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המרכז למחקר בכלכלה חקלאית
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# Off-Farm Participation and Family Composition: Comparing 1995 with 1981 in Moshavim

by

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# Off-Farm Participation and Family Composition: Comparing 1995 with 1981 in Moshavim

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In an earlier paper, Kimhi (1996) has found that Israeli farm couples are more likely to work off the farm when the number of other adults in the household increases. This result was obtained using data from the 1981 Census of Agriculture. Recently, Kimhi and Seiler (2001) investigated the same issue using data from a 1995 farm survey including roughly 10% of family farms in Moshavim. They included only nuclear families without siblings or parents of the head of household, and obtained strikingly different results: the off-farm participation decisions of adult males were not affected by the presence of adult children, while participation rates of adult women declined with the number of adult children. The question is whether the different results can be attributed to the different methodology or to genuine changes in the behavior of family farms in Moshavim over the years.

In this paper we go back to the 1981 data and try to replicate the 1995 results of Kimhi and Seiler (2001) using a similar methodology. In particular, we limit the analysis to two-parent nuclear families, with the exception of adult children living with their parents when one of the parents is the head of household. We also exclude families with missing ages and those in which age differentials between spouses or between parents and children were outside of the logical range.

Several differences between the 1981 and 1995 data sets are worth mentioning. First, work data were missing for many observations in the 1995 data set, while this is not the case in the 1981 data set. Every person that reported no work either on or off the farm in 1981, provided a reason for that (housewife, student, soldier, etc.). Second, in 1981 there was no question about on-farm non-agricultural employment (which in 1995 was included in the off-farm employment), so farmers with such activities could count them either as farm or as off-farm work. Third, we have the ethnic origin and country of birth only for the head of household. Therefore, we include the household head's variables in the spouse's equation. For the adult children, we know whether they were born in Israel or not because we know when the head of household immigrated to Israel, hence this is not a problem, except perhaps for children who are not the biological children of the head of household, but we have no way of knowing that. Fourth, in the 1981 data set we have actual years of schooling, while in the 1995 data set we have dummies for levels of education and for agricultural education. Fifth, in 1981 we have non-depreciated values of capital stock, while in 1995 we have the depreciated values. Finally, in the 1981 data set we do not have an indication of the way in which the current farm operator obtained the farm.

We now turn to compare the descriptive statistics, keeping in mind the qualifications outlined above. Tables 1 and 2 provide descriptive statistics of the variables in the 1981 data set, by group of households. Group 1 includes households with no adult children (over the age of 21), group 2 – households with one adult child, group 3 – households with two adult children or child and spouse, and group 4 – households with more than two adult children or spouses. By definition, only adult children that live on the farm are counted.

We first compare the whole sample means in the first column of tables 1 and 2 with the 1995 means in tables 1 and 2 in Kimhi and Seiler (2001). In table 1 we can immediately see that work participation patterns changed considerably from 1981 to 1995. For the males, farm participation rates decreased from 1981 to 1995 while off-farm participation rates increased. For females, farm participation rates remained the same, but off-farm participation rates increased dramatically from 24% in 1981 to 59% in 1995. The changes in the participation rates of the oldest adult child have been somewhere in between, with farm participation rates showing a moderate decrease while off-farm participation rates rise from 54% in 1981 to 74% in 1995.

We note that farm couples in the 1995 sample are almost six years older than their 1981 counterparts. We also note that the fraction of persons born in Israel is much higher in 1995 while the fraction of those with Asia/Africa origin is much lower. This can be explained by the fact that third-generation Israelis are not counted as having Asian/African origin even if their grandparents immigrated from Asian or African countries, while second-generation Israelis are.

In table 2 we can see that the number of children and adolescents declined from 1981 to 1995. Tenure (years on farm) increased by almost seven years. The fraction of specialized farms decreased moderately, while the fraction of diversified farms decreased more sharply. This means that the fraction of inactive farms (the excluded group) doubled, from 18% in 1981 to 37% in 1995. Among active farms, specialization increased over the years. We also observe an increase in landholdings. As there is no legal transfer of land between farms, this is perhaps due to the existence of very small farms in 1981 that were not included in the sampling frame in 1995. The value of capital stock decreased dramatically from 1981 to 1995, but recall that in 1981 we have non-depreciated capital stock while in 1995 we have depreciated capital stock. In addition, the 1981 capital stock was transformed to 1995 prices using the consumer price index. It is reasonable to think that the real price of farm capital assets rose less than the consumer price index between these years. Looking at the branch dummies, we observe that all have lower means in 1995 than in 1981, reflecting both the higher fraction of inactive farms and the increased specialization. Relative to other branches, cattle and field crops declined more sharply.

We now turn to the multivariate results. In table 3 we report the results of estimating a trivariate probit model using a quasi-maximum likelihood approach that was described in Kimhi and Seiler (2001). The three probit equations are for the off-farm participation of the male farm operator or spouse, the female spouse or farm operator, and the oldest adult child, respectively. We tried to add another equation for the second child, but could not get convergence in this case, perhaps because of the relatively small number of observations with two or more children. The 1981 results are compared in table 3 with the 1995 results which were taken from Kimhi and Seiler (2001).

