)	(15,000)
Labor, Operator	(40,000)	(40,000)	(40,000)
Labor, Help		(20,000)	
Service of Business Debt			(40,500)

Continued on next page

Table 3 (*continued*)

	Type A (Milk)	Type B (Mixed)	Type C (Poultry)
Income Tax			
Assessment	(28,373)	(47,549)	
Tax Shield	6,910	13,277	
Credit Points	7,332	7,332	
=========	====	====	====
Net Income (s)	33,203	35,423	(38,760)
Investment year 10	400,000	600,000	300,000
Investment year 30	200,000	300,000	150,000

Notes:

a. Units in farm enterprises: Livestock--heads, others--dunnams.

b. Monetary values--in December 1992 NIS.

c. Income is gross value added.

d. Income and standard deviations were calculated using the coefficients reported for the second and the third stage in Table 2. In calculating income, the intercept of the third stage regression was multiplied by the standard deviation.

e. Labor (Operator) is opportunity cost of operator's labor on farm. Labor (Help) is cost of hired labor employed part-time after 10 years. The assigned value is average salary per employee in the country for 1992.

f. Income tax: tax shield is depreciation times the marginal tax rate; credit points are for two families; payment is the tax to be paid.

g. Net income was calculated by deducting from gross income: depreciations, labor, and income tax (payment).

Table 4. Capitalized Flows and Value of Assets by farm type

	Type A (Milk)	Type B (Mixed)
Cost of Equity	0.0415	0.0473
Income	1,602,808	2,041,091
Labor	735,680	937,188
Investment	354,824	532,234
Residual Value	236,339	187,194
Business Debt		
Agriculture	748,543	758,863
Non-agr (land, net)	504,378	504,378
=========	=====	=====
Total Debt	1,252,921	1,263,241

Notes:

a. The capitalized value of income, based on data form Table 3, was calculated as: income minus income tax assessment (discounted using the cost of equity capital) plus the tax shield and credit points (discounted using the safe rate r=0.035).

b. Labor was discounted at 3.5%.

c. The residual value is the value of the farm capitalized to infinity and discounted for 30 years (this is the value the succeeding family will transfer to its child). The discount factor was the cost of equity capital.

d. All other entries were discounted at the safe rate.

e. Land valuation incorporates an anticipated increase in market value of 5% per year.

f. Non-agriculture is the value of the land net of a debt settlement charge of 13,000 NIS per farm.

Table 5. Division of the Surplus between the Generations (December 1992 NIS)

	Farm Type A		Farm Type B	
Initial Wealth (W_0)	1,292,550		1,681,334	
Reservation Wealth				
Parents	350,000		500,000	
Succeeding Family	735,682		735,682	
Cooperative Surplus	206,868		445,652	
Utility Parameter	$\gamma=0.75$	$\gamma=1.25$	$\gamma=0.75$	$\gamma=1.25$
Succeeding Family Takes All				
Parents	229,803	221,886	328,290	316,980
Succeeding Family	1,062,747	1,070,664	1,353,044	1,364,354
Parents Take All				
Parents	556,868	556,868	945,652	945,652
Succeeding Family	735,682	735,682	735,682	735,682
Nash Solution				
Parents	393,303	374,410	638,290	610,000
Succeeding Family	899,247	918,140	1,043,044	1,071,334

Continued on next page

Notes:

a. Initial Wealth: net income plus returns to own labor, discounted at the rate of return on equity, plus services of assets in land calculated at 3.5%.

b. Reservation Wealth: for the parents the sale price of the farm, for the succeeding family wages earned if not joining the farm (discounted at the safe rate of 3.5%).

c. Utility Parameters: in equation (15).

d. For other entries, see text.

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