COMPARATIVE STUDY OF LAND REFORM
IN LATIN AMERICA
BACKGROiND PAPER

ASENTAMIENTO MANAGEMENT AND PRODUCTIVITY CHANGES
IN CHILE'S CENTRAL VALLEY

by

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NOTE

1. This report was prepared as a background paper for a comparative study of land reform in Latin America conducted by the Development Economics Department of the World Bank. The main report by Shlomo Eckstein, Thomas Carroll and Douglas Horton, summarized the lessons that can be learned from a comparison of the land reform experiences of Bolivia, Chile, Mexico, Peru, and Venezuela.

2. The background papers vary substantially in terms of their subject matter and methodology. In most cases published and official documentation have been supplemented by field investigations.

3. Since most of the data were collected by other agencies, the IBRD can not attest to the accuracy of the statistical information which appears in this report. The views expressed are those of the author(s) and do not necessarily represent those of the Bank.
Asentamiento Management and Productivity Changes
In Chile's Central Zone

The often heated and always complex debate over agrarian reform in Chile has involved questions of political power, income distribution, and social welfare. But the broad interests of the Chilean society keep the theme of production in the forefront of the debate. Some have argued that the agrarian reform caused a drop in agricultural production both in the private sector and on the newly reformed farms. Our analysis in Section II has suggested that at least during the more orderly and less conflict-filled Frei period, this did not occur, on the average, in either the reformed or the private sectors. In addition, marked shifts toward more labor intensive and higher value crops took place, apparently in response to changing economic conditions.

However, the value added per hectare from crop and livestock production dropped considerably on some reformed farms compared to the fundo prior to expropriation, while it increased significantly on others. The existence of these differences has led us to an analysis of what factors produced them. This section, then, is an attempt to determine what factors contributed to the changes in total crop and livestock value added per hectare in the reformed sector. The focus is not on the differences between the reformed and private sectors, but on the reformed sector alone.

We approach this problem from a farm management point of view. We argue, however, that farm management under the very peculiar circumstances characteristic of the Chilean agrarian reform involved factors usually not considered in analyses of production. First, the farms were collectively operated enterprises
BACKGROUND PAPERS PREPARED FOR THE LAND REFORM STUDY

Land Reform in Chile, by Eduardo Cifuentes. Studies in Employment and Rural Development No. 15.


The Impact of Agrarian Reform on Chile's Large Farm Sector, by David Stanfield, and Others. Studies in Employment and Rural Development No. 25.

at least during the interim three years after expropriation. The change in how decisions were made about the operation of the farms was dramatic and undoubtedly introduced confusion into the farms' management. The fundo usually operated with a fairly rigid hierarchical structure, where the patron and his staff gave the orders about what to do, where to plant, when to irrigate. On the asentamiento, there was a diffuse structure without a clear chain of command; in fact, on many asentamientos there existed strong pressures to avoid defining authority allegedly to keep a small group of asentados from becoming new patrones.

Unaccustomed to the operation of a large farm, the asentados often had difficulties in securing needed machinery, in making the necessary arrangements for the purchase of seeds and fertilizer, as well as in selling the farm's production after the harvest. Such undeniable confusion on the newly expropriated farms certainly affected production.

Other factors, however, tended to reduce the impact of these adverse influences. As has been noted, the new asentados were not new to the farming business since they and their fathers had grown crops and raised animals on their own plots as well as on the central farm enterprise. They had on some farms functioned as a group in a union and certainly as small work gangs responsible for milking the cows, tending the orchards, or planting and cultivating the corn. They also had in many instances good political connections in the agrarian bureaucracies which helped them to get the short-term loans needed to finance the yearly production as well as longer-term loans for the building up of the enterprise through the purchase of machinery, new houses and buildings, and getting the irrigation canals in good condition.
In order to evaluate the overall tendencies of these and other factors in influencing the change in the value added of production by the farm enterprise, we selected measures of the various phenomena which might affect such a change but which also had some relationship with the structural changes being occasioned by the agrarian reform. This analysis, then, is not an analysis of the optimum combination of resources that might produce the most efficiently run enterprise, but rather a search for structural factors that might contribute to an increase or decrease in the value added per hectare after the farms' expropriation.

**Definition and Measurement of Value Added**

We define the value added concept similarly to Yang's notion of net farm output which "represents the net addition of wealth from farming. The value added per hectare of each annual and perennial crop, orchard crop, and vineyard was calculated with the following formula:

\[
\text{value added/hectare} = \text{average yield/hectare} \times \text{constant (1971)}
\]

\[
\text{price} - (\text{average value of purchased seeds/hectare} + \text{average value of fertilizer/hectare} + \text{average value of pesticides and herbicides/hectare})
\]

The variable should be interpreted as representing the value added to the central farm enterprise by the employment of the resources controlled by the farm. Included in this formulation of resources controlled by the farm are land, labor, machine and animal power, and fixed capital assets.

One set of calculations for the values of production, fertilizer, pesticides, and herbicides was made from the 1970/71 sample data. Too little information on seed use was available to allow these calculations from sample data. A second set of information on the variables was compiled from Insumos.

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Físicos en la Agricultura: Año 1971-72, "Costos de la producción por rubro," and tables of average yields provided by the Instituto de Desarrollo Agropecuario (INDAP). A comparison of the values calculated from the sample data with those calculated from secondary sources showed few differences. Thus the sample averages were used wherever possible. Secondary information was substituted in the cases where no sample data was present. The secondary sources were also used in the few cases when the sample average was based on a very small number of observations and was very different from the secondary average.

At this point averages of each variable for each crop category were calculated. These averages were used as substitutes in cases where neither sample nor secondary data were available. The value added/hectare for each crop and an average of value added/hectare for each crop category were then calculated. The crop category averages were used for five crops on which no information was available. These crops appeared only seven times and accounted for less than 30 hectares in both samples together.

To facilitate computation of value added per farm the value added/hectare figures for each crop were combined into 24 groups on the basis of similarity of value added. The average value added/hectare was then calculated for each group. From these group averages an index of value added/hectare was derived.

The derived value added/hectare (VA) variable was used to obtain a total value added by crops. These figures were calculated by multiplying the hectares of each crop on a farm by each crop's VA and summing the results for each farm. The average value added per crop hectare for each farm was also calculated by dividing the above sums by the total crop hectares on each farm. These last two variables permit an immediate comparison of the relative cropping intensities of the farms as well as the cropping intensity in relation to wheat.
goats, and feeder cattle were not found. The feed costs for these categories were calculated by multiplying the cost figure for the most closely related category (broilers, sheep in general, and cattle in general) by the ratio of the animal unit of the unknown category to the animal unit of the category whose feed cost was known. The livestock value added was calculated for each livestock category by subtracting the feed cost per animal from the value per animal. Total value added was calculated by adding the crop and animal VA estimates for each farm.

We considered three groups of factors that might be related to the change in value added after expropriation. The first group is composed of the characteristics of the fundo prior to the initiation of the agrarian reform in 1955 that reflected the management of land, labor, and capital resources. The value added per hectare in 1965 was used to control for "regression effects," i.e., the tendency for the initial level of a variable to be correlated with its change.

The number of tractors per hectare and the intensity of labor use measured by the number of paid man-days per basic irrigated hectare in the farm reflect the extent to which these factors were used in the fundo and thereby indicate the form of factor mix with which the permanent labor force, the future asentados, were accustomed. Depending on the availability of machinery and the amount of influx of labor after expropriation, we would expect that the organization of the farm around high usage of such factors prior to expropriation should be related to the change in value added.


2/ Theodore Brinkman, Economics of the Farm Business (Berkeley, California, 1935) provides the classic rationales for these expectations.
The proportion of the land in the central enterprise (not share-cropped or turned over to the permanent workers as raciones) is an indication of how experienced the workers were prior to expropriation with "management" decisions, how well they knew the marketing system, the technology associated with crops, and, in the case of sharecroppers, how well they managed to get credit to finance the year's plantings. Of course we assumed that the land not in the central enterprise we used by workers who later became asentados, which was practically always true except in rare cases where sharecroppers were transients.

Finally, the proportion of land in high value crops such as fruit and vegetables is an indication of the cropping patterns of the farm as well as the extent to which the management of these crops was known among the permanent workers who later became asentados.

All of these measures refer to the agricultural year 1965, and are thereby subject to similar price and climate conditions as well as the same political environment, in a general sense at least.

The second group of variables includes the changes in the structure of the farm--the year of its expropriation, the change in proportion of land in the central enterprise, the change in cropping patterns--as well as changes in mechanization and labor intensity on each farm. We also included a measure of non-farm work experience of the asentados to see what effect "reverse migration" might have on reformed farm management.

The third set of factors includes those phenomena which we were able to observe only during the second phase of the study, such as the extent to which the asentados had been members of unions, the degree of participation in group activities, and so on.

1/ Cristobal Kay, "La participacion campesina en el gobierno de la U.P.," Mimeo paper (Universidad de Chile, 1973) is one example among many who offers this general hypothesis.
decisions; and how involved the Corporación de la Reforma Agraria (CORA) was in the management of the farm. The union membership and participation variables indicate experience with group decision-making. CORA involvement is a proxy for technical assistance.

To summarize, these three groups of variables reflect: (1) the conditions on the farms prior to the reform, the raw materials that the asentados received either directly in the form of land or indirectly in the form of experience with machinery, various cropping patterns, and enterprise management; (2) the results of the asentados' management of the farms in terms of the changes that were introduced in the factor combinations; (3) non-farm experiences and influences on management as well as on group decision-making techniques; and (4) the group's general orientations and consensus around social issues which should have a bearing on how well the group functions in its collective decision-making.

Due to the limited number of farms and the large number of variables in the analysis, we proceeded in two steps. The first involved the calculation of three equations relating the change in value added to each of the three sets of independent variables separately. The first equation is presented in Table I.

Table I shows the "best" equation for predicting the change in value added between 1965 and 1970 using only the measures of the farms' characteristics in 1965. As might be expected, this change in value added depends on the amount of value added in the base year, the so-called regression or ceiling effects. This means that those farms with higher levels of value added in 1965 tended not to increase or even to decrease somewhat, while the farms with the lowest levels
Table 1. Results of Stepwise Regression Predicting the Change in Value Added from the 1965 Variables Only

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Beta</th>
<th>Standardized Beta</th>
<th>F of the Beta</th>
<th>Probability of Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Initial level of value added per BIH in 1965</td>
<td>-1.10</td>
<td>-43</td>
<td>6.48</td>
<td>&lt;0</td>
</tr>
<tr>
<td>2) Percent of cultivated land in fruit and vegetables in 1965</td>
<td>-3.67 X 10</td>
<td>-.51</td>
<td>7.81</td>
<td>&lt;0</td>
</tr>
<tr>
<td>3) Number of tractors per BIH in 1965</td>
<td>5198.6</td>
<td>.36</td>
<td>5.13</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>4) Percent of farm land in central enterprise in 1965</td>
<td>-1.64 X 10</td>
<td>-.32</td>
<td>2.96</td>
<td>&lt;.2</td>
</tr>
</tbody>
</table>

Constant = 1.985 X 10

R² = .60
R² = .36
F = 3.67, df₁ = 4, df₂ = 26, p <.05
Dependent Variable = change in value added per BIH
of value added in 1965 tended to increase by 1970. Such tendencies are to be expected in most analyses of change scores and are usually statistical artifacts that should be eliminated.

