Agrarian reform and agricultural production : Chile, 1970-73.

Leilani Dianne Behn. Wallace

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AGRARIAN REFORM AND AGRICULTURAL PRODUCTION: CHILE, 1970-73

by

Leilani Dianne Behn Wallace

A Thesis
submitted to the Faculty of Graduate Studies
through the Department of
Geography in Partial Fulfillment
of the requirements for the Degree
of Master of Arts at
The University of Windsor

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1973
THE UNIVERSITY OF WINDSOR

FACULTY OF GRADUATE STUDIES

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INTRODUCTION

In recent years, most South American countries have been faced with a seeming paradox in their agricultural systems: although these countries have an apparent sufficiency of productive land on which to grow food for their present populations, they have for several years been net importers of food. Growing awareness of global food shortages and the consequent financial burden of importing food has prompted much concern with the improvement of food production within individual South American countries. Since the formation of the Alliance For Progress in 1961, and its agreement in the formal Charter of Punta del Este regarding the urgency of the issue of land reform in Latin American countries, much of the debate surrounding the improvement of production has centered upon changes in the land tenure structures. This study is intended as an assessment of approaches to restructuring the agricultural system in a specific South American country, Chile.

During the years 1964-1973, Chile became one of the very few Latin American countries to carry out an extensive agrarian reform including large-scale changes in the structure of land tenure. For this reason, it is felt that the case of Chile provides an excellent opportunity for an examination of the impact of changing patterns of land tenure upon food production. The objective of this study is to examine and assess this impact.

This study concentrates on the area south of Santiago, for several reasons. Much of the area represents a pre-reform extreme of land
ownership concentration and rural poverty, especially Cautín Province. It is also a rich wheat-producing area, and a study of approaches to increasing food production should have significance in terms of one of Chile's most valuable agricultural products. Provincial case studies have been selected from the two basic climate types of agricultural land south of Santiago. The Mediterranean type of climate is represented by O'Higgins and Colchagua Provinces together, and the cooler and more moist climate of the Frontier Provinces is represented by Cautín Province. There has been little formal study of the latter agricultural area of Chile; no study known to the writer has attempted to make a systematic assessment of the impact of the agrarian reform upon production.

This study begins with a short history of the evolution of the land tenure structure in Chile. After this basic background is presented, the current literature pertaining to the research problem is reviewed and a short description given of the working hypotheses for the study and the methodology used in testing them. This is followed by a general study of land reform and production in the Southern Agricultural Provinces, two case studies of individual provinces, and the general conclusions regarding the agrarian reform, in that order. A glossary of Spanish words used in the text appears in the Appendix, along with a list of abbreviations and acronyms used for government organizations.
CHAPTER I

HISTORY OF LAND TENURE IN CHILE

Settlement and Evolution of the Hacienda.

The first Spanish expedition arrived in Chile in 1535, and in 1544 the explorer, Valdivia, began distributing encomiendas to settlers who were favored by the crown. Encomiendas were apparently not originally intended as land grants; they merely entitled the colonists to tribute and, more importantly, to labour from the local Indians so that the land could be settled and developed. In Chile the Indian population was relatively small—about 70,000 between the Aconcagua and Maule Rivers, compared with millions in similar areas of Mexico and Peru.1 This meant that labour was scarce in some areas, and according to McBride, "Resort to litigation over Indians was common."2 Due to the lack of sedentary villages in most areas, the kinship group was the common way of distributing Indians among the settlers. This tended to increase the controversy over ownership of Indians, as in many cases kinship ties were either chaotic or simply unintelligible to the Spaniards. After a group of Indians was settled on an encomienda, their numbers would usually begin to diminish from a combination of several factors, including disease, starvation, overwork, and escapes. Up un-


2Ibid. p. 75.
til the mid-1600s, their numbers were commonly replenished by slave raids into the frontier territory south of the Bio-Bio River.¹

Labour problems on the encomiendas also resulted from a Spanish law declaring that children of Indian mothers and Spanish fathers could not be held in encomiendas; it was not infrequent in the 1600s for whole encomiendas to disappear when the entire labour force was declared to be mestizo. Some of the holders of encomienda grants managed to hold onto parcels of land after the dissolution of the encomienda, but in general the de facto control over land under the encomienda did not survive the 17th century. The mercedes, outright grants of land which were much less common than the encomiendas, actually provided the basis for the hacienda system which dominated rural Chile from the 17th to the mid-twentieth centuries.² By the beginning of the 17th century, very large amounts of land had become concentrated in a very few of these estates, owned by families of the conquistadores and other royal favorites.

There was a variety of other types of land holdings during the colonial period. Some of the smaller land grants expanded into large estates by taking over adjacent land; others were subdivided among new generations and became part of the modern pattern of small holdings, or minifundia. The formal abolition of the encomienda in 1720 had little effect upon the land tenure structure, as encomiendas had nearly disappeared by then.³

¹George M. McBride, Chile, p. 86.
³George M. McBride, Chile, p. 119.
Primary sources of labour for the early haciendas were Indians captured on the frontier and a few local landless mestizos or Spanish settlers. The haciendas were at first primarily large livestock enterprises, with extensive methods not requiring much labour, but near the end of the 17th century new opportunities on the Peruvian market encouraged some ranchers to begin wheat enterprises. In order to solve the resulting labour shortages on these commercially-oriented haciendas the owners often offered rentals of land to labourers from outside the estate. By the mid-1700s this type of arrangement became very common.  

The resultant social structure on the haciendas, which continued into the mid-20th century, was a complex mixture of inquilinos (resident wage labourers who often had access to garden plots), cash renters, and sharecroppers. In addition, the hacienda typically employed seasonal labour, usually from small holders in the area who needed a cash wage to supplement their earnings from their own properties. Thus, the classic hacienda system as expressed in most of the agriculturally developed areas of Chile was based primarily on the needs of the colonists to develop solutions for the labour problems involved in changing from extensive cattle operations to commercially-oriented cropping enterprises.

The settlement of the area south of the Bio-Bio River took a somewhat different pattern, due to the presence of about 140,000 hostile Indians immediately south of the river. ² The area was first occupied by the Spanish in the 1600s, but the Indians regained the territory in an uprising around the turn of the century, and the Spanish settlers

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²George M. McBride, Chile, p. 69.
fled to central Chile. Organized settlement of the area was not re-
newed until the early 1800s, after independence from Spain.¹

After independence, the new Chilean government underwrote a large-
scale colonization program to attract northern European settlers, espe-
cially Germans. The official rationale for this immigration scheme was
identical to that used in the 1970s by Bolivia to attract white set-
tlers from Rhodesia—these hardy and thrifty settlers were supposed to
show the lazy and inefficient locals how to farm. In Chile, the gov-
ernment made a major error of judgement in setting up this program; the
program was advertised mainly in the cities of Europe, and the prospec-
tive settlers were not screened carefully enough. The program there-
fore attracted many urban people, some of whom refused to even get off
the boat when they saw the impenetrable temperate rain forest which
awaited them for clearing. Thus, this early colonization scheme was
the first great step in increasing the ethnic diversity of Chile's cit-
ties. However, some European settlers did land at Valdivia, and the
settlements began to spread north and east from Valdivia into the Indi-
an country. At the same time, the frontier which had been maintained
for many years at the Bio-Bio River began to be pushed back by Chilean
settlers from the North.

The government originally made land grants in this area in par-
cels of 20–40 hectares each. However, many of these were sold to spec-
culators, who promptly resold them to estate-building. During the mid-
1800s, after a change in government, the land was sold in larger par-
cels.² Although it was possible and common to build up large estates

¹Ibid., p. 287-288.
²Ibid., p. 292-294.
in the frontier country, the estates never reached the size or the total dominance of the haciendas farther north. The evolving social structure was also somewhat different from that in Central Chile. The system of *inquilinaje*, which had its roots in the enslavement of Indians and Spanish camp followers, never became as dominant in the southern agricultural areas. Sources of labour for the large estates were more likely to be non-resident landless labourers and *minifundistas*. There was also a good deal of migrant labour seasonally from the poorer land to the south of Valdivia.\(^1\) While these people were theoretically more independent than the *inquilinos*, they also lacked the minimal security and protection afforded by the system of *inquilinaje* at its height of development.

This developing social system in the south was further differentiated from other areas by the fact that this area contained the only large surviving population of indigenous people, the Mapuche Indians. A law passed in 1868 created *reducciones*, or reservations, for these natives. Since the Mapuches traditionally held their land collectively in kinship groups rather than in large, organized tribes, these *reducciones* were fairly small, numerous, and widely dispersed in the area. In 1866, 1874, 1927, 1928, 1929, and 1930 legislation was passed "seeking to divide the collective holdings of the Araucanians [Mapuche] to assign adequate lands in severalty to each individual of the kinship group, and to dispose of any remainder for white colonization."\(^2\) White settlers, however, did not always depend upon these laws; various illegal means were also used to take over Mapuche land. Much of the best

\(^1\)Ibid. p. 294.

\(^2\)Ibid. pp. 310-311.
land of the original reserves eventually became part of the large estates. This contributed to the growing agrarian unrest in Chile and eventually sparked the incidents of rural violence described in later chapters.¹

Rural unrest, however, was not unique to the Southern Provinces; conditions deteriorated all over Chile in the early 20th century. In 1917, journalist Pinochet Le Brun investigated the hacienda belonging to the current President and concluded that conditions for rural laborers were actually worse than a century before.² In 1919, Chilean writer Poblete Troncoso published a work on agrarian problems in which he concluded that in Chile there existed a greater monopolization of the agricultural land than in any other country of the world.³ Also in 1919 the unionization process which had begun in Chile’s urban and mining labour forces began to spread to the countryside; the country’s first rural strikes occurred during 1919.⁴ The hacendados, worried by this activity, began to make some attempts at improvement of working conditions on the estates. These improvements, however, primarily affected the inquilinos and not the landless labourers. Reform legislation which began to be passed for the benefit of urban workers at this time

¹Norman Gall, The Agrarian Revolt in Cautín: Chile's Mapuches, West Coast South America Series, American Universities Field Staff Reports, vol. 19, no. 4, passim; and Kyle Steenland, Agrarian Reform Under Allende: Peasant Revolt in the South (Albuquerque: University of New Mexico Press, 1977), passim.

²Pinochet Le Brun, "Inquilinos en la hacienda de Su Excelencia" and "Oligarquía y democracia," cited by McBride, Chile, pp. 157-158.

³Poblete Troncoso, Problema agrícola, Vol. 1, 1919, p. 31. Cited in McBride, Chile, p. 145, with the comment that the statistics seem to support his contention.