We first observe that the correlation coefficients between the participation equations of the different household members are all positive and significant, as in 1995, although the 1981 correlation coefficients are much smaller in magnitude than

the 1995 coefficients. Looking at the group dummies, we find a totally different picture than in 1995. While the group dummies were not significant for males and significantly negative for females in 1995, they are significantly positive for males and insignificant for females in 1981. The effects of explanatory variables are not much different qualitatively in 1981 and 1995 for males and females, except for land. In 1995, land has a positive effect on the off-farm work participation of both males and females, while in 1981 land has a negative effect on males' participation and no significant effect on females' participation. As for the oldest adult child, there are no differences that are worth mentioning here.

As in Kimhi and Seiler (2001), we now estimate a different model for each group of households. The results are in table 4. As in 1995, we find that there is no significant correlation between the participation equation of the oldest adult child and the participation equations of the parents, except for one case. As a result, we can use the child's off-farm participation status as an explanatory variable in the parents' equations. We therefore estimate a bivariate probit model for males and females in each group separately. The results are in table 5. As in the 1995 data set, we find that the child's participation status does not have a significant effect on the parents' off-farm participation decisions. As in 1995, we conclude that family composition affects the parents' off-farm participation decisions, but not directly via the children's participation decisions. However, this indirect effect is different in 1981 than in 1995, as the results in table 3 reveal.

Finally, we reproduce table 6 of Kimhi and Seiler (2001) with the 1981 data and results. We can see that the predicted off-farm participation rates of both males and females by group follow the same pattern as the actual participation rates, namely participation declines as the number of adult children increases. However, when evaluated at the mean values of the explanatory variables, participation rates of males follow an opposite pattern, namely they increase with the number of adult children. Females' participation rates, when evaluated at mean values, do not change much with the number of adult children if we use predictions from the joint estimation, but decline with the number of adult children if we use predictions from the separate estimation. Children's predicted probabilities rise with the number of adult children in all cases.

These results provide partial support to the earlier conclusions of Kimhi (1996), in that the net effect of the number of adult children on the off-farm

participation probability of adult males is positive, after controlling for explanatory variables. However, in the case of females we obtain here the opposite effect, which goes in line with the 1995 results of Kimhi and Seiler (2001). We conclude that the change in results from 1981 to 1995 that was observed in the earlier papers was, at least in the case of females, due to the different methodology. Using a similar methodology showed that adult females reduce their tendency to participate in off-farm work as the number of adult children rises. For adult males, on the other hand, we observe a change in behavior from 1981 to 1995. In 1995, more adult children result in a higher off-farm participation probability, while no such relation was found in 1995. When we note that more adult children tend to work off the farm in 1995 than in 1981, we find support for the hypothesis that adult children substituted their fathers on the farm in 1981 thereby allowing them to seek off-farm work, which was the conclusion of Kimhi (1996). In 1995, adult children could not be counted on anymore to serve this role, as the results of Kimhi and Seiler (2001) reveal.

**References**

Kimhi, Ayal (1996). "Demographic Composition of Farm Households and its Effect on Time Allocation." *Journal of Population Economics* **9**, 429-439.

Kimhi, Ayal, and Eddie Seiler (2001). *The Effect of Family Composition on the Off-Farm Participation Decisions in Israeli Farm Households*. Working Paper No. 20101, The Center for Agricultural Economic Research, March 2001.

**Table 1. Descriptive Statistics of Personal Variables (1981)**

| Variable | All | Group 1 | Group 2 | Group 3 | Group 4 |
|---|---|---|---|---|---|
| *Male Operator or Spouse* | | | | | |
| WORKS ON FARM | 0.68 | 0.68 | 0.73 | 0.69 | 0.64 |
| WORKS OFF FARM | 0.51 | 0.55 | 0.47 | 0.42 | 0.45 |
| AGE | 47.53 | 43.89 | 55.76 | 57.53 | 58.37 |
| BORN IN ISRAEL | 0.24 | 0.30 | 0.09 | 0.07 | 0.03 |
| ASIA/AFRICA ORIGIN | 0.57 | 0.51 | 0.62 | 0.76 | 0.92 |
| YEARS OF SCHOOLING | 9.05 | 10.17 | 7.04 | 5.65 | 4.17 |
| *Female Operator or Spouse* | | | | | |
| WORKS ON FARM | 0.30 | 0.31 | 0.36 | 0.30 | 0.23 |
| WORKS OFF FARM | 0.24 | 0.29 | 0.19 | 0.13 | 0.10 |
| AGE | 43.54 | 40.14 | 51.33 | 52.84 | 53.46 |
| BORN IN ISRAEL | 0.24 | 0.30 | 0.09 | 0.07 | 0.03 |
| ASIA/AFRICA ORIGIN | 0.57 | 0.51 | 0.62 | 0.76 | 0.92 |
| YEARS OF SCHOOLING | 8.75 | 10.13 | 6.22 | 4.61 | 2.65 |
| *Oldest Adult Child or Spouse* | | | | | |
| WORKS ON FARM | 0.27 | | 0.28 | 0.31 | 0.20 |
| WORKS OFF FARM | 0.54 | | 0.43 | 0.56 | 0.60 |
| MALE | 0.68 | | 0.69 | 0.71 | 0.62 |
| AGE | 26.07 | | 24.63 | 27.11 | 28.87 |
| BORN IN ISRAEL | 0.82 | | 0.88 | 0.79 | 0.67 |
| ASIA/AFRICA ORIGIN | 0.57 | | 0.62 | 0.76 | 0.92 |
| YEARS OF SCHOOLING | 11.30 | | 11.50 | 11.23 | 10.78 |
| *2nd Oldest Adult Child or Spouse* | | | | | |
| WORKS ON FARM | 0.22 | | | 0.22 | 0.22 |
| WORKS OFF FARM | 0.50 | | | 0.43 | 0.53 |
| MALE | 0.56 | | | 0.53 | 0.61 |
| AGE | 24.86 | | | 24.22 | 26.06 |
| BORN IN ISRAEL | 0.89 | | | 0.91 | 0.85 |
| ASIA/AFRICA ORIGIN | 0.57 | | | 0.76 | 0.92 |
| YEARS OF SCHOOLING | 11.20 | | | 11.31 | 10.99 |
| OBSERVATIONS | 17847 | 12786 | 2707 | 1536 | 818 |

**Table 2. Descriptive Statistics of Family, Operator, and Farm Variables (1981)**

| Variable | All | Group 1 | Group 2 | Group 3 | Group 4 |
|---|---|---|---|---|---|
| NORTH | 0.22 | 0.22 | 0.22 | 0.23 | 0.21 |
| SOUTH | 0.29 | 0.28 | 0.29 | 0.32 | 0.36 |
| ADOLESCENTS[a] | 0.85 | 0.59 | 1.44 | 1.49 | 1.78 |
| CHILDREN[b] | 1.57 | 1.85 | 0.81 | 0.99 | 0.94 |
| TENURE[c] | 18.00 | 15.02 | 24.82 | 26.15 | 26.68 |
| SPECIALIZED[d] | 0.42 | 0.42 | 0.44 | 0.41 | 0.47 |
| DIVERSIFIED[e] | 0.40 | 0.38 | 0.45 | 0.49 | 0.45 |
| LAND[f] | 25.06 | 24.14 | 27.34 | 27.90 | 26.67 |
| CAPITAL[g] | 352.22 | 334.71 | 403.81 | 393.03 | 378.52 |
| FLOWERS | 0.17 | 0.18 | 0.16 | 0.17 | 0.17 |
| POULTRY | 0.29 | 0.26 | 0.35 | 0.40 | 0.37 |
| FIELD CROPS | 0.39 | 0.37 | 0.42 | 0.45 | 0.48 |
| CATTLE | 0.10 | 0.07 | 0.15 | 0.16 | 0.16 |
| OBSERVATIONS | 17847 | 12786 | 2707 | 1536 | 818 |

a. Children between 15 and 21 years of age.
b. Children younger than 15 years of age.
c. Number of years the current farm operator is operating the farm.
d. Farms in which at least 90% of value added is in a single branch.
e. Farms with positive production and less than 90% of value added in a single branch.
f. Landholdings in Dunams.
g. Value of capital stock in 1995 prices (NIS 1,000).

**Table 3. Quasi-Maximum Likelihood Estimation Results**

| | 1995 | | 1981 | |
|---|---|---|---|---|
| Variable | Estimate | t-statistic | Estimate | t-statistic |
| CORRELATION MALE/FEMALE | 0.3475 | 6.1370 ** | 0.1870 | 11.9480 ** |
| CORRELATION MALE/CHILD | 0.2744 | 4.6060 ** | 0.0511 | 4.3880 ** |
| CORRELATION FEMALE/CHILD | 0.4661 | 6.5540 ** | 0.0783 | 7.1660 ** |
| *Male Operator or Spouse* | | | | |
| CONSTANT | -0.2643 | -0.1850 | -2.3472 | -12.3240 ** |
| AGE | 0.1172 | 2.1250 * | 0.1634 | 20.0780 ** |
| AGE SQUARED | -0.0015 | -2.8890 ** | -0.0020 | -24.0950 ** |
| ADOLESCENTS | 0.0816 | 1.3850 | 0.0314 | 2.8330 ** |
| CHILDREN | -0.0340 | -0.9160 | -0.0030 | -0.3600 |
| SPECIALIZED | -0.8115 | -5.0100 ** | -0.3613 | -9.0470 ** |
| DIVERSIFIED | -0.8003 | -4.1790 ** | -0.5047 | -9.4400 ** |
| BORN IN ISRAEL | -0.0054 | -0.0460 | 0.0515 | 1.6110 |
| ASIA/AFRICA ORIGIN | 0.0183 | 0.1610 | 0.0023 | 0.0790 |
| FLOWERS | -0.4813 | -3.3520 ** | -0.5135 | -13.9600 ** |
| POULTRY | -0.2354 | -1.6790 * | -0.0833 | -2.4350 ** |
| FIELD CROPS | -0.6146 | -4.6010 ** | -0.3041 | -9.1900 ** |
| CATTLE | -0.2793 | -1.2220 | -0.3046 | -6.4830 ** |
| HIGH SCHOOL years of schooling | 0.1710 | 1.4290 | 0.0443 | 13.8390 ** |
| HIGHER EDUCATION | 0.3073 | 1.9830 * | | |
| AGRICULTURAL EDUCATION | -0.1657 | -0.8220 | | |
| NORTH | -0.1404 | -0.9640 | -0.1647 | -5.5900 ** |
| SOUTH | -0.4483 | -3.0760 ** | -0.1424 | -4.9430 ** |
| LAND | 0.0047 | 1.6670 * | -0.0043 | -2.7100 ** |
| TENURE | -0.0093 | -2.1920 * | 0.0000 | -0.0160 |
| CAPITAL | -0.0019 | -5.1240 ** | -0.0007 | -11.9080 ** |
| SUCCEEDED | -0.0657 | -0.4110 | | |
| PURCHASED | 0.2618 | 2.0110 * | | |
| GROUP 2 | 0.0526 | 0.3800 | 0.1025 | 2.9500 ** |
| GROUP 3 | -0.2126 | -1.3830 | 0.0529 | 1.1940 |
| GROUP 4 | -0.1261 | -0.6760 | 0.1550 | 2.5950 ** |

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**Table 3.** (continued)

| Variable | 1995 Estimate | 1995 t-statistic | 1981 Estimate | 1981 t-statistic |
|---|---|---|---|---|
| *Female Operator or Spouse* | | | | |
| CONSTANT | -4.9879 | -4.0090 ** | -3.6207 | -17.9020 ** |
| AGE | 0.2934 | 5.3230 ** | 0.1433 | 14.9990 ** |
| AGE SQUARED | -0.0034 | -5.7810 ** | -0.0018 | -16.6270 ** |
| ADOLESCENTS | -0.0796 | -1.2900 | -0.0090 | -0.6520 |
| CHILDREN | -0.0405 | -1.0350 | -0.1147 | -11.4420 ** |
| SPECIALIZED | -0.1747 | -1.1760 | -0.1367 | -3.8080 ** |
| DIVERSIFIED | 0.0123 | 0.0680 | -0.1964 | -3.9680 ** |
| BORN IN ISRAEL | 0.1925 | 1.7980 * | 0.1718 | 5.8750 ** |
| ASIA/AFRICA ORIGIN | -0.0026 | -0.0240 | 0.0482 | 1.6470 * |
| FLOWERS | -0.3238 | -2.5510 ** | -0.2518 | -6.5700 ** |
| POULTRY | -0.3123 | -2.1260 * | -0.1511 | -4.3750 ** |
| FIELD CROPS | -0.3302 | -2.5760 ** | -0.0013 | -0.0410 |
| CATTLE | -0.3000 | -1.2490 | -0.1214 | -2.4110 ** |
| HIGH SCHOOL years of schooling | -0.2010 | -1.6970 * | 0.1046 | 23.8380 ** |
| HIGHER EDUCATION | -0.2376 | -1.4890 | | |
| AGRICULTURAL EDUCATION | 0.1318 | 0.6860 | | |
| NORTH | -0.3222 | -2.2860 * | 0.0060 | 0.2020 |
| SOUTH | -0.4316 | -3.0360 ** | -0.0955 | -3.1550 ** |
| LAND | 0.0149 | 5.3030 ** | -0.0006 | -1.1080 |
| TENURE | -0.0021 | -0.4650 | -0.0093 | -4.7100 ** |
| CAPITAL | -0.0011 | -3.5960 ** | -0.0002 | -4.2500 ** |
| SUCCEEDED | -0.0503 | -0.3370 | | |
| PURCHASED | 0.1187 | 0.9010 | | |
| GROUP 2 | -0.5163 | -3.4080 ** | -0.0312 | -0.7620 |
| GROUP 3 | -0.3504 | -2.2640 * | -0.0225 | -0.3900 |
| GROUP 4 | -0.6403 | -3.1760 ** | -0.0369 | -0.4350 |

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**Table 3.** (continued)

| Variable | 1995 Estimate | 1995 t-statistic | 1981 Estimate | 1981 t-statistic |
|---|---|---|---|---|
| *Oldest Adult Child or Spouse* | | | | |
| CONSTANT | -2.5971 | -1.4570 | -4.4554 | -7.2540 ** |
| MALE | -0.2111 | -1.2310 | 0.2414 | 6.0220 ** |
| AGE | 0.1800 | 1.6790 * | -0.3272 | -5.0290 ** |
| AGE SQUARED | -0.0027 | -1.6920 * | -0.0023 | -5.8330 ** |
| ADOLESCENTS | 0.1175 | 1.2160 | 0.0804 | 4.9550 ** |
| CHILDREN | -0.0067 | -0.1110 | 0.0087 | 0.5360 |
| SPECIALIZED | -0.4296 | -1.7370 * | -0.0490 | -0.6960 |
| DIVERSIFIED | -0.3685 | -1.2860 | -0.0457 | -0.5380 |
| BORN IN ISRAEL | 0.1902 | 0.7140 | 0.1294 | 2.2700 * |
| ASIA/AFRICA ORIGIN | 0.1600 | 0.9710 | 0.1552 | 3.0750 ** |
| FLOWERS | -0.0323 | -0.1750 | -0.2341 | -3.8820 ** |
| POULTRY | -0.0605 | -0.3140 | 0.0345 | 0.7180 |
| FIELD CROPS | -0.0390 | -0.2190 | 0.0027 | 0.0570 |
| CATTLE | 0.2397 | 0.7320 | 0.1321 | 2.0900 * |
| HIGH SCHOOL | -0.1470 | -0.8930 | 0.0398 | 4.8950 ** |
| HIGHER EDUCATION | -0.2152 | -0.9510 | | |
| AGRICULTURAL EDUCATION | -0.1248 | -0.4850 | | |
| NORTH | -0.2946 | -1.5010 | -0.2772 | -5.5400 ** |
| SOUTH | -0.1844 | -0.8960 | -0.0536 | -1.1560 |
| LAND | -0.0011 | -0.2680 | -0.0026 | -2.4780 ** |
| TENURE | 0.0141 | 1.7570 * | 0.0074 | 2.3060 * |
| CAPITAL | -0.0023 | -5.7930 ** | -0.0004 | -6.5830 ** |
| SUCCEEDED | 0.2027 | 0.8120 | | |
| PURCHASED | 0.5348 | 2.7640 ** | | |
| GROUP 3 | 0.2055 | 1.1570 | 0.1576 | 3.4260 ** |
| GROUP 4 | 0.4542 | 2.0930 * | 0.1362 | 2.1620 * |

* coefficient significant at 5%.
** coefficient significant at 1%.

**Table 4. Off-Farm Participation Results by Groups of Households (1981)**

| | Group 1 | | Group 2 | | Group 3 | | Group 4 | |
|---|---|---|---|---|---|---|---|---|
| Variable | Estimate | t-statistic | Estimate | t-statistic | Estimate | t-statistic | Estimate | t-statistic |
| CORR. MAL/FEM | 0.1742 | 9.6860 ** | 0.2483 | 5.7690 ** | 0.1309 | 2.2370 * | 0.2416 | 2.6840 ** |
| CORR. MAL/CHI | | | 0.0771 | 2.2750 * | 0.0345 | 0.7520 | 0.0235 | 0.3740 |
| CORR. FEM/CHI | | | 0.0600 | 1.4680 | 0.0771 | 1.3430 | 0.1133 | 1.2250 |
| *Male Operator or Spouse* | | | | | | | | |
| CONSTANT | -2.4447 | -11.2290 ** | -7.4409 | -4.8330 ** | -5.0537 | -2.5640 ** | -1.3913 | -0.4760 |
| AGE | 0.1675 | 17.5310 ** | 0.3365 | 6.1180 ** | 0.2500 | 3.6980 ** | 0.1271 | 1.3070 |
| AGE SQUARED | -0.0020 | -20.4990 ** | -0.0034 | -7.0120 ** | -0.0026 | -4.5090 ** | -0.0015 | -1.8480 * |
| ADOLESCENTS | 0.0414 | 2.7300 ** | 0.0267 | 1.0350 | 0.0307 | 1.0160 | 0.0218 | 0.5420 |
| CHILDREN | -0.0076 | -0.7640 | 0.0311 | 1.1440 | -0.0141 | -0.4740 | 0.0127 | 0.2950 |
| SPECIALIZED | -0.3826 | -8.0440 ** | -0.3009 | -2.9010 ** | -0.1897 | -1.4320 | -0.1090 | -0.5300 |
| DIVERSIFIED | -0.5132 | -7.9920 ** | -0.4122 | -3.1440 ** | -0.4454 | -2.6830 ** | -0.2599 | -1.0370 |
| BORN IN ISRAEL | 0.0331 | 0.9500 | 0.1582 | 1.4640 | 0.0007 | 0.0050 | -0.1679 | -0.4420 |
| ASIA/AFRICA ORIGIN | 0.0099 | 0.2980 | -0.0496 | -0.6590 | 0.0124 | 0.1080 | -0.3462 | -1.3660 |
| FLOWERS | -0.5493 | -12.7640 ** | -0.4031 | -4.0780 ** | -0.4309 | -3.4460 ** | -0.3693 | -2.1560 * |
| POULTRY | -0.1094 | -2.6320 ** | 0.0068 | 0.0880 | -0.1488 | -1.4820 | 0.0688 | 0.5000 |
| FIELD CROPS | -0.4022 | -10.1410 ** | -0.1011 | -1.4430 | -0.0055 | -0.0580 | -0.1601 | -1.2090 |
| CATTLE | -0.3702 | -6.1280 ** | -0.3366 | -3.1180 ** | -0.3077 | -2.3830 ** | 0.1000 | 0.5810 |
| YEARS OF SCHOOLING | 0.0516 | 12.3350 ** | 0.0360 | 5.1700 ** | 0.0423 | 4.5920 ** | 0.0307 | 2.5530 ** |
| NORTH | -0.1326 | -3.7970 ** | -0.0996 | -1.3580 | -0.3218 | -3.1960 ** | -0.6863 | -4.7680 ** |
| SOUTH | -0.1408 | -4.1350 ** | -0.0725 | -1.0380 | -0.2020 | -2.1940 * | -0.0507 | -0.4110 |
| LAND | -0.0036 | -1.9580 * | -0.0056 | -2.4830 ** | -0.0088 | -2.9930 ** | -0.0073 | -1.8740 * |
| TENURE | 0.0014 | 0.6040 | 0.0039 | 0.8780 | -0.0043 | -0.6220 | -0.0095 | -0.9440 |
| CAPITAL | -0.0008 | -9.6510 ** | -0.0010 | -6.3670 ** | -0.0004 | -2.8420 ** | -0.0003 | -1.4980 |

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**Table 4.** (continued)

| Variable | Group 1 Estimate | Group 1 t-statistic | Group 2 Estimate | Group 2 t-statistic | Group 3 Estimate | Group 3 t-statistic | Group 4 Estimate | Group 4 t-statistic |
|---|---|---|---|---|---|---|---|---|
| *Female Operator or Spouse* | | | | | | | | |
| CONSTANT | -4.2232 | -18.1850 ** | -2.7294 | -1.7730 * | -5.1271 | -1.9030 * | -5.1256 | -1.0490 |
| AGE | 0.1603 | 14.4620 ** | 0.1119 | 1.9320 * | 0.1997 | 2.0010 * | 0.2436 | 1.3580 |
| AGE SQUARED | -0.0020 | -15.5720 ** | -0.0015 | -2.6880 ** | -0.0022 | -2.3390 ** | -0.0027 | -1.6110 |
| ADOLESCENTS | -0.0247 | -1.3760 | 0.0348 | 1.0500 | -0.0318 | -0.7060 | -0.0194 | -0.3050 |
| CHILDREN | -0.1314 | -11.6340 ** | -0.1145 | -2.8550 ** | -0.0176 | -0.4300 | -0.1457 | -2.0180 * |
| SPECIALIZED | -0.1479 | -3.7270 ** | -0.0039 | -0.0340 | -0.2495 | -1.5480 | -0.0782 | -0.2780 |
| DIVERSIFIED | -0.2071 | -3.7290 ** | -0.1468 | -0.9760 | -0.1523 | -0.7530 | -0.0410 | -0.1260 |
| BORN IN ISRAEL | 0.1527 | 4.8640 ** | 0.4671 | 4.3930 ** | -0.0305 | -0.1740 | -0.0032 | -0.0060 |
| ASIA/AFRICA ORIGIN | 0.0953 | 2.9240 ** | -0.1393 | -1.6170 | -0.2532 | -1.8770 * | -0.2425 | -0.7440 |
| FLOWERS | -0.2330 | -5.5330 ** | -0.3929 | -3.2270 ** | -0.4461 | -2.6650 ** | -0.2008 | -0.7480 |
| POULTRY | -0.1279 | -3.2460 ** | -0.1918 | -2.0310 * | -0.2205 | -1.7850 * | -0.2528 | -1.2520 |
| FIELD CROPS | -0.0344 | -0.9770 | 0.0876 | 1.0100 | 0.1760 | 1.4520 | 0.0754 | 0.3700 |
| CATTLE | -0.0913 | -1.5220 | -0.0883 | -0.6930 | -0.3762 | -2.3110 * | -0.1008 | -0.3750 |
| YEARS OF SCHOOLING | 0.1258 | 21.5680 ** | 0.0748 | 7.4730 ** | 0.0527 | 3.9260 ** | 0.0434 | 2.0880 * |
| NORTH | 0.0421 | 1.2560 | 0.0020 | 0.0230 | -0.1499 | -1.1720 | -0.4279 | -2.0950 * |
| SOUTH | -0.0913 | -2.6610 ** | 0.1659 | 2.0510 * | -0.3461 | -2.8080 ** | -0.3391 | -1.6470 * |
| LAND | -0.0001 | -0.2430 | -0.0050 | -2.3060 * | -0.0005 | -0.1970 | -0.0100 | -1.5270 |
| TENURE | -0.0066 | -2.8040 ** | -0.0084 | -1.6870 * | -0.0027 | -0.3240 | -0.0256 | -2.0310 * |
| CAPITAL | -0.0002 | -3.3890 ** | -0.0004 | -3.2720 ** | -0.0002 | -0.9890 | -0.0006 | -1.8630 * |

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**Table 4.** (continued)

| Variable | Group 1 Estimate | Group 1 t-statistic | Group 2 Estimate | Group 2 t-statistic | Group 3 Estimate | Group 3 t-statistic | Group 4 Estimate | Group 4 t-statistic |
|---|---|---|---|---|---|---|---|---|
| *Oldest Adult Child or Spouse* | | | | | | | | |
| CONSTANT | | | -5.4174 | -6.0090 ** | -2.6628 | -2.3940 ** | -3.5847 | -2.2110 * |
| MALE | | | 0.3256 | 5.2550 ** | 0.1348 | 1.9720 * | 0.1266 | 1.3380 |
| AGE | | | -0.4585 | -4.3330 ** | -0.1789 | -1.6740 * | -0.1690 | -1.1920 |
| AGE SQUARED | | | -0.0021 | -3.7250 ** | -0.0029 | -3.7520 ** | -0.0031 | -3.0880 ** |
| ADOLESCENTS | | | 0.1005 | 4.1920 ** | 0.0566 | 1.9910 * | 0.0380 | 0.9690 |
| CHILDREN | | | 0.0141 | 0.5790 | -0.0128 | -0.4590 | 0.0484 | 1.1490 |
| SPECIALIZED | | | -0.0608 | -0.6550 | -0.0888 | -0.6730 | 0.1783 | 0.8810 |
| DIVERSIFIED | | | -0.0900 | -0.7910 | -0.1577 | -1.0020 | 0.5314 | 2.2070 * |
| BORN IN ISRAEL | | | 0.2082 | 2.3210 * | 0.4022 | 6.2170 ** | 0.4700 | 5.3710 ** |
| ASIA/AFRICA ORIGIN | | | 0.1369 | 2.1580 * | 0.0967 | 0.9960 | 0.3544 | 1.7710 * |
| FLOWERS | | | -0.1944 | -2.2840 * | -0.1888 | -1.7730 * | -0.5367 | -3.3370 ** |
| POULTRY | | | 0.0468 | 0.6950 | 0.0590 | 0.6900 | -0.1172 | -0.9060 |
| FIELD CROPS | | | -0.0467 | -0.7250 | 0.0099 | 0.1140 | 0.0792 | 0.6180 |
| CATTLE | | | 0.2160 | 2.4550 ** | 0.1050 | 0.9300 | -0.1395 | -0.8730 |
| YEARS OF SCHOOLING | | | 0.0105 | 0.8750 | 0.0721 | 4.9330 ** | 0.0609 | 3.3040 ** |
| NORTH | | | -0.2274 | -3.3510 ** | -0.1726 | -1.8730 * | -0.6129 | -4.6560 ** |
| SOUTH | | | -0.0587 | -0.9210 | 0.0071 | 0.0830 | -0.1621 | -1.3420 |
| LAND | | | -0.0033 | -2.0050 * | -0.0031 | -1.6770 * | 0.0007 | 0.2940 |
| TENURE | | | 0.0058 | 1.4240 | 0.0023 | 0.3750 | 0.0242 | 2.4850 ** |
| CAPITAL | | | -0.0004 | -4.7390 ** | -0.0004 | -4.0410 ** | -0.0003 | -1.6740 * |

* coefficient significant at 5%.
** coefficient significant at 1%.

**Table 5. Bivariate Probit Participation Results with Child's Participation Given (1981)**

| Variable | Group 2 | | Group 3 | | Group 4 | |
|---|---|---|---|---|---|---|
| | Estimate | t-statistic | Estimate | t-statistic | Estimate | t-statistic |
| CORR. MAL/FEM | 0.2486 | 5.7510 ** | 0.1268 | 2.1630 * | 0.2445 | 2.700 ** |
| *Male Operator or Spouse* | | | | | | |
| CONSTANT | -7.3581 | -4.7720 ** | -5.0975 | -2.5870 ** | -1.4341 | -0.4900 |
| AGE | 0.3321 | 6.0330 ** | 0.2486 | 3.6820 ** | 0.1272 | 1.3040 |
| AGE SQUARED | -0.0034 | -6.9340 ** | -0.0026 | -4.4960 ** | -0.0015 | -1.8430 * |
| ADOLESCENTS | 0.0239 | 0.9270 | 0.0297 | 0.9840 | 0.0217 | 0.5400 |
| CHILDREN | 0.0298 | 1.0980 | -0.0139 | -0.4670 | 0.0115 | 0.2680 |
| SPECIALIZED | -0.2973 | -2.8680 ** | -0.1907 | -1.4370 | -0.1094 | -0.5300 |
| DIVERSIFIED | -0.4072 | -3.1080 ** | -0.4465 | -2.6870 ** | -0.2676 | -1.0620 |
| BORN IN ISRAEL | 0.1609 | 1.4850 | -0.0055 | -0.0340 | -0.1623 | -0.4220 |
| ASIA/AFRICA ORIGIN | -0.0488 | -0.6480 | 0.0139 | 0.1200 | -0.3467 | -1.3550 |
| FLOWERS | -0.3988 | -4.0400 ** | -0.4186 | -3.3440 ** | -0.3531 | -2.0540 * |
| POULTRY | 0.0070 | 0.0900 | -0.1461 | -1.4490 | 0.0699 | 0.5070 |
| FIELD CROPS | -0.0999 | -1.4260 | -0.0024 | -0.0250 | -0.1607 | -1.2120 |
| CATTLE | -0.3443 | -3.1920 ** | -0.3146 | -2.4230 ** | 0.1043 | 0.6060 |
| YEARS OF SCHOOLING | 0.0367 | 5.2690 ** | 0.0429 | 4.6540 ** | 0.0318 | 2.6470 ** |
| NORTH | -0.0921 | -1.2520 | -0.3104 | -3.0820 ** | -0.6710 | -4.5890 ** |
| SOUTH | -0.0682 | -0.9760 | -0.2071 | -2.2540 * | -0.0482 | -0.3890 |
| LAND | -0.0056 | -2.4450 ** | -0.0084 | -2.8670 ** | -0.0073 | -1.8630 * |
| TENURE | 0.0038 | 0.8620 | -0.0045 | -0.6570 | -0.0104 | -1.0240 |
| CAPITAL | -0.0010 | -6.3290 ** | -0.0004 | -2.7390 ** | -0.0003 | -1.4770 |
| CHILD WORKS OFF | 0.0910 | 1.6290 | 0.1198 | 1.5870 | 0.0878 | 0.8180 |

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**Table 5.** (continued)

| Variable | Group 2 Estimate | Group 2 t-statistic | Group 3 Estimate | Group 3 t-statistic | Group 4 Estimate | Group 4 t-statistic |
|---|---|---|---|---|---|---|
| *Female Operator/Spouse* | | | | | | |
| CONSTANT | -2.7782 | -1.8180 * | -5.3142 | -1.9720 * | -5.1448 | -1.0350 |
| AGE | 0.1114 | 1.9370 * | 0.2034 | 2.0360 * | 0.2380 | 1.3040 |
| AGE SQUARED | -0.0015 | -2.6930 ** | -0.0022 | -2.3770 ** | -0.0026 | -1.5520 |
| ADOLESCENTS | 0.0359 | 1.0890 | -0.0337 | -0.7470 | -0.0177 | -0.2760 |
| CHILDREN | -0.1149 | -2.8660 ** | -0.0187 | -0.4570 | -0.1456 | -2.0150 * |
| SPECIALIZED | -0.0028 | -0.0250 | -0.2448 | -1.5180 | -0.1011 | -0.3540 |
| DIVERSIFIED | -0.1479 | -0.9830 | -0.1445 | -0.7130 | -0.0952 | -0.2910 |
| BORN IN ISRAEL | 0.4731 | 4.4500 ** | -0.0322 | -0.1830 | -0.0140 | -0.0280 |
| ASIA/AFRICA ORIGIN | -0.1382 | -1.6030 | -0.2476 | -1.8360 * | -0.2637 | -0.8010 |
| FLOWERS | -0.3879 | -3.2030 ** | -0.4364 | -2.6100 ** | -0.1577 | -0.5900 |
| POULTRY | -0.1908 | -2.0250 * | -0.2240 | -1.8180 * | -0.2364 | -1.1750 |
| FIELD CROPS | 0.0897 | 1.0290 | 0.1791 | 1.4710 | 0.0839 | 0.4100 |
| CATTLE | -0.0964 | -0.7590 | -0.3842 | -2.3790 ** | -0.1099 | -0.4070 |
| YEARS OF SCHOOLING | 0.0750 | 7.4850 ** | 0.0533 | 3.9720 ** | 0.0457 | 2.1900 * |
| NORTH | 0.0050 | 0.0550 | -0.1370 | -1.0700 | -0.3478 | -1.6960 * |
| SOUTH | 0.1691 | 2.0900 * | -0.3470 | -2.8070 ** | -0.3192 | -1.5390 |
| LAND | -0.0048 | -2.2650 * | -0.0004 | -0.1370 | -0.0100 | -1.4820 |
| TENURE | -0.0087 | -1.7420 * | -0.0029 | -0.3490 | -0.0276 | -2.1860 * |
| CAPITAL | -0.0004 | -3.1730 ** | -0.0001 | -0.8640 | -0.0005 | -1.7810 * |
| CHILD WORKS OFF | 0.0853 | 1.2550 | 0.1253 | 1.2900 | 0.2775 | 1.7450 * |

* coefficient significant at 5%.
** coefficient significant at 1%.

**Table 6. Comparing Off-Farm Participation Frequencies (1981)**

| | Group of Households | | | | |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | All |
| *Males* | | | | | |
| Actual frequency | 0.550 | 0.458 | 0.388 | 0.391 | 0.515 |
| Joint estimation | | | | | |
| Predicted | 0.607 | 0.455 | 0.363 | 0.368 | 0.553 |
| At the means | 0.508 | 0.549 | 0.529 | 0.570 | 0.519 |
| Separate estimation | | | | | |
| Predicted | 0.592 | 0.474 | 0.337 | 0.321 | |
| At the means | 0.496 | 0.399 | 0.435 | 0.567 | |
| Predicted w/kids' work | | 0.473 | 0.345 | 0.323 | |
| *Females* | | | | | |
| Actual frequency | 0.292 | 0.154 | 0.104 | 0.066 | 0.245 |
| Joint estimation | | | | | |
| Predicted | 0.171 | 0.038 | 0.012 | 0.003 | 0.130 |
| At the means | 0.195 | 0.186 | 0.189 | 0.185 | 0.193 |
| Separate estimation | | | | | |
| Predicted | 0.167 | 0.038 | 0.003 | 0.003 | |
| At the means | 0.175 | 0.189 | 0.115 | 0.093 | |
| Predicted w/kids' work | | 0.038 | 0.002 | 0.001 | |
| *Children* | | | | | |
| Actual frequency | | 0.470 | 0.594 | 0.644 | 0.536 |
| Joint estimation | | | | | |
| Predicted | | 0.423 | 0.793 | 0.883 | 0.609 |
| At the means | | 0.509 | 0.572 | 0.564 | 0.537 |
| Separate estimation | | | | | |
| Predicted | | 0.424 | 0.852 | 0.824 | |
| At the means | | 0.517 | 0.640 | 0.622 | |

Note: the actual frequencies are somewhat different from those reported in table 1 because of the different treatment of missing values.