Once we control for ceiling effects three factors emerge as important determinants of the change in value added. The factor whose contribution we can be most sure of is the initial percent of land planted to fruit orchards and vegetables. Those fundos in 1965 that had a low proportion of their land in these labor-intensive and high-value crops showed an increase in value added by 1970. This relationship may derive from the introduction of these high-value crops after expropriation, so final interpretation of this finding will be presented later where both the initial level and the changes in the percent of fruit and vegetables are included in the equation.

The second factor is the level of investments in tractors on the fundo in 1965. Those fundos with more tractors per basic irrigated hectare tended to show an increase in value added during the intervening years after expropriation. We have said that in most cases the machinery on the expropriated fundos was sold at auction, and a check of the age of the tractors on the asentamientos showed that most were purchased new after expropriation. The fact that the initial level of tractor investments has an effect on the change in value added may imply that the "human" investments in the form of trained people able to use and repair machinery plus the asentados' capabilities in effectively using this experience are of great importance to increased production. The relationship between the actual change in the number of tractors on the reformed farms and the change in value added will be examined in the final part of this section. At this point we can only note that the initial level of machinery use is positively related to the change in value added.
The final factor shown in Table I is the proportion of a farm's land in the central enterprise. Apparently on those farms where in 1965 there was less land under the direct control of the patron there occurred an increase in the value added by 1970, while on farms where the patron operated more of the farm's land himself in 1965 the value added decreased after expropriation in 1970. This relationship points toward the often mentioned factor of "entrepreneurial experience" as crucial in the operation of the reformed unit after expropriation. On farms where prior to expropriation the permanent workers held and operated more of the land themselves either as sharecroppers or as part of their royalties there occurred an increase in value added after expropriation. The low $F$ as well as the low zero order correlation makes it difficult to make firm statements about this relationship, but the tendency is there and will be further analyzed.

Table 2 presents the second set of variables and their relationships with the change in value added. These variables are indicators of change in the structure of the farm between 1965 and 1970 plus indicators of other interim activities such as date of expropriation, union activities, and extent of non-farm work experiences.

The initial level of value added in 1965 was introduced into the equation on the first step, as in the previous equation, to control for the ceiling effects noted earlier.

The first factor to emerge, once we controlled for the initial level of value added, was the change in the percent of the farm's total area that was operated in the central enterprise. Asentamientos where there was a decline in the percent of land operated in the collective enterprise tended to show an increase in the value added for that enterprise when compared to the value added
Table 2. Results of Stepwise Regression Predicting the Change in Value Added from Other Changes on the Farm

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Beta</th>
<th>Standardized Beta</th>
<th>$F (df_1 = 1, df_2 = 24)$</th>
<th>Probability of Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Initial level of value added</td>
<td>-.25</td>
<td>-.10</td>
<td>.65</td>
<td>--</td>
</tr>
<tr>
<td>(2) Change in percent of land in central enterprise</td>
<td>1.5 x 10</td>
<td>-.48</td>
<td>14.9</td>
<td>p .001</td>
</tr>
<tr>
<td>(3) Change in resident labor intensity</td>
<td>100.6</td>
<td>.37</td>
<td>8.80</td>
<td>p .01</td>
</tr>
<tr>
<td>(4) Change in proportion of land in fruit and vegetables</td>
<td>7.2 x 10</td>
<td>.27</td>
<td>5.50</td>
<td>p .05</td>
</tr>
<tr>
<td>(5) Proportion of asentados with factory work experiences</td>
<td>14.5.6</td>
<td>.19</td>
<td>3.0</td>
<td>p .1</td>
</tr>
<tr>
<td>(6) Year of expropriation</td>
<td>-804.7</td>
<td>-.20</td>
<td>2.97</td>
<td>p .1</td>
</tr>
</tbody>
</table>

**Constant = 1958.9**

\[
R^2 = .85
\]

\[
R = .73
\]

\[
F = 10.67, df_1 = 6, df_2 = 24, p \quad .001
\]

Dependent variable: change in value added per BTH
per hectare of the rancho's central enterprise in 1965. We interpret this finding, in part at least, to be the result of the asentados having eliminated land not in high-value crops, land that was capable of producing but did not have large investments in orchards, vineyards, for example, from the collective enterprise. The fact that the average change in this variable was 4.1 percent (see Table 4) indicates that the overall trend was to increase land in the central enterprise, which in most cases was what CORA was strongly encouraging during the interim asentamiento phase. However, on those farms where there was an increase in the central enterprise, the tendency was for there to be a drop in the productivity of this enterprise. The most common explanations for this drop are: (1) that there was no incentive for the asentados to work on the collective land, since payment for this work came from the sales of crops and was often delayed for two or even three years, and since the asentado received an "advance" monthly from CORA whether he worked or not, and (2) that the materials necessary for making the land produce did not arrive, neither the large capital investments in the form of machinery nor the yearly inputs of seeds and fertilizer. Both the incentive and the investment arguments could be buttressed by the fact that in many cases the quality of land operated by the asentamiento declined because of the carving out of unexpropriated parcels or reserves, so that it was more difficult to maintain productivity, let alone increase it.

These hypotheses about why the productivity ratio increased on those farms where the percent of land in the central enterprise decreased while the ratio decreased on the farms where this percent increased should be the subject of further study in order to determine the relative importance of each explanation. At this point we can say that the relationship is there and maintains itself in conjunction with other factors.

2/ The standard lament of the asentado leadership whom we interviewed in the field study.
Table 2 indicates that the second independent factor most significantly related to a change in value added is the change in resident labor intensity (man-days per basic irrigated hectare). An increase in the intensity of resident labor use was positively related to an increase in the value added.

As noted in the first section of this report, on some farms the government was able to introduce new residents from outside the borders of the farm, but on most farms the increase in the number of new permanent workers was done by simply incorporating the sons of the imquilinos-asentados as asentados.

Whatever the source, the contention that it was possible to increase the amount of permanent labor in the large farm sector primarily as an income redistribution measure may well have been true, but such an increase contributed also to an increase in the value added to the farm's production. We will not speculate further at this point about the reason for these relationships since the intensity variable apparently is overshadowed by other factors measured in 1965. The discussion of Table 3 will cover some of these points.

The third factor shown in Table 2 is the change in the proportion of land in the central enterprise that was dedicated to the cultivation of fruit and vegetables. Should the proportion of land in these high-value crops increase, it would be expected that the overall value added estimate would increase. What is interesting, however, is the fact that the effect of this change comes in addition to the changes in the percent of land in the central enterprise and resident labor intensity. Those farms that decreased the proportion of land in the central enterprise and increased resident labor and increased the proportion of high-value fruit and vegetables were very likely to have

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1/ Eduardo Frei, Presidential Message on the Agrarian Reform Law ...
increased the productivity of the central enterprise. Such relationships tend to support the incentive and investment side of the productivity argument presented above, but more will be said about this point later.

The fourth factor in Table 2 is a measure of the extent to which the asentados had factory work experiences, an indication of the extent to which certain asentamientos were populated by return migrants who had the capabilities to have found work in the urban industrial sector. The proportion of workers who had worked at one time in a factory yielded a significant and positive coefficient in the equation.

Most authors who have considered the inter-sectoral shifts in the labor force during the development process have focused on the requirement for developing industry to absorb the supposed labor surpluses in the rural economy. This shift in residence and employment from rural to urban areas has been a general phenomenon in most countries. Many authors have studied the problems of incorporating such an influx into the urban labor force and have indicated that a certain selection process occurs, those individuals with a better fit in terms of their motivations, training, and economic capacity move into the higher paying jobs that are generally characteristic of the industrial sector.

The experience of moving to an urban job undoubtedly has its effects on migrants. Seeing how factories are operated, where the work is highly regimented and where the workers usually have had some experience with self-organization through their union is likely in sharp contrast to the farm where the workers labor in isolation and depend on a cash wage substantially supplemented by the small-scale exploitation of regalías.


2/ E.g., Bert Hoselitz ... and especially the article by Jorge Balon
These two processes, that of selection of a particular type of farm worker to become migrant and that of affecting the migrant through experiences with the organizational forms of factories, would be important training for participating in a worker-operated enterprise like an asentamiento should some of these out-migrants return to the farm. The overall percentage of individuals who have had such experiences and have returned to the asentamiento is small in our sample, 6.03 percent (see Table 4), but of the sub-sample of household heads this proportion rises to about 15 percent, and on the 15 asentamientos which had anyone who had such experiences the average percent of household heads who had worked in a factory rises to nearly 23 percent. Whatever the total number, the variation of this variable in conjunction with the change in value added indicates that such experience and selection are important for the productivity of the asentamiento's central enterprise.

The final factor in Table 2 is the year of expropriation of the fundo. The asentamientos formed from fundos expropriated earlier tended to show an increase in value added per basic irrigated hectare while those more recently expropriated tended toward a decline. The fact that the newer asentamientos tend to have more difficulties in increasing productivity is not surprising due to the problems of organization that inherently afflict the transformation of a privately operated enterprise to one that is worker-operated. What is somewhat surprising is the slightness of the relationship. We are not statistically sure of the existence of the relationship, and as we shall see later, the effect of this variable is neutralized by other factors.

1/ The undeniably lower productivity of the farms expropriated earlier is controlled by having this variable in the equation on the first step.
The third set of variables, those dealing with union membership, CORDA involvement in asentamiento decisions, and the extent of impact of asentado participation (see Chapter IV for a discussion of these concepts) did not yield a multiple R significantly different from 0. Since we have no basis for an historical comparison of these variables, i.e., their change over time, we cannot be sure of the lack of relationship, but the indication is that such factors have little to do with productivity changes.

Table 3 provides the equation for predicting changes in value added from a combination of the initial conditions found on the fundos prior to the beginning of the agrarian reform in 1965 and the changes these farms experienced by 1970. Once again we controlled for the "ceiling" effects by introducing the initial level of value added in 1965 as the first variable in the equation. The list of possible predictors of the change in value added included the important predictors that emerged in the discussions of Tables 1 and 2.

Clearly, a central factor in the productivity changes on these 31 asentamientos was the proportion of land in the central enterprise. Those farms that decreased the proportion of BHN in the collective enterprise (in comparison with the proportion in the central fundo enterprise) tended to increase the value added per BHN in the collective enterprise. We speculate that this relationship indicates economically sound management decisions on those farms to continue profitable lines of production that the fundo had developed and discontinue other operations. The land thereby freed from the central collective enterprise was used to enlarge individual family plots of the asentados. It is also possible that new lines of production were developed that would use less land while producing more, but this crop intensity factor
Table 3. Results of the Stepwise Regression Predicting Changes in Value Added from Initial Conditions and Subsequent Changes in Farm Operation

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Beta</th>
<th>Standardized Beta</th>
<th>F</th>
<th>Probability of Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Initial value added, 1965</td>
<td>-0.35</td>
<td>-0.14</td>
<td>2.52</td>
<td>p .2</td>
</tr>
<tr>
<td>(2) Change in proportion of land in central enterprise</td>
<td>-2.93 X 10</td>
<td>-0.94</td>
<td>82.52</td>
<td>p .001</td>
</tr>
<tr>
<td>(3) Initial proportion of land in central enterprise</td>
<td>-3.20 X 10</td>
<td>-0.63</td>
<td>38.16</td>
<td>p .001</td>
</tr>
<tr>
<td>(4) Change in percent of land in fruit and vegetables</td>
<td>7717.4</td>
<td>0.29</td>
<td>12.04</td>
<td>p .01</td>
</tr>
<tr>
<td>(5) Proportion of asentados with factory work experience*</td>
<td>117.1</td>
<td>0.15</td>
<td>3.50</td>
<td>p .1</td>
</tr>
<tr>
<td>Constant = 31587.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Not including this variable, the R² = 82, F = 30.17, p = .001

R = .92
R² = .84

F = 27.16, df = 5, df = 25, p = .001

Dependent Variable = change in value added per BIIH
is apparently independent of the change in the proportion of land in the central enterprise. That is, controlling for increases in high valued crops, the negative relationship between the change in the proportion of land in the central enterprise and change in productivity of that enterprise remains.

Two reservations should be kept in mind when interpreting these findings, however. First, the decline in the relative size of the central enterprise on some farms in the sample was in direct conflict with CORA attempts to maintain and build up this activity on the asentamientos. Secondly, for the sample as a whole, the tendency was for the proportion of central enterprise land to increase (the average change was +4.1%, as shown in Table 4). Therefore, when we note a negative correlation between the change in central enterprise relative size and change in productivity, it is "against" the overall trend for the sample as a whole at the time of the study. The pressures for de facto subdivisions of some farms at the time and even more so in recent months, however, will probably give more instances of the tendencies we have noted.

The second independent variable shown in Table 3 both adds to the significance of the first and introduces yet another "management" factor into the argument. This variable is the initial proportion of land in the central enterprise. The multiple correlation method selects variables that have an "additive" effect, that is the initial proportion adds to the explanation of changes in productivity. Since both the initial level and the change in the proportion of land in the central enterprise enter into the equation, we argue that these variables are indicators of independently operating forces. While the change in the proportion probably indicates the emphasis of profitable production lines, the initial values of this variable in 1965 has another meaning.
Farms with lower proportions of land in the fundos' central enterprise in 1965 tended to show an increase in productivity by 1970, while those with a high proportion of BIH in the central unit tended to decrease (or not to increase as much). We think that this finding supports the notion that the shift from a private fundo to collective asentamientos is facilitated where the workers have had significant management experiences on their own plots of land or as sharecroppers prior to the reform. This variable was marginally effective as a predictor in Table 1, but emerged as an undeniably important factor when combined with the change in the proportion of BIH in the central enterprise. The high negative correlation between these two variables (−.60 in Table 4) and the insignificant correlation between the initial 1965 level and subsequent change in value added (−.007 in Table 4) points out the capacity of multiple correlation to uncover statistically "hidden" relationships. A weakness of the method is that the likelihood of multicollinearity makes it difficult to say which variable is more important. Nonetheless, the separate as well as combined impact of the two variables is demonstrated in Table 3.

The third variable in Table 3 tends to support the argument that the asentamientos which increased their productivity per hectare did so by selecting highly profitable lines of production for the central enterprise. Those farms that increased the proportion of BIH in fruit and vegetables also tended to increase the value added per BIH. Again it appears that on some asentamientos at least production decisions were made more in accord with the idea of securing higher farm income than being in accord with the policy directives which at times emerged from the agricultural bureaucracy to produce more grain and ease the pressures to import these materials. However, other directives
competed with this idea and tended to encourage the production of fruit for export. Vegetables produced close to urban centers, which is the case in most of the sample, also had a ready market and prices varied more in accord with demand than did the officially controlled price of wheat and corn.

Table 4 shows that the proportion of land in 1965 which was dedicated to fruit and vegetables was small, not quite 7% of total BIH. However, by 1970 there had occurred an increase of this proportion to nearly 23% of the central enterprise BIH. Such a change reflects some of the differences between the asentamiento after the reform and the fundo prior to it. The fundo owner tended to emphasize the extensive crops which required low labor inputs but delivered a steady if low income. On some asentamientos at least, with more labor available because of the incorporation of the sons of the inquilinos as asentados, permanent resident labor, wanted to maximize the productivity of the collective lands as long as they had to operate as a collective. This is not to say that the income of the collective was maximized, since the sale of fruit and vegetables often occurred in ways to provide direct payment to the asentados and not be processed through the CORA bureaucracy (to avoid the 2 year delay on the one hand in calculating the net income of the asentamiento and on the other to avoid paying CORA the usual 10% to be applied toward the purchase of the farm and to repay CORA for the long term capital investments CORA may have made in the asentamiento). The land use data, however, shows how important shifts were made and how these shifts were related to the land's productivity.

The final variable in Table 3 is the proportion of asentados with factory work experience. We have already discussed the likely reasons for the appearance of this variable as a predictor of change in productivity per hectare. Processes involving the selection of out-migrants, their work
Table 4: MEANS AND INTERCORRELATIONS OF VARIABLES IN THE THREE EQUATIONS (n=31)

<table>
<thead>
<tr>
<th></th>
<th>Means</th>
<th>1</th>
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<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<tbody>
<tr>
<td>(1) Initial Level of Value Added........</td>
<td>5065.5</td>
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<td></td>
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<tr>
<td>(2) Percent of Land in Fruit and Vegetables</td>
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<td>-0.12</td>
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<tr>
<td>(4) Percent of Farmland in Central Enterprise</td>
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<td>-0.13</td>
<td>-0.07</td>
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<tr>
<td>(5) Change in % of Land in Central Enterprise</td>
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<td>(7) Change in Proportion of Land in Fruit and Vegetables</td>
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<tr>
<td>(8) Percent of Asentado with Factory Experience</td>
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<td>0.05</td>
<td>0.36</td>
<td>-0.003</td>
<td>-0.13</td>
<td>0.01</td>
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<tr>
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<td>0.25</td>
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<td>-0.06</td>
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<td>0.04</td>
<td>-0.27</td>
<td>-0.20</td>
<td>0.36</td>
<td>-0.34</td>
<td>0.10</td>
<td>-0.54</td>
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<tr>
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<td>0.29</td>
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<td>0.45</td>
<td>0.27</td>
<td>0.005</td>
<td>-0.28</td>
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Table 4: MEANS AND INTERCORRELATIONS OF VARIABLES IN THE THREE EQUATIONS (n=31)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Means</th>
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<th>6</th>
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<tr>
<td>(4) Percent of Farm in Central Enterprise</td>
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<td>-43</td>
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<td>1.00</td>
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<td>.11</td>
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<td>-.38</td>
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<td>.45</td>
<td>.27</td>
<td>.005</td>
<td>-.28</td>
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</table>
training received while off the farm, and their return to the farm should all be explored further research. What is important to note at this point is the likely importance of this factor in the management of collectively run enterprises.

In our discussion of Table 3, we have distinguished four "management" dimensions as most predictive of changes in asentamiento productivity. The first is the entrepreneurial experience of the asentados in the management of small enterprises prior to the reform. The more the asentados had such experience, the more likely they were to raise the productivity per hectare of the farm once it was expropriated. The second factor is the selection of lines of production which had produced best for the fundo and distribution of the remaining land to the asentado families for individual attention. The more such concentration of the central enterprise, the more the productivity of this enterprise increased. The third dimension is the focus of the collective on high value fruit and vegetable production. This focus likely developed during the asentamiento period, since the proportion of land in such production when the farm was a fundo was very low. Having plenty of labor and a desire to take advantage of the market opportunities probably led to this focus. Finally, the impact of outside work experiences on some asentados apparently was important in helping operate the farm when it was expropriated.

These four dimensions are independent, that is they have an effect on the change in productivity individually regardless of the effect of the other factors. The implications of these findings are fairly obvious, again as limits to changes in productivity as well as indicators of what to do to raise productivity. Farms that have few people with factory work experience
and farms where the asentados had little experience as "land users" prior to the reform, may have to have more attention from the reform agencies and technical assistance bureau than farms with such people. On the other hand, specific actions could be taken on asentamientos to critically evaluate the lines of production practically open to it and eliminate relatively low producing fields from the enterprise as well as introduce labor intensive high value crops where feasible. Such a plan would likely maximize the productivity of the collectively operated part of the asentamiento as well as the incomes of the individual asentados.