⁴Brian Lóveman, "Chilean Countryside," p. 244, and McBride, Chile, p. 166.
bypassed the rural labour force for the most part. Beginning in the 1930s, administrative and legislative pressures were brought to bear upon rural labour; in the 1940s, legislation was passed denying the rural labour force the right to organize.¹

As of 1925, in Chile's central 14 provinces, 375 farms of over 5,000 hectares (.4% of the total farms) held 52% of the agricultural land, while 69,761 holdings under 51 hectares accounted for about 5% of the land. Of these, 41,305 held less than 5 hectares. The 5,396 estates in this area over 200 hectares accounted for 8% of all farm land.² It should be noted that in this rich farming area farms between 50 and 200 hectares also tended to be run like haciendas, especially those under irrigation. Many hacienda owners also own more than one property, so these statistics probably underestimate the concentration of land holdings in the area. The haciendas were and are most prominent in the area surrounding Santiago. Numbers of smallholdings tend to increase as one moves south or north from the capital. In the Atacama Desert, and also in the extreme south around the Straits of Magellan, extremely large landholdings are common; land, however, is not very productive in these areas.

In 1930, McBride estimated from census data that 60-75% of the rural population of Chile lived on the large estates.³ About 25% of these properties were rented out, usually to wealthy foreigners or upper-class Chileans. Many of these renters were absentee, living in the

¹Brian Loveman, "Chilean Countryside," p. 244.
²Republic of Chile, Agricultural Census, 1925. Cited in McBride, Chile, pp. 125, 235, 236.
³McBride, Chile, p. 141.
city like the owners. The land was farmed primarily by inquilino labour, and the working conditions had not improved substantially since the turn of the century. Inquilinos were not generally allowed to supplement their income by working elsewhere or engaging in private enterprise, and this restriction applied to family members as well. In 1930 it was still a common practice to pay inquilinos wages in vouchers which were good only at the hacienda-owned store; prices there were often exorbitant, and a large share of the money paid out in wages came back to the hacienda in excess profits from the store.\(^1\) Conditions for landless labourers were usually much worse than for inquilinos.

In 1940 Chile, which had always been a net exporter of food, became a net importer. Although production increased slightly in the 1940s, population increased more rapidly.\(^2\) Between 1940 and 1954, the national economy saw a redistribution of total income at the expense of the lower classes, with wages declining from 27 to 21% of the national income.\(^3\) The Institute of Economics at the University of Chile estimated the decline of income to farm labourers during this period to be 6%, while farm owners' income increased nearly 50%.\(^4\) Growing peasant militancy along with increasing awareness of the inefficiencies of the haciendas, forced the government to consider agrarian reform.

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\(^1\)Ibid. p. 157.


Attempts at Land Reform

During the 19th century and early 20th there had been a number of colonization schemes which passed as agrarian reform; these schemes had little effect upon the land tenure structure in Chile. The agricultural census of 1955 shows 9.7% of the farms holding 86% of Chile's arable land. On these large estates an average 2 out of 5 hectares was being used productively. The vast majority of irrigated land was on the large estates, and about 30% of the irrigated land on large estates remained under natural pasture.¹

In the late 1950s the broadening of the voting franchise and the introduction of the secret ballot forced a change in the attitude of urban politicians toward the rural labour force, now potential voters. In the 1958 presidential election the Socialist candidate, Salvador Allende, lost to conservative Jorge Alessandri by only 35,000 votes.² The performance of the leftist coalition party, FRAP (Popular Action Front), in the countryside proved that the hacendados had indeed lost much of their traditional control over rural votes. The 1961 Congressional elections saw the right failing to gain 1/3 of the seats in Congress, for the first time in the 20th century; FRAP obtained more votes than any other slate, and the centrist Christian Democrats outperformed the right.³ Alessandri's government therefore had to depend upon centrist parties to back its measures in Congress, and one of the concessions demanded in exchange for that support was an agrarian reform

¹Brian Loveman, "Chilean Countryside," p. 245.
³Brian Loveman, "Chilean Countryside," p. 245.
bill. The law was enacted in 1962, but had little impact during the
remaining two years of Alessandri's term. Near the end of Alessandri's
term, in mid-1964, nine large estates had been divided into 1,111 small
farms. If one considers the families of the beneficiaries, perhaps
5,000 people benefitted from this "reform", out of about 500,000 poten-
tial beneficiaries. Qualifications for benefits were also so broad
that many non-peasant, and even urban, families got land. By the time
of the 1964 presidential elections, pressure for land reform was such
that both leading candidates, Salvador Allende and Eduardo Frei (Chris-
tian Democrat), promised more drastic reform measures. The majority of
the landowners backed Frei, apparently considering him the lesser of
two evils, and he became the first presidential candidate in this cen-
tury to win by a majority.

Frei's government failed to pass a new land reform law until 1967
by which time Frei had taken a sharp turn to the right and begun to
place less emphasis on land reform. Until 1967, the expropriations of
the Frei government were carried out under the old law passed under
Alessandri. The 1967 law passed by Frei authorized the expropriation
of all estates over 80 standard irrigated hectares, a variable measure
introduced by the Chilean government in order to take land quality into
account when determining "excess size" for properties. The law also

1Stephen Michael Smith, "Changes in Farming Systems, Intensity of
Operation, and Factor Use Under an Agrarian Reform Situation: Chile

2Juan Carlos Collarte, "Another View of Allende's Agrarian Re-
form," Seminar given at the Land Tenure Center, University of Wisconsin
p. 25.

authorized expropriation of properties for various other reasons such as abandonment or inefficient use. Expropriated farms were formed into asentamientos, a sort of collective farm, for three years during which the resident workers were to receive training in farm management. At the end of that time, the asentamientos were to be divided into individual holdings for the residents. Peasants receiving land were to have 30 years to pay for it. The stated intention of the Frei government at the beginning of his term had been to settle 100,000 peasants on their own land by the end of the 6-year presidential term; the actual number settled was 15–20,000, depending on whose statistics one accepts.

Salvador Allende took office in 1970 with a commitment to end the latifundia system in Chile. Because his coalition did not have a congressional majority, his administration was unable to get a new agrarian reform law passed in the three years of its existence. Thus, the entire reform effort was carried out under Frei's 1967 law. The application of this law was greatly accelerated by Allende. By June, 1972, the government had expropriated 5,296,756 hectares of land, compared with 3,563,554 hectares expropriated during the six years of Frei's administration.1 By 1973, estates over 80 basic irrigated hectares had been practically eliminated. The resulting structure in the countryside was a complicated mixture of several kinds of reform units, small family farms, and medium-sized capitalist enterprises. The remaining chapters of this study will focus on an examination of the effects of this far-reaching change in the land tenure structure of Chile.

1 Kyle Steenland, Agrarian Reform, p. 10.
CHAPTER II

REVIEW OF THE LITERATURE

General Literature pertaining to Agrarian Reform

with that in South and Southeast Asia, most of Latin America, and much of Africa. Here population on the land is higher, and industrialization of the past few decades has been characterized by capital-intensive, low labour-absorptive technology. In these areas, the rational objective of the current phase of agricultural development must be to retain people on the land as well as to increase productivity. This would imply development of a labour-intensive agricultural system combined with yield-increasing technical innovations, rather than a North-American-style capital-intensive and heavily mechanized system. They argue that programs in such countries should emphasize production increases per unit of land rather than productivity per labour unit. This, of course, has an obvious spatial dimension in the retention of large numbers of people in the countryside rather than continuing migration to urban areas, and involves changes in the spatial arrangement of human beings, capital resources, and production units in the countryside.

It is tempting for a North American, used to thinking in terms of increased efficiency with mechanization and large farms, to consider Latin America's agricultural problems purely as a matter of increasing yields in the most obvious way—providing technical aid to large farmers in an attempt to make the large farms operate like their North American counterparts. North American agronomists working in Latin America and other underdeveloped areas have often taken this approach in providing aid and advice. The consequences of transplanting North American agricultural technology into the Latin American agrarian system can be problematic for the general development of the country concerned. One illustration of the kinds of consequences to be expected
is the case of Brazil. Brazil has recently seen impressive progress in increasing agricultural yields, along with the much-publicized increases in GNP and industrial production. If Brazil's 1961-65 agricultural production is averaged and used as an index of 100, 1973 production would be 131, 1974 would be 143 and 1975 would be 147.¹ In this period, more land has been brought under cultivation than anywhere else in the Americas, and yields have also been increased. Since 1968, agricultural expansion has been a high priority for the Brazilian government. Millions of dollars have been spent in the Amazon development scheme, which originally was to absorb small farmers from the drought-stricken Northeast, but since 1974 has been reoriented toward large corporate farms. Government funding has been provided for research and extension programs, credit has been increased, and price supports introduced. The results in terms of total agricultural production have been impressive, although the increases in yields per land unit have not been so dramatic. In spite of all this increase in agricultural production and corresponding increases in agricultural exports however, Brazil's malnutrition rate has risen to 40; in recent years, fifty million Brazilians are barely able to make a subsistence-style living in the countryside, and unemployment is on the rise despite industrial development.² Most of this industrial development is very capital-intensive and consequently has been unable to absorb a natural


increase of workers in the cities, much less the migrants from poverty-stricken and drought-persistent rural areas. As high-capital, low-labour technology continues to spread in the countryside, this migration of rural people can only continue. Poverty, unemployment, and malnutrition are increasing faster than Brazil's population.

A dilemma of agricultural planning in Third-World countries is the particularly important need to increase agricultural productivity in areas undergoing rapid population growth; it is easy for an agricultural technician, faced with such an urgent problem, to lose sight of the economic context or demographic realities in which the agrarian system must function. Thiesenhusen suggests that there are four ways in this situation to increase agricultural production: 1) Convert forests or natural pasture in already settled areas into cropland. 2) Intensify cultivation of already cultivated land by traditional methods (e.g., using more labourers per hectare). 3) Develop expertise in frontier farming. 4) Use new technology to increase yields on land presently cultivated. He notes that the first alternative usually has considerably undesirable ecological consequences—deforested hills and humid jungle areas can lead to serious erosion, leached soils, and the formation of dust bowls. Most policy makers currently use some combination of the third and fourth alternatives. The new technology of the fourth alternative, the so-called "Green Revolution", has undoubtedly increased production in some areas, but it does have physical limita-

tions. For example, most Green Revolution seeds at this point require high inputs of water from irrigation. If irrigation is not practical for a given area, these seeds are useless. Irrigation itself sometimes has an attendant set of problems, such as salinization of the soil, a condition which is difficult and expensive to cure. In dry Northwest Mexico, where the Green Revolution produced dramatic results in improving wheat yields, the salinization problem is becoming serious. Some parts of this area which rely exclusively upon groundwater for irrigation are also finding that water tables have been drastically lowered since the late 1960s. The Green Revolution technology has also caused agricultural labourers to be displaced by machinery in many parts of the world, but this is a consequence of social and economic decisions within a particular area rather than a necessary consequence of the technology itself. In the Hazara district of Pakistan, high-yielding wheat has actually increased labour man-hours per hectare by about 60% due to the impossibility of mechanized harvesting on hilly and terraced farms there. In Taiwan, where land is mostly in small parcels and farmers have approximately equal access to credit, water and technology, Green Revolution rice has been very successful and its use is widespread among all farmers.\(^1\) It is in countries with inequities of distribution of land and credit that such innovations tend to drive out small farmers.

There is some evidence to indicate that, even under conditions of unequal access to credit and technology, small farms are more efficient than larger units when output per hectare is used as a measure of efficiency rather than output per capita of labour. Kanel and Dorner pres-

\(^1\)Ibid, pp. 6-9.
ent data from India, Brazil, Colombia, Mexico, Japan, Guatemala, Taiwan and the Philippines which demonstrates very clearly an inverse relationship between farm size and output per hectare.\(^1\) The difference between farm size categories is the most striking in Guatemala and Brazil and the least striking in Mexico and Japan, but the inverse relationship exists in each case. One would assume that there is a higher level of technology on the larger farms in Mexico and Japan than in Guatemala and Brazil, and that this would decrease the difference. It is also likely that access to credit is more equally shared in the first two countries. Kanel and Dorner also point out that the much-discussed "drop" in agricultural output following the Bolivian land reform was a decline not so much in output as in the amount marketed.\(^2\) Even this did not change as much as the official statistics indicated, according to Kanel and Dorner, because marketing systems were altered and some of the produce marketed through the new channels did not get counted. Market reports were obtained only at the traditional outlets. These outlets were still largely controlled by the old landowners, and the beneficiaries of the reform were often unwilling or afraid to use these channels. This is not an uncommon side effect of agrarian reforms in rigid, semi-feudal social and economic systems; there is some evidence that this also happened to some degree in Chile in the 1960s and 1970s.\(^3\)

With respect to yields after the Bolivian reform, it should also be mentioned that the Bolivian reform included only land redistribution,

\(^1\)D. Kanel and Peter Dorner, *Economic Case*, p. 17.

\(^2\)Ibid, p. 21.

\(^3\)Stephen M. Smith, "Changes in Farming Systems," p. 112.
with no attempt to produce a comprehensive set of services such as credit and technological aid.

Thiesenhusen cites an interesting example of the employment effects of differing approaches to land tenure structure in Bolivia and Peru. These two countries both border on Lake Titicaca. Thiesenhusen says that the man-land ratio on the Bolivian side of the lake is at least eight times that on the Peruvian side; since the 1953 Bolivian land reform, population in the lake area has increased between 50 and 100 percent. The Peruvian side of the lake has latifundia up to 3,000 hectares in size. Massive firings and evictions of peasants since 1965 and their consequent migrations have lowered the population density to 8.3 per sq. mile on the Peruvian side of the lake, compared with 67.9 persons per sq. mile on the Bolivian side. Bolivian farms produce about the same marketable surplus as the Peruvian farms across the lake, while feeding a much larger number of farm workers and families on the land itself. This would seem to support the contention that in Latin America there is an inverse ratio between farm sizes and food production per unit of land.

Another study of importance is the CIDA study edited by Barraclough in 1973. This study includes material from Argentina, Brazil, Chile, Colombia, Ecuador, Peru, and Guatemala, virtually all of which shows an inverse relationship between property size and productivity per hectare. One of the most interesting examples is Peru, where the rich coastal lands have long been farmed by large, modern, mechanized, and efficient farms rather than traditional-style latifundia.

\footnote{Solon Barraclough, ed., \textit{Agrarian Structure in Latin America} (n.p.: Inter-American Committee For Agricultural Development (CIDA), 1973).}
fundia; even here, there is an inverse relationship between farm size and productivity per hectare, although it is a relatively small difference in this case.

One factor discussed in this study which affects the total productivity of land under the traditional latifundia system is the practice of overly extensive land use on the good land in the latifundias. When Chilean farms were divided into four categories according to size, very striking differences in cropping patterns were observed. The following table shows the percentage of land given to various uses according to farm size:

<table>
<thead>
<tr>
<th>Size</th>
<th>Ann. Crops</th>
<th>Fallow</th>
<th>Fruits</th>
<th>Improved</th>
<th>Natural</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than Family</td>
<td>38.5</td>
<td>6.1</td>
<td>21.4</td>
<td>4.7</td>
<td>29.2</td>
</tr>
<tr>
<td>Single Family</td>
<td>28.3</td>
<td>12.7</td>
<td>5.6</td>
<td>3.0</td>
<td>52.3</td>
</tr>
<tr>
<td>Multi - Medium</td>
<td>21.9</td>
<td>12.5</td>
<td>3.5</td>
<td>6.0</td>
<td>56.1</td>
</tr>
<tr>
<td>Multi - Large</td>
<td>23.2</td>
<td>11.8</td>
<td>2.4</td>
<td>10.8</td>
<td>51.7</td>
</tr>
</tbody>
</table>

The value of output per hectare, in 1960 escudos, was 391 for the mini-fundia, 126 for family farms, 96 for medium latifundia, and 83 for large latifundia.

In this case, the medium latifundia actually had more fallow land and more natural pasture than the large latifundia. These properties also tend to be on better land, as the largest latifundia in Chile are in the arid north and the southern pampa. The differences in land quality and climate may be reflected in the figures for value of produce per hectare, as the larger properties had lower values per hectare in spite of having more land in annual crops and improved pasture and less fallow land. Family size farms operate with about the same amount of

\[\text{1Jeannine Swift, Agrarian Reform, p. 20.}\]
fallow land as the medium latifundia, but their higher value of output is related to more intensive use of cropland for annual crops and fruits and vineyards, and relatively less land in pasture. Sub-family farms use the land much more intensively than any of the other categories, especially in the relative importance given to fruits and the small amount of land in pasture. These farmers are using the second of Thiesenhuser's four alternatives for increasing agricultural production, intensification of cultivation by traditional methods. This is the alternative which seldom receives the attention of contemporary agricultural planners.

Although nearly all countries in Latin America suffer from similar agricultural stagnation and inequality of income in the countryside, very few countries have actually tried any far-reaching agrarian reform. With a few exceptions, Latin American countries have tended to respond to agrarian frustrations with some sort of colonization scheme, such as Guatemala's attempts to develop the Peten area and Brazil's Amazon development plan. At best, these programs are only temporary stopgaps; many of these countries are running out of land which can economically be colonized, and the structural problems are still acute. Other countries which have tried far-reaching reform programs have seen these programs reversed within a few years after a change of government, as in Guatemala and Bolivia. The only countries which have been able to carry out a radical agrarian reform and keep the reformist government in power are Mexico and Cuba, both of which introduced land reform programs after successful revolutions. It is very difficult to assess the Cuban land reform in terms of impact upon production, since the production statistics are not commonly available, but Mexico has been rather
Folke Dovring, writing in 1969, offers evidence from the 1960 Mexican census, newly available at the time, to support his claim that agrarian reform did not produce adverse effects upon production. Agricultural production has actually risen very rapidly since the reform was completed in 1940. The beginning of this rise was much too early for Green Revolution technology to be a factor. Some of the rise in production is accounted for by the opening of new lands to cultivation and substantial irrigation, but some of the increase is due to intensification of farming.\(^1\) This intensification has been a prime factor in the increase of production in the reformed sector which enabled it to keep up with the pace of agricultural development. Overall there is very little difference in productivity between reform units and private farms over five hectares; units under five hectares have a larger output per hectare. Unfortunately there are no data readily available to break down the category of "farms over five hectares" into more precise size groups for comparison with the reform units. It is known, however, that the ejidos, or reformed holdings, tend to be on relatively poorer land than the larger holdings. Dovring notes that the number of holdings between 5 and 50 hectares has increased greatly since the 1930s, indicating a genuine decrease in the prominence of large holdings. Mexico's land reform cannot be considered total, however, since large holdings and latifundia-style farming methods still exist, along with large numbers of minifundia and landless labourers on the large holdings especially in the South. In fact, in

the nine years since Dovring did his analysis, there is a certain amount of evidence indicating that the trend is presently moving in the direction of concentration of land ownership into a smaller number of hands once more.¹ The primary difference between this trend and that of a century ago is that the ownership now tends to be in large commercial enterprises rather than low-technology haciendas; many of these commercial enterprises are multinationals, primarily based in the United States.

In summary, existing literature on the general issue of Third-World agricultural development, and especially Latin American development, indicates that the spatial structure of agriculture, including the land tenure system, may have an important impact upon agricultural productivity. An examination of the current literature on specific developments in Chile will provide a basis for hypothesizing the effects of the most recent attempt in Chile to change that spatial structure of the agricultural system.

**Studies of Chilean Agriculture**

Of the major studies of recent agricultural development in Chile, most were done during the presidential term of Eduardo Frei, 1964–70. The most recent few include material from Salvador Allende's term of office, which ended with the military coup on September 11, 1973.

R. Kaufman's 1972 study,² covering the period from 1950 to 1970, points out that in 1964 Chile and Bolivia ranked the highest of all

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Latin American countries in land ownership concentration. J. Swift, in her 1971 study,\(^1\) discusses the fact that Chile's first land reform law, passed under the Alessandri administration, favored those potential owners who had been administrators or were sons of _latifundia_ owners. Parcels formed were also generally too large to be worked by one man, and there was no provision for collective ownership. The new owners usually kept on the old group of _incuílmos_ to work the land, and the system remained basically unchanged. In one case described, only three of the 34 new owners of one former _latifundia_ were chosen from the resident labour force; the rest of the labour force went to work for the new owners. Thiesenhufen, in his major report on Chilean agriculture in 1966,\(^2\) points out that this early system of "reform" led in many areas to the creation of a sort of new rural upper class, who were anxious to perpetuate the old system once it was working in their favor. This was undoubtedly due in part to the method of selecting beneficiaries and the excessive size of the new landholdings described by Swift, and also probably was a function of the slow speed of the reform process under both Alessandri and Frei. This allowed certain favored sectors of the potential beneficiaries to become used to what was in effect a new static social structure in the countryside, with themselves near the top.

One detailed micro-study of Chilean agriculture during Frei's administration is R. Meyer's study in 1970\(^3\) of six _asentamientos_ in the

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\(^1\) Jeannine Swift, _Agrarian Reform_, passim.


Central Valley region. While Meyer's study is mainly an economic study involving changes in rural income structure, he does touch upon the issue of production. His crop data for one year, the 1967-68 growing season, compares production on the six asentamientos with the national average for a number of crops, showing a yield difference in favor of the asentamientos. The Central Valley, however, happens to be the most fertile agricultural area of Chile; it is probably not a sound practice to compare production on Central Valley asentamientos with a national average which includes less fertile areas. Since the Frei land reform concentrated on the Central Valley, it might have been more useful to compare reformed parts of the Central Valley with unreformed parts of the same area, one of the comparisons to be made in the present study for one small area of the Central Valley, O'Higgins and Colchagua Provinces.

Writing shortly after the end of Frei's term, Petras and LaPorte\(^1\) point out that financial support for the land reform program under Frei was considerably less than the government money spent on upper and middle class landowners through credit, extension services, etc.\(^2\) They cite several studies of CORA (Corporacion de la Reforma Agraria - State Agrarian Reform Corporation) asentamientos which show a substantial improvement in production on these properties in terms of yields per hectare. This was accomplished in spite of the drought of 1967-68 and at a time when agricultural production in the country as a whole was declining in relative terms. The major shortcoming of the Frei land re-


\(^2\) Ibid. p. 198.
form, in their estimation, was that it did not proceed rapidly enough or thoroughly enough. They conclude that the most important change in the countryside during Frei's presidency was not in the area of land tenure change at all, but in the unionization of rural workers. Initially all Christian Democrats were in favor of rapid growth of unions in the countryside. As trade unions grew in size and militancy, a division developed within the party over the goals of the movement. Frei and the right wing of the party perceived the rural unions as pressure groups within the traditional structure. These unions were to be an instrument to integrate the peasants into the existing capitalist organization of the economy, giving them a limited role in determining their terms of employment by rural capitalists. Jacques Chonchol, Frei's INDAF administrator (fired by Frei and re-hired by Allende) and his supporters perceived the union as an instrument to transform the rural structure. Frei himself never envisioned this sort of approach, and according to Petras and LaPorte cannot be accused of "betraying" his program as many younger and more radical Christian Democrats eventually did accuse him. What did change after 1967 was the viewpoint of the younger Christian Democrats, many of whom were working in the countryside trying to implement the agrarian reform. These young administrators and technicians became increasingly frustrated with the political obstacles to real change erected by the Frei government, and as they grew more frustrated they also grew more radical. Petras and LaPorte conclude that Frei unwittingly set the stage for more conflict and more radical change:

1Instituto de Desarrollo Agropecuario or State Agricultural Development Institute; its head is also Chile's Minister of Agriculture.
The trade unions were to serve as tools to improve the living standards of the rest of the campesinos. The few thousand campesinos who have received land have experienced a substantial increase in their standard of living. The agrarian reform program of the Frei government has created a new stratum of relatively better-off, middle-class peasants, who now employ labor, mimic the old landowners, and follow their political lead in many cases. On the other hand, Frei allowed a vast number of landless peasants to be unionized without meeting their basic demands. Frei's policies polarized the countryside and in the process undercut the basis of support of the 'centrist' Christian Democrats. The vote of the economically active campesinos—largely males—shifted to the left; the right wing picked up support precisely in the areas where unionism was weak and among small farmers little affected by the new rural organizations.¹

This conflict in the countryside played a larger role in the 1970 election of Allende to the presidency. When he took office in November he had committed himself to eliminating the latifundia system in the countryside. It was also a stated policy of his government to insure the inclusion of landless peasants, unionized under Frei, in the actual reform process. Jacques Chonchol returned as Minister of Agriculture in the Allende government, an appointment which was greeted by a conservative newspaper, El Diario Austral, with the comment "Chonchol is to private property what a tiger in the jungle is to a gazelle."² The Allende government, however, never really developed a consistent policy as to the ultimate form of reformed holdings; bureaucrats in the reform bureaucracy were a mixture of all the parties which made up Allende's coalition, as well as Christian Democrats and some National Party holders, and were committed to a variety of goals for the form of reform units. These commitments ranged from the old three-year asentamiento

¹Ibid. pp. 245-246.

²Norman Gall, The Agrarian Revolt in Cañín - Land Reform and the MIR, West Coast South America Series, American Universities Field Staff Reports, vol. 19, no. 5, 1972, p. 6.
plan through larger collective units to state farms. Eventually, the
government officially opted for rather vaguely conceived units called
Centros de Reforma Agraria or CERAs.

Brian Loveman, in his lengthy 1976 study,1 bitterly attacks the
UP (Unidad Popular) government for attempting to replace the asentamien-
tos on newly expropriated farms with CERAs, which many people saw as a
prelude to state farms. Among other criticisms cited by Loveman was
the participation of women and teenagers in the assemblies and as offi-
cers; and also the restriction of private plots as an attempt to
counteract a widespread tendency for asentados to spend more time on
their private plots than in the communal labour pool. Opposition politi-
cal parties did much to feed public fear of these new forms, and the
controversy reached the point where, in 1972, farms which had been ex-
propriated and not yet formally structured were being established as
asentamientos by some campesinos themselves, in open defiance of gov-
ernment policy. Loveman claims that the UP's "contempt" for campesinos
led them to such high-handed tactics and lost the UP its support in the
countryside. This is somewhat contradicted by other writers such as
Steenland, who claim increases in rural support for Allende in the sec-
tors affected by land reform (except for the latifundistas). Small
landowners, who were not affected by the land reform, and who belonged
to the latifundista-dominated National Landowners' Association, did
move to the right.

Kyle Steenland, in an article in Latin American Perspectives,2


claims an increase of 6% in total agricultural production in the first full year of the Allende land reform, but estimated a decrease of 15% for the 1973 harvest, due to the lock-outs of 1972 which prevented seed and fertilizer from arriving on many farms during the planting season. He states that the production increase for the first year was due to increased productivity per hectare and increases in area under cultivation in the reformed sector, both of which were able to compensate for widespread sabotage of production by latifundistas. This is borne out by government statistics published in Chile Hoy on August 7, 1973.1 These statistics show the expected decrease in production for the 1972-73 season, but the decreases are due primarily to decreases in area planted; most crops actually show an increase in yields per hectare during this season. Wheat, for example, showed a drastic decrease in planting area, from 711,8 thousand hectares in 1971-72 to 470,0 thousand hectares in 1972-73. Harvests were, respectively, 1,195,1 and 827,2 thousand tons, resulting in a slight increase in production per hectare of about 1 ton. Barley, on the other hand, increased production while the area planted was slightly decreased. The area planted was 67,1 thousand hectares in 1971-72, and 67,0 thousand hectares in 1972-73; production was 139,0 thousand tons and 147,4 thousand tons, respectively.

Solon Barraclough, in the 1972 ICIR/A study of the Allende reforms, also cites an increase of 6% in total agricultural production in

2Instituta de Capacitacion e Investigacion en Reforma Agraria—State Agricultural Research and Planning Institute.
the first full year of the program. One of the interesting aspects of productivity discussed by Barreclough is its relationship to the agrarian sector's function in the larger economy. The Chilean economy saw a large change in the balance between supply and demand in the agrarian sector in the year's 1970-72. The total availability of food per capita, which had risen slowly from 1965-70, expanded rapidly during the first year of the Unidad Popular government. This was a function both of increased production and increased imports, and the actual rate of growth varied a great deal among the individual foods listed. Using the year 1970 as index 100, in 1971 the amount of wheat available per capita was 115.0; the amount of rice was 105.2, carrots 125.0, potatoes 170.2, and oats 99.1, to give a few examples. Of these, the increment in rice was due primarily to imports, and there were substantial imports of wheat and potatoes to supplement the increases in production. In 1972 the increases in production had slowed down, and the per capita availability of most kinds of food either made slight increases or remained stable. Oats, beef, and pork actually decreased. In terms of the total availability of food per capita, especially staple foods for the lower-income segments of the population such as corn, beans, and rice, there was a slight increase in 1972. This is of interest in light of the "pots and pans" marches which received world-wide news coverage during this period, and which were reported to be protests against shortages of food supposedly caused by government agricultural policies. Stephen Smith in his PhD thesis at the University of Wisconsin presents evidence that the actual shortage of beef may have been due primarily to clandestine slaughter for the black market and smuggling of cattle
into Argentina.\(^1\) Jaime Crispi, writing in *Chile Hoy*,\(^2\) presents an interesting discussion of the effects of the right-wing-manipulated black market upon the actual availability of other kinds of food. It appears as though where shortages existed the cause was in the distribution system rather than in the countryside. More specifically, according to both Crispi and Barraclough,\(^3\) the cause was a deliberately-induced malfunctioning of the normal distribution channels. The malfunctioning was so severe that the black market became, in effect, a sort of parallel economy, and its primary victims were the middle-class urbanites seen in the marches.

The redistribution of income during the Allende years was also an important factor in perceived food shortages; there was a large increase in the demand for food, especially better quality food. Thus, the beef shortage appeared more acute than it would have a few years before when there would not have been as much competition for purchase of the beef available. Barraclough says that in order to keep pace with the increases in demand, due primarily to increases in income in the poorer sectors rather than to population increase, agricultural production would need to increase by more than 50\% within five years, a lot to ask of any agrarian structure. Barraclough and Affonso, writing for FAO in mid-1972,\(^4\) conclude that production could still be increased more rapid-

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\(^3\) Solon Barraclough, *Diagnostico*, p. 106.

ly than in the past; with much of the land reform accomplished (expropriations had gone about as far as they could under the 1967 law) the new emphasis should be on planning. They criticize the UP for its lack of coherent policy, stemming primarily from the differences in aims and strategies between the parties which made up the coalition. They also remark that, as of 1972, the most acute social and economic problems in rural Chile were in the small producer sector, which generally had not benefitted from the land expropriations. In the ICIRA/FAO study Barraclough also says that a crucial factor in the success or failure of the UP's agrarian policies would be the breaking up of the "parallel economy"—the black market.

It appears as though Barraclough and Affonso underestimated the militancy of many peasants, especially in the south, who were not at all willing to accept the idea that the land reform was nearly complete as far as expropriations were concerned. The Allende government had very little choice but to find legal ways to continue the expropriation of land in problem areas such as Cañín Province, and in doing so further alienated the large landowners and many of the small and medium property owners who then began to fear expropriation. It is also questionable if, as Barraclough and Affonso say, the most acute remaining problems in the countryside were those of smallholders; there were still a large number of landless workers who had not yet benefitted from the land reform program. The plight of these landless peasants accounts for some of the continued peasant militancy in 1972.

The most recent major work on Chilean agriculture as a whole is the study performed by the Programa Postgrado Economia Agraria of the Catholic University of Santiago. The authors reach the following con-
clusions with regard to land reform and production:

The process [of land reform] as conducted between 1965 and 1971, does not produce a fall in the productive levels, neither in the farms affected by it nor in the farms kept by the private producers. However, in the following period, namely 1971-1973, there is a general fall in production. It is not possible to isolate whether this fall occurred in the private, reformed, or both sectors.¹

It should be pointed out, however, that the statistics used by this group do not entirely bear out this statement; the first fall in production at the national level occurred after the lock-outs which affected the 1973 harvest, and a further drop in production in some areas occurred in 1974, the last year which they cite. There is some evidence that production has continued to decline since 1974; wheat production, for example, was expected to be down 30% from 1976 in the 1977 harvest.²

One of the most interesting studies of the effects of land reform in Chile is Stephen M. Smith's 1974 PhD thesis at the University of Wisconsin.³ Smith was part of a research team which had a unique opportunity to observe a group of specific properties before and after the land reform process. The study produced by Smith focuses on a sample of 105 haciendas in the Central Valley, approximately 10% of the haciendas found in the nine-province area studied before the land reform. Of the original 105 properties, 41 remained under the original owner at the time of Smith's second study, shortly after the 1971 harvest. Sixteen properties had been expropriated entirely and made into sixteen asentamientos. Three had been expropriated entirely and made into two


³Stephen M. Smith, "Changes in Farming Systems."
asentamientos each. Eighteen had been partially expropriated, leaving a reserve of land for the former owner, and made into nineteen asentamientos. Twenty-seven of the original properties had been subdivided by the original owner to avoid expropriation, forming 97 new units.

In his second contact with these properties, Smith found that there were important differences between the farming systems used on the different types of holding. The latifundias and the subdivisions were the most extensively farmed, and the asentamientos and reserves were both quite intensively farmed. The performance of the reserves is not surprising, since the original owner would not have been left a reserve unless the original property had been efficiently farmed; moreover, the original owner would have been allowed to keep most of the capital goods such as machinery. Owners who kept a reserve were also allowed to choose the specific area, making it likely that the best land would be in the reserve. The most important difference between the farming systems of the reserves and the asentamientos was that the reserves were more likely to have an efficient balance between livestock and crops; asentamientos were primarily crop enterprises. The cost of animals is probably relevant here, as the owners of reserves were allowed to keep all of their livestock, and the cost of building a herd was probably beyond the means of most of the asentamientos.

The greatest changes on the properties studied by Smith from the 1965–66 agricultural year to the 1970–71 year were on the properties formed into asentamientos. The most important changes were increases in the amount of land cultivated, the intensity of crops, and the intensity of labour use. Incomes of the peasants concerned were also higher than before expropriation. Most asentamientos showed a large
shift to vegetable growing, for a number of reasons. Most campesinos on these properties had been inquilinos, and were used to having vegetable plots for their use. They were also acquainted with the high market value of vegetables, since many of them had sold their small surpluses from the garden plots. This meant that they also found it easy to become part of the market structure for vegetables, both because of familiarity and because former latifundistas were not so likely to be involved in the vegetable market system. In the cases of many other crops, the market system was oriented toward, and often controlled by, the latifundistas. These former landowners were likely to be quite hostile to the asentados. (This may have been one factor in the market shifts noted in the Bolivian agricultural reform previously mentioned as well.) Due to the shift toward vegetable production, the value of produce per hectare was often much higher on the asentamientos than on the reserves, in spite of the fact that land in asentamientos was of lower quality than that of any other type of holding in the study.

Smith's study, although it does not deal directly with effects of agrarian reform upon actual agricultural productivity, seems to support the idea that reform would have a positive effect upon production. It is logical to suppose that intensification of cropping and labour use would be major factors leading to an increase in production after a change in the land tenure structure.

In the literature considered, there is very clearly a relationship between farm sizes and production, probably for the reasons illustrated by Smith's findings. Existing literature on Latin American and Chilean agriculture, therefore, provides a good basis for the assumption that a far-reaching change in the land tenure system will have a
considerable impact upon agricultural production as well as the obvious impact upon the rural social structure. If the change is in the direction of eliminating the **latifundia** system with its demonstrated inefficiencies and replacing it with smaller properties in the hands of the agricultural workers themselves, this impact should be positive. In the case of Chile, there have been strong statements both in agreement and disagreement with this assumption. Most of these statements have been supported with small amounts of information about actual production performance during the Allende period, and the information given is usually at the national level. For this reason, it would seem appropriate to collect the information available, particularly in smaller administrative units such as provinces, and attempt a quantitative assessment of the agrarian reform process under the Allende administration. This is the task of the remainder of this thesis.
CHAPTER III

METHODOLOGY

The model for this study assumes that within the framework of Chilean social and technological conditions we can expect to find a particular set of quantifiable relationships between agricultural policies affecting the spatial structure of land tenure in agriculture and increases or decreases in agricultural production. It is recognized that there are a number of other variables which affect productivity. Some of these, such as land quality, will be considered during this analysis; others will be controlled by limiting some comparisons to areas which are similar in physical characteristics such as climate. Other variables are discussed, but their quantification and statistical analysis is beyond the scope of this study.

Latifundias tend to use land extensively rather than intensively, even where intensive use would be appropriate. Farmers who must earn a living from a smaller land unit are less likely to engage in overly extensive use of the land. Investment and incentive also play a major role in increasing farm production at the individual level. Ownership of a unit of land and the necessity of earning a living from its produce should increase incentive for production on individual or collective units. It is therefore hypothesized that the division of latifundias into family or collective units with ownership vested in the peasants who work the land will increase agricultural production with-
in the restructured area.

The following variables are defined for this study:

1) Productivity: measurable amounts of a crop or crops produced on a unit of land, usually in quintals of produce per hectare.

2) Latifundia: units of land, individually owned, of a size greater than 80 standard irrigated hectares. The standard irrigated hectare is a variable measure which takes land quality into consideration; in the areas of this study, it would vary from 1 hectare to more than 10 hectares. Thus, latifundias will vary from 40 to about 1000 hectares, depending upon the locale. Latifundias will be measured for this study by their number in a given area or by their percentage of the farmland in a given area.

3) Minifundia: units of land smaller than 10 standard irrigated hectares; also called sub-family units. To be measured as in 2) above.

4) Small holdings: units of land between 10 and 40 standard irrigated hectares. To be measured as above.

5) Medium holdings: units of land between 40 and 80 standard irrigated hectares. To be measured as above.

Data for this study have been collected from a large number of published sources, including the Chilean government publications from agricultural censuses, Corporacion de Fomento de la Produccion (CORFO), Corporacion de la Reforma Agraria (CORA), Instituto de Capacitacion e Investigacion en Reforma Agraria (ICIRA), Instituto de Investigacion de Recursos Naturales (IREN); World Bank and FAO statistics, Universidad Catolica de Chile and other academic sources, and some unpublished data. Comprehensive data from provinces have been used for general analysis of the southern agricultural area.
Analysis begins with general study of seven southern frontier provinces in a contiguous area with very similar climate, terrain, and soil quality. All underwent rapid agrarian reform, especially after 1969. Average production and yield figures of the area's major crops are analysed province by province, for the years immediately before and after the acceleration of reform, to demonstrate in a general way the occurrence of increases in agricultural production concurrent with agrarian reform. This is followed by a case study of one of these provinces, Cautín. This study, using map studies based on 1969 data, will show the structure of land tenure and production before the land reform; it will then describe the reform process and its impact in one representative province selected from the general study.

The case study of O'Higgins and Colchagua Provinces is based primarily on map studies using 1972 data, gathered after expropriations were nearly complete in the part of Chile represented by these provinces. In this chapter, it is possible to make a direct comparison of the performance of reformed areas with non-reformed areas, thus providing a more direct support for the hypothesis than the general analysis of the previous chapters. Thus, the discussion of the process of land reform and its concurrence with general increases in yields and production can be linked specifically to reformed areas within O'Higgins and Colchagua Provinces.

In the two provincial case studies, a number of maps of various aspects of land use and land tenure have been utilized. Some of the more important variables mapped are property sizes, yields of some crops, broad cropping patterns, fertilization, and labour use, and in one case study, areas of land reform. For each province, all maps used are of
identical scale, making direct comparisons possible. The maps have been
divided along latitude and longitude lines, and the resultant grids di-
vided into ½ cm. grids for counting. The grid counts have been convert-
ed into percentages of occurrence of each variable studied within each
larger grid, and this data has been computerized to obtain Pearson co-
rrelation coefficients between the variables as they occur on the vari-
ous maps. Only correlations of a significance level greater than .065
will be discussed in the text. Maps have also been compared visually,
using a light table where possible, to determine directly the patterns
of interaction among the variables discussed.
CHAPTER IV

THE SOUTHERN AGRICULTURAL PROVINCES

Of the seven contiguous provinces shown on Table 1, all had at least 23% of their tillable dry land expropriated during the land reform. Some had as much as 38.9% of tillable dry land expropriated. All also had some irrigated land expropriated, although none has enough irrigated land in total to have much impact upon production patterns. Only Arauco Province had any substantial amount of land expropriated prior to 1969, but expropriations continued in that province into 1973. Therefore, none of these provinces can serve as a control in assessing the impact of land reform. Although the rates of expropriation and reorganization were not identical in all of the provinces discussed, they were close enough so that distinctions will not be made within the scope of this chapter. Nevertheless, even without a control group, some examination of production patterns over the period of land reform may be useful.

The first major expropriations in these provinces, excepting Arauco, took place in 1969, with the greatest amount of activity taking place after November, 1970. Therefore, this chapter will compare average production figures for a group of years prior to 1971, before the reform could have had a major impact upon production, with average production figures for the three years following the acceleration of reform. In compiling pre-reform averages, the years 1967 and 1968 have
been left out of the average. These were drought years, and it was felt that this might have had an impact upon yields during those years in some cases—although a spot check using the figures for these two years in addition to 1965, 1966, 1969, and 1970, showed no substantial differences in the results obtained. However, in the discussion, the pre-reform average used is for the years 1965, 1966, 1969, and 1970. Seven crops have been selected for the comparison, including most of the important crops grown on dry land in all or most of the seven provinces considered. Table 2 shows the pre-reform and reform averages of production per hectare of the seven crops studied in each province.

Arauco Province, the first to begin the reform effort, shows an increase in yields per hectare for all crops on the table (rape and lentils excepted, since they are not grown in Arauco). The increases in potatoes and barley were substantial—more than a 50% increase in the latter case. Bio-Bio Province shows an increase in yields in 5 out of the 7 crops studied, the exceptions being beans and barley. Increases in potatoes, rape, and lentils were substantial, but not as large as the increases in Arauco. Malleco Province shows an increase in four out of seven crops, with one maintaining the same average and two decreasing. Those decreasing are rape and barley, with wheat yields remaining the same. The only very large increase was in lentils. Cautín Province shows an increase in six out of seven crops, with beans the exception. The most substantial increases are in rape and lentils. Valdivia Province shows an increase in yields in four out of six crops grown there. The exceptions were beans and barley, with lentils not grown in the province. The largest increases were in wheat and potatoes. Osorno Province shows increases in yields for three out of the five crops.
TABLE 1

EXPROPRIATIONS IN SEVEN SOUTHERN AGRICULTURAL PROVINCES, 1965-73

<table>
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<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Arauco</td>
<td>10,421</td>
<td>29,594</td>
<td>13,989</td>
<td>13,359</td>
<td>9,513</td>
<td>—</td>
<td>33.5</td>
<td>32,817</td>
<td>10,882</td>
<td>5,114</td>
<td>5.4</td>
</tr>
<tr>
<td>Bio-Bio</td>
<td>—</td>
<td>1,397</td>
<td>—</td>
<td>—</td>
<td>9,656</td>
<td>6,819</td>
<td>3.4</td>
<td>57,976</td>
<td>166,493</td>
<td>60,756</td>
<td>24.8</td>
</tr>
<tr>
<td>Malheco</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>7,915</td>
<td>21,340</td>
<td>25,557</td>
<td>8.9</td>
<td>128,128</td>
<td>185,744</td>
<td>56,800</td>
<td>29.1</td>
</tr>
<tr>
<td>Cautín</td>
<td>4,913</td>
<td>24,701</td>
<td>18,805</td>
<td>11,283</td>
<td>14,004</td>
<td>25,548</td>
<td>8.3</td>
<td>137,059</td>
<td>86,880</td>
<td>15,188</td>
<td>20.7</td>
</tr>
<tr>
<td>Valdivia</td>
<td>3,750</td>
<td>—</td>
<td>4,600</td>
<td>8,564</td>
<td>54,291</td>
<td>19,314</td>
<td>8.0</td>
<td>369,366</td>
<td>222,027</td>
<td>94,564</td>
<td>28.2</td>
</tr>
<tr>
<td>Osorno</td>
<td>458</td>
<td>—</td>
<td>2,876</td>
<td>1,041</td>
<td>109,931</td>
<td>6,525</td>
<td>11.4</td>
<td>98,533</td>
<td>52,026</td>
<td>8,184</td>
<td>25.0</td>
</tr>
<tr>
<td>Llanquihue</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>4,251</td>
<td>1,388</td>
<td>1.1</td>
<td>47,388</td>
<td>223,040</td>
<td>8,235</td>
<td>21.9</td>
</tr>
</tbody>
</table>

Sources: Dept. Economia Agraria, Universidad de Chile, CORA, IREP
listed, beans and lentils not being grown there. The exceptions are the very slight decrease in the average wheat yield, and a larger decrease in barley. The largest increase, about 18%, is in potatoes. Llanquihue Province shows increases in four of the five crops shown, beans and lentils not being grown there. There is a small decrease in potato yields. None of the increases in yields is very large.

Total provincial production of the seven crops varies somewhat from the pattern of yield averages, although the basic response is similar. Table 2 shows pre-reform and reform averages for production of the seven crops, expressed in thousands of tons.

Arauco, which showed yield increases in all crops studied, only shows an actual increase in total production of one crop. Four other crops were grown in such small amounts that their total was not available, since the totals were calculated from a listing of each province's percentage of the country's total; these crops were less than 1% of the total, and thus were not on the listing. The one crop, potatoes, which does show an increase in total production in Arauco, shows a very large increase, about 73%. Bio-Bio Province shows production increases in four of the seven crops studied. All increases are large, from 39 – 62% except the 19% increase in oats. Malleco shows increases in production in five out of seven crops studied, the exceptions being wheat and rape. The largest increases are in oats, 51%, beans, 98%, and barley, 159%. Cañete shows increases in production in five of seven crops studied. The exceptions are oats and rape. The largest increase is the 10% increase in barley production. Valdivia Province shows production increases in four of five crops studied. The exception is a slight decrease in production of rape. The largest increases are in potatoes,
### TABLE 2

**AVERAGE CROP YIELDS IN SOUTHERN AGRICULTURAL PROVINCES**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Arauco</td>
<td>11.0 12.1 9.7 11.4 64.7 88.9 5.6 6.5</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
</tr>
<tr>
<td>Bio-Bio</td>
<td>15.2 15.3 12.7 12.9 61.9 68.3 7.7 7.4 8.6 11.5 4.9 7.3</td>
<td>23.6 19.9</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
</tr>
<tr>
<td>Mal£eco</td>
<td>16.1 16.1 11.3 12.6 47.3 47.1 8.7 9.7 12.4 11.8 5.9 7.5</td>
<td>17.3 15.0</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
</tr>
<tr>
<td>Cautin</td>
<td>15.1 17.7 12.4 12.7 44.3 47.0 6.4 6.2 11.9 13.5 6.6 8.6</td>
<td>19.0 20.1</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
</tr>
<tr>
<td>Valdivia</td>
<td>20.7 24.0 16.1 18.6 96.9 109.7 6.2 5.1 14.1 17.7</td>
<td>— — — — —</td>
<td>25.8 25.0</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
</tr>
<tr>
<td>Osorno</td>
<td>23.1 23.0 17.6 19.5 99.1 117.1</td>
<td>— — 13.9 14.2</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
</tr>
<tr>
<td>Llanquihue 24.5 26.6 21.4 22.7 144.4 142.9</td>
<td>— — 17.3 19.3</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
<td>— — — — —</td>
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</tr>
</tbody>
</table>

Data based on production figures from Dept. of Economa Agraria, Universidad de Chile
33%, and barley, 15%. Osorno shows production increases in four of five crops studied, the exception being a small decrease in wheat. The largest increases were in potatoes, 33%, rape, 38%, and barley, 17%. Llanquihue shows production increases for three of the five crops studied, the exceptions being wheat and potatoes. None of the increases was very large.

Total provincial production of a crop increased in 63% of the cases studied, while average yields per province increases in 74% of the cases. The discrepancy is caused by decreases in the areas planted to some crops while the yields per hectare were increasing. It is noteworthy, however, that the increases in total production for some crops was truly impressive; in no case was there a comparable decrease in an individual crop, with the exception of the 41% decrease in wheat production in Llanquihue. The reform averages included the year 1973, which saw a decrease in production in many crops in the south, for reasons described in the next chapter; if the 1973 production is left out of the average, production increases are more impressive, and in many cases the decreases disappear. The worst performance in increasing total production of the various crops was the province of Llanquihue, which also had the smallest proportion, 23%, of its tillable dry land in the land reform. Its neighbour, Osorno, did less well in increasing yields per hectare, but much better in increasing production; Osorno had 36.4% of its tillable dry land in the reform program, considerably more than the country's average, and slightly higher than the 33% average for the seven provinces considered here.

It would appear as though the patterns of increased use of land for crops and increased efficiency under the land reform program docu-
### TABLE 3

**AVERAGE PRODUCTION IN SOUTHERN AGRICULTURAL PROVINCES**

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Arauco</td>
<td>12.49 11.03 2.92 2.21 27.10 47.97 0.1</td>
<td>0.1</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td>Bio-Bio</td>
<td>74.71 69.63 6.38 7.35 6.98 6.60 4.33 6.05 1.75 2.69 1.81 2.94 2.98 2.78</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malleco</td>
<td>127.35 119.80 13.34 20.19 6.98 7.39 1.19 2.36 6.17 6.13 1.07 1.16 2.84 7.26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cautín</td>
<td>202.75 203.45 23.40 20.98 40.14 43.48 0.1</td>
<td>0.1</td>
<td>33.64 27.58 1.17 1.17 10.90 33.73</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Valdivia</td>
<td>81.34 82.58 11.42 12.50 62.32 82.75 0.1</td>
<td>0.1</td>
<td>16.18 16.02 1.89 4.90</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Osorno</td>
<td>43.51 42.03 8.76 9.20 36.78 48.96 0.1</td>
<td>0.1</td>
<td>3.96 5.45 2.32 6.39</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Llanquihue</td>
<td>18.60 11.02 11.36 12.53 96.15 89.69 0.1</td>
<td>0.1</td>
<td>4.13 4.38 1.55</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sources: ODEPA, Chile Hoy

*production less than 1% of total for Chile*
mented by Smith for individual farms would also hold true for the southern agricultural provinces, accounting for the general increase in areas sown for many crops and accounting for some of the increase in production. Some of the increase in production in the south is also attributable to increases in yields of some crops. A general increase in the per hectare yield of wheat prevented its production from declining as much as might have been expected from the decrease in area sown.

There are a number of factors involved in the increase in yields, most of them having to do with increased use of inputs on individual farms. Grants of agricultural credit, which began increasing in 1965, reached their high point in 1972, as shown on the following table which shows total credit in millions of 1974 dollars:

<table>
<thead>
<tr>
<th>Year</th>
<th>Credit in Millions of 1974 Dollars</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>$103.8</td>
</tr>
<tr>
<td>1966</td>
<td>171.2</td>
</tr>
<tr>
<td>1967</td>
<td>190.8</td>
</tr>
<tr>
<td>1968</td>
<td>202.3</td>
</tr>
<tr>
<td>1969</td>
<td>211.6</td>
</tr>
<tr>
<td>1970</td>
<td>221.3</td>
</tr>
<tr>
<td>1971</td>
<td>303.0</td>
</tr>
<tr>
<td>1972</td>
<td>331.4</td>
</tr>
<tr>
<td>1973</td>
<td>252.5</td>
</tr>
<tr>
<td>1974</td>
<td>217.5</td>
</tr>
</tbody>
</table>

Credit grants saw their largest increase in 1971, the first year of the intensified reform program, which also saw the largest increase in yields per hectare of crops shown in the southern agricultural provinces. Average amounts of loans put out by the various agricultural agencies were generally under 3,000 dollars, indicating that they were going to small operators. In 1974, these average loan amounts saw a sharp increase, as well as a decrease in the total amount of credit. In

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In addition to approximately a quarter of the total reformed land in Chile being returned to former owners in 1974, prices for fertilizers and seeds saw a sharp increase as agricultural credit decreased in both amount and equality of distribution. There is reason to believe that the effects of these changes are still being felt in Chile's agricultural system. For example, in 1976 the country as a whole saw decreases in production from 1975, which was also a decrease from 1974. Of 14 crops listed in Chile Economic News, November, 1976, five saw decreases in area sown; twelve saw decreases in yields per hectare; and nine saw decreases in total production, many of them very large decreases.

1Ibid, pp. 2:24-27.
CHAPTER V

CAUTIN PROVINCE

Physical Geography of Cautin

Cautin Province lies between the latitudes 38° 20' and 39° 30' south. The province extends the entire width of the country, which at that point is an average of 160 km. Cautin's area of 18,376 sq. km. represents 2.5% of the area of Chile. The province is divided into five Departments: Lautaro, Imperial, Temuco, Pitrufquen, and Villarrica; each of these is divided into three or four Communes.

The Coastal mountain range which runs the length of Cautin never reaches the height that it does in some other parts of the coast such as in Arauco Province, the highest peaks being less than 700 m. above sea level. This, however, is enough to provide a rain shadow effect for the area immediately to the east of the mountains, and the northern extreme of this area is considered an extension of the Mediterranean climate of the Central Valley which runs north and south through most of central Chile. Even in this rain shadow, though, the average annual precipitation is at least 1,000 mm., enough to grow some crops such as wheat without irrigation. In Temuco, rainfall averages 1,359 mm., with only two dry months, January and February. In the Andean cordillera to the east, rain fall is as high as 4,000 mm. annually. Except in the highest parts of the Andes, temperatures are fairly mild at this latitude. Average winter lows range from 4.9 C. in Puerto Dominguez, situated near the
coast, to -2.8 C. in Lonquimay, at the head of the Cautin River in the Andes. Growing seasons range from 151 days in Lonquimay to 234 days in Traiguén, in the Central Valley. The Cautin River valley, in the northern part of the province (it runs through the towns of Lautaro and Temuco and into the Imperial River) marks the place where volcanic soils begin to attain some prominence in the soil structure of the area.

There are six distinct physical regions in Cautin Province: the Andean cordilleras, ranging from 900 m. above sea level to several thousand meters; the precordilleras between the Andes and the Central Valley, between 300 m. and 900 m. above sea level; the Central Valley; the Coastal cordilleras; the Chol-Chol Depression, surrounded on the west, north, and east by the Coastal range; and the littoral plain between the mouths of the Imperial River in the north and the Queule River to the south. These areas are outlined on Map 2.

The population of Cautin has grown slowly relative to the total population of Chile. The population of the province actually decreased from 374,659 in 1940 to 365,072 in 1952; the population in 1960 was 394,654.\(^1\) Obviously, Cautin contributed more than its share to the general migration within Chile to the large urban areas, primarily Santiago and Concepcion. Cautin's rural population in 1960 was 241,753, or 61.7% of the total population; this is much higher than the rural 'percentage' of Chile as a whole. Agriculture is the primary employer of labour in Cautin, and much of the industry that exists in the urban areas of the province is dependent upon agriculture, as dairy processing, for example. The illiteracy rate in the province is 26.6%, in comparison with the

\(^1\) IREN, Estudio integrado de los recursos naturales, Cautín; IREN publication no. 29, Part two, 1970, p. 212.
PHYSIOGRAPHICAL REGIONS OF CAUTIN, PROVINCE

LEGEND

AC  Andean Cordillera
PC  Precordillera
CV  Central Valley
CC  Coastal Cordillera
CD  Chol-Chol Depression
LP  Littoral Plain
national rate of 16.4%; the distribution of illiteracy is heavily weight-
ed toward the rural population, where the rate is 36.2% in comparison
with the urban rate of 12.1%. ¹

Due to high levels of poverty in the province, Cautín’s population
does not represent a good market for either agricultural or industrial
output; therefore, agricultural production in the province is heavily
influenced by the demand of the urban market in Santiago and the limi-
tations of the country’s transportation system. The most common crops
are cereals, rape, potatoes, forage for livestock, and sugar beets.

Agrarian Structure of Cautín

About 35.8% of Cautín’s soil is considered suitable for intensive
agriculture; about 13.7% is suitable for livestock raising, and the rest
is primarily suitable for forestry. The majority of the good agricul-
tural land, about 58%, is in the Central Valley, 20% is in the precordil-
lera, 16% in the Chol-Chol Depression, and 6% on the littoral plain.
The structure of land holdings varies between these areas somewhat; in
the precordillera, holdings over 500 hectares occupy 50% of the land and
in the Central Valley they occupy 25%. ² Differences in land quality and
slope between areas, however, make the differences more apparent than real.

Mapuche Indians number 100,000-173,000 in Cautín Province, accord-
ing to various estimates,³ and form the majority of the rural population
living on the small landholdings. Most Mapuches live on reducciones,

¹Ibid., pp. 217-223.

²IREN, Estudio integrado de los recursos naturales, Cautín. IREN
publications no. 29, part one, pp. 55-61.

³IREN, Estudio, part two, p. 213; and Norman Gall, The Agrarian
Revolt in Cautín: Land Reform and the MIR. West Coast South America
on which the amount of land per family never exceeds 50 hectares; the average is 10.5 hectares per family. These properties are perhaps the extreme of minifundismo in Cautín Province, and their owners form the majority of the extreme low income families in the province. The areas around the reducciones were the prime focus of the tomas (land take-overs) in the early 1970s, and were an important area of effort for the land reform program during the Allende administration.

Map 3, drawn from 1969 data, shows slightly over 16% of the province’s area taken up by Mapuche holdings, or 22% of the area actually studied for the map. Of these, only about 6% are not reducciones. If the map is considered grid by grid (grids for study being bounded by latitude and longitude lines) there are three grids out of 41 in which the majority of the land is held by Mapuches: the grid—which includes Nueva Imperial, its neighbour to the immediate south, and the area on the coast which includes Puerto Dominguez and Puerto Saavedra. Grids with a proportion of Indian holdings greater than their proportion of the total provincial population, 29%, would include these three plus the grids surrounding Temuco, Bautaro, and Galvarino; the grid immediately to the east of Galvarino; Pitrufquén and Freire; the grids immediately to the east and south of Puerto Dominguez; and the grid between Loncoche and Villarrica.

According to the 1966 CIDA study, Mapuches were operating 86% of the production units in Cautín on this small proportion of the land.

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1TREN, Estudio, Part two, p. 204.
2Ibid., p. 213.
Wheat is the primary commercial crop grown on their land, and takes up about 4/5ths of the Mapuche land planted to annual crops. The annual per capita income of Mapuche farmers at the time of the study, including the value of subsistence consumption, was $58. (U.S.). The land on reserves, according to the 1970 IREN study, is mainly poor soil, and reserves, none of which have access to irrigation, are often located in areas where there is a moisture deficit for several months a year. In the case of Galvarino, Nueva Imperial, and Cholchol, the moisture deficit is as much as six months a year. This is the last outpost of the Mediterranean climate of the provinces further north, and all of these towns are located in the rain shadow of the Coastal mountains. The IREN study notes that small properties in general in Cautín share this problem of poor soils and climates in comparison to the larger properties.

The actual distribution of property sizes in Cautín is shown on Map 4. About 21% of the province, mostly in the high Andes, was not studied for the map. Of the land studied, 35.62% is in properties smaller than 50 hectares; 17.31% is in properties from 50.1 - 200 hectares; 12.15% is in properties from 200.1 - 500 hectares, and 33.89% is in properties over 500 hectares. Land ownership in reality is even more concentrated than the map indicates, because the map only lists four size classifications. The 1955 agricultural census lists 8 properties over 5,000 hectares, and 55 between 2,000 and 4,999.9. The 3,356

1Ibid., p. 12.

2IREN, Estudio, Part two, p. 206.

3Ibid., pp. 206 - 207.

properties smaller than 50 hectares represent 47.11% of the properties, on 26.99% of the province's land. The 452 properties over 500 hectares represent 2.40% of the total properties, on 39.05% of the province's land. (In addition, many of the big landowners own several farms, which are recorded separately in the census.) In much of Gautín, 500 hectares would approximately equal the 80 standard irrigated hectares which officially define a latifundia; in the Andes and the higher parts of the precordillera, the 80 standard irrigated hectares would approach 1,000 hectares, and in some parts of the Central Valley the figure would be much smaller than 500 hectares. Nowhere, however, would it approach the 1:1 ratio seen in much of the irrigated land of Chile's Mediterranean areas to the north. In Lautaro Commune there are 50 properties over the official latifundia size; by the calculations of the present writer, these 50 properties occupy approximately 26% of the land in the commune. Galvarino Commune has 18 properties over 500 hectares, which occupy roughly 46% of the land. Nueva Imperial's 26 properties over 500 hectares occupy about 62% of the land. Temuco's 38 properties over 500 hectares occupy 44% of the land in the commune. Pitrufquén's 4 properties over 500 hectares occupy 4% of the land. Saavedra Commune has 28 properties over 500 hectares, which occupy 33% of the land; Villarica has 19 on 28% of the land. These happen to be communes which have very large Indian populations, but the same level of concentration prevails over most of the province.

Indians are obviously not the only minifundistas, but they are consistently so. A direct comparison of the map of Indian properties with the map of property sizes shows large blocks of land in small prop-

1Kyle Steenland, Agrarian Reform, p. 108.
erties, containing Indian reserves, often surrounded by other *minifundia* (it has been relatively easy to squat on Indian land, thus shrinking the reserves). Blocks of land in properties over 500 hectares are invariably bordered by these areas of *minifundia*, in the classic *latifundia/minifundia* pattern. In the few grids with no areas of small properties, the blocks of large properties extend down into the next grid and meet their satellite properties. In mountainous areas, the same pattern exists, but the satellite properties may be in the next two size categories, rather than under 50 hectares. This pattern is much more obvious in Cautin than in O'Higgins and Colchagua (described in the following chapter), probably in part because Cautin does not contain such climate contrasts. There are no really dry areas which would lend themselves to the huge, extensive cattle holdings of Colchagua. In O'Higgins and Colchagua, small properties tend to follow the irrigated valleys, which do not exist in Cautin for all practical purposes; less than 1% of Cautin is irrigated. It is interesting to find this classic *latifundia/minifundia* in an area which was settled after independence, by a mixture of ethnic groups (Germans, Swiss, Irish, and Spanish are prominent), and under a program which was supposed to lead to the establishment of family-sized farms. In fact, McBride, writing in the early 20th century, claimed that the *latifundia* system as expressed in Central Chile did not exist here, and praised the family farms which he said dominated the landscape.¹ These family farms do exist, but they cover less than 1/3 of the land in the study if family farms are defined as between 50 and 500 hectares; in some cases, farms from 250-500 hectares should really be considered as *latifundia* and would lower the proportion of the land.

¹George McBride, *Chile*, p. 282.
in family-sized farms.

Much of Cautín's marginal land is presently being farmed; about 61% of the total is used for agriculture, 30% for forestry, 4% for natural pasture, and only 4% is listed as sin uso. About 10% of the total would be considered more suitable for forestry than its present agricultural use. This use pattern is in sharp contrast to O'Higgins and Colchagua, where almost 29% of the land is listed as sin uso and slightly over 1% of the land is used for forestry. Cautín even has some small stands of virgin forest, largely *Araucaria*, in inaccessible places. About 59% of the land in O'Higgins and Colchagua is actually cropped, as opposed to the 61% of Cautín; about 35% of O'Higgins and Colchagua is natural pasture, as opposed to only 4% in Cautín. These differences are largely due to the difference in rainfall between the two areas; the patterns of relief are quite similar. Areas where forest predominates in Cautín are mostly in the Andes, with other fairly large areas in the Coast mountains. Small patches of forest are found elsewhere throughout the province. Areas where agriculture predominates are found everywhere, including the Andes, but are most prominent in the Central Valley, the Chol-Chol Depression, the littoral plain, and the lower parts of the precordillera. There are no areas where natural pasture predominates over more than a few square km., but the largest areas of natural pasture are in the precordillera, the Andes, and the Coastal mountains. Existing areas of predominantly natural pasture, with few exceptions, occur on properties over 500 hectares, as do patches of forest outside the Andes; there are more exceptions among the patches of forest, however. Areas with large Indian populations have neither large areas of natural pasture nor forest patches, as a rule.
There is a discrepancy between the 1955 agricultural census and Map 5 (1969) in that on the map, small properties are shown primarily with no or low fertilization. The census lists small properties as far above the average in fertilizer use. In fertilization with salitre, the highest average fertilization level of any property size is on properties from 5–9.9 hectares. The lowest fertilization levels with salitre are all on properties over 500 hectares, which are shown on the map as having high levels of fertilization. A similar pattern holds for the use of guanos and other phosphates. This study uses the data from the map for the computerization, as it is more recent than the census, and it is possible that there have, in fact, been drastic changes in the 14-year period between the two studies. Chile has had double-digit inflation for many years, and it is possible that during this period the small farmers of Cautin, among the poorest in the country, fell behind the larger landowners in fertilizer use through having insufficient capital to invest in inputs. Also, some of the larger farms were moving from hacienda-type land use to modern commercial farming during that period, which would affect their use of inputs such as fertilizer.

A study of Map 5 shows 26.08% of the land worked with less than 5 units of labour (man-days/hectare/year); 42.95% of the land is worked with 5.1–15 units, and 30.83% with more than 15. Comparison of the maps reveals that low labour use is associated with large properties, medium fertilization, non-Indian land ownership, and high mechanization. High labour use is associated with small properties, Indian proprietorship, and low mechanization. A sample of 175 properties reported in the IREM study shows the 75 properties smaller than 50 hectares hiring no outside labour; the 25 farms from 50–200 hectares hired 41 outside labourers, the 14 farms from 200–500 hectares hired 85 outside labourers,
and the 11 farms over 500 hectares hired 291. Obviously, the number of labourers per property is larger on the farms over 500 hectares, but the number of labourers per hectare is much smaller.

A grid count of the CORFO map shows 30.8% of the properties worked with no mechanization. Mechanization from .01-.5 HP per hectare per year characterizes 48.3% of the properties, and the other 20.2% of the land considered in the study uses more than .51 HP per hectare per year. Mechanization is closely connected with size of property. In the previously-reported sample of 125 properties in the IREN study, none of the properties less than 20 hectares used tractors; 8.6% of the properties from 20-50 hectares and 29.2% of the properties from 50-200 hectares used tractors; 100% of the properties over 200 hectares used tractors. This is a great increase from 1955, when only about half the large properties used tractors. This change during the late 1950s and the 1960s undoubtedly contributed to the high rural unemployment rate.

Yields of crops planted in Cautín vary widely with the location and the size of property involved. For example, the 1955 census lists wheat (all varieties considered together) as having average yields of 14.5 qtes per hectare in the province as a whole. Seven communes are listed as having average yields above the provincial average: Lautaro, 17.1, Temuco, 16.3, Vilcún, 13.1, Freire, 17.9, Cunco, 18.9, Pitrufquen, 15.2, and Gorbea, 15.5. Several of these communes are predominantly Indian and small holdings, especially Temuco and Pitrufquen, and it is known that wheat is the main commercial crop on the reserves in these areas. However, when the provincial data on yields is broken down into size categories, there are no size groups under 500 hectares in which the average yields are above the provincial average. The highest average
yields, 21.9, are on properties from 2,000-4,999.9 hectares. Maps 3 and 6 show a rather close congruence between areas of yields of winter wheat less than 14 qls per hectare and the Indian reserves in areas like Temuco and Pitrufquen. Many of the larger properties in these areas have small areas of average yields over 28 qls per hectare.

Corn, however, in the 1955 census, shows an average yield in the province on dry land of 7.8 qls per hectare. This somewhat poor performance is exceeded in nine communes: Penco, 13.6, Saavedra, 9.1, Temuco, 10.6, Freire, 10.0, Cunco, 16.2, Pitrufquen, 7.9, Tolten, 16.5, Loncoche, 10.7, and Villarica, 10.5. The highest average yields by property size are on properties from 5-9.9 hectares, 14.7. The other size groups which exceed the provincial average are 1-4.9 hectares, 20-49.9, 50-99.9, and 500-999.9. The lowest average yields, 3.1 qls per hectare, are on properties from 1,000-1,999.9.

The provincial average yield for beans, 8.5 qls per hectare, is exceeded in seven communes: Lautaro, 10.7, Galvarino, 9.5, Temuco, 12.3, Vilcun, 10.0, Cunco, 12.7, Loncoche, 11.2 and Villarica, 10.4.

The average is exceeded on only two size categories, 10-19.9 hectares and 200-499.9 hectares. The lowest average yield, 2.5, is on properties from 7,000-4,999.9 hectares; this low average, however, is based on a very small area sown on only three farms. The provincial average yield for rye, 10.3 qls per hectare, is exceeded in seven communes: Carahue, 11.2, Temuco, 13.1, Vilcun, 12.0, Freire, 14.5, Cunco, 12.1, Pitrufquen, 10.7 and Gorbea, 12.3 The highest average yields by property size are on properties 1-4.9 hectares, 14.9. Properties 20-49.9 average 10.6. All categories over 200 hectares exceed provincial norms.

In production of vetch, the provincial average yield is 12.7 qls
MAP 6 CAUTIN PROVINCE YIELDS OF WINTER WHEAT

1=14qts per ha  2=14.1-28qts per ha  3=>28qts per ha
4=Sin Uso  5=Not Studied
per hectare. This is exceeded in eight communes: Lautaro, 17.8, Penguenco, 13.7, Carahue, 12.3, Saavedra, 16.0, Temuco, 19.6, Vilcun, 17.6, Pitrufquen, 15.2, Corbea, 19.2, and Villarica, 16.5. The highest average yields by size are on farms 5-9.9 hectares, 18.0; other farms which exceed the provincial average are 1-4.9, 10-19.9, 200-499.9, 1,000-1,999.9 and 2,000-4,999.9 hectares. The lowest average yield, 5.1, is on farms over 5,000 hectares. The provincial average yield for beets, 162.1 qls per hectare, is exceeded only in Temuco, with 224.7. There are no farms under 20 hectares growing beets commercially, and the average yield is exceeded in only three farm sizes: 20-49.9 with 200.0, 200-499.9 with 206.5, and 2,000-4,999.9 with 200.0.

The provincial average yield for oats, 13.7, is exceeded in Lautaro, 14.1, Carahue, 13.9, Temuco, 16.8, Vilcun, 15.0, Freire, 14.7, and Cunco, 18.3. Property sizes with averages higher than the province are 1-4.9 (15.2), 500-999.9 (16.5), and 2,000-4,999.9 (17.8). The provincial average yield for barley, 14.5, is exceeded in Lautaro, 19.8, Carahue, 16.9, Saavedra, 17.5, Vilcun, 18.5, Cunco, 16.3, and Corbea, 18.7. Property sizes with averages higher than the provincial average are 5-9.9 (15.2), 500-999.9 (19.2), and 1,000-1,999.9 (20.0). The provincial average yield for lentils, 9.9 qls per hectare, is exceeded in Carahue, 14.5, Saavedra, 13.1, and Freire, 12.0. Property size groups which exceed the average are 20-49.9 (10.8), 50-99.9 (12.7), and 500-999.9 (14.0).

The provincial average yield for potatoes, 59.8 qls per hectare, is exceeded in Lautaro, 63.8, Nueva Imperial, 72.1, Temuco, 71.5, Vilcun, 112.0, Freire, 64.4, Pitrufquen, 91.4, Corbea, 62.5, Loncoche, 66.2, and Villarica, 61.9. Property sizes which exceed the provincial average are 200-499.9 (68.3), 1,000-1,999.9 (88.5), 2,000-4,999.9 (81.2), and over
It is apparent that among the sixteen communes there are some which consistently outperform the other communes on the basis of yields. In the ten cases just described, Temuco appears eight times; Vilcun seven; Lautaro, Cunco, and Freire each six; and Pitrufquen, Gorbea, and Carahue each five times. These communes are all in relatively flat or gently sloping areas, with precipitation levels over 1200 mm per year. Climate and physiography play an important role in the relatively high crop yields in these areas. Property sizes, however, show no such predictable connection with yields in the 1955 Agricultural Census. This is an important consideration in assessing the correlations of map data which have been computerized for this study, as yield data were only mapped for one crop, winter wheat. It is important to discuss yields of winter wheat, as it is a primary commercial crop. However, it is likely that if data for other crops had been available the correlations with property sizes would have varied greatly between different crops.

Map 7 shows a majority of the land included in the study as over-used, 51.4%. Only 1.7% of the land is underused, and 46.9% of the land is in use equilibrium. One of the great difficulties in Cautin has been this pressure on resources which are already being overused. Unlike O'Higgins and Colchagua Provinces farther north, there are no large tracts of underused land in Cautin on which to begin a land reform program. There are patterns of underuse on individual farms, but these are much more difficult to assess objectively.

For an assessment of the significance of the observations from the maps discussed on the preceding pages, data from grid counts of
MAP 7 CAUTIN PROVINCE
COMPARISON OF ACTUAL AND POTENTIAL USE

- Overuse
- Underuse
- Equilibrium
- NS: Not Studied
the maps have been converted into percentages and computerized to obtain Pearson correlation coefficients. Each map has been divided into 41 observation grids along latitude and longitude lines, and the observation grids divided into 0.5 cm grids for counting. Table 4 shows the correlations obtained between the variables observed on the maps.

Indian reserves are significantly correlated with property sizes less than 50 hectares, 0.92138; wheat yields less than 33 qls. per hectare, 0.83655; low or no fertilization, 0.90536; no mechanization, 0.91836; and labour use over 15 labour units per hectare, 0.91836.

Non-reserve properties correlate positively with all farm size categories, all wheat yield categories, medium and high fertilization, medium and high mechanization, and low and medium labour use. This confirms the impression that Indians are the prime minifundistas in this province, and that much of the discussion of problems of small farmers in Cautín must necessarily center on the problems of the Indian reserves.

There is, in fact, a very striking dualism in the countryside of Cautín, between Indian and non-Indian farmers. There are, however, some important differences within the non-Indian farming sector, as the next set of correlations will demonstrate.

Properties of less than 50 hectares, being primarily Indian holdings, behave in comparison very much like the reservation properties, except for a positive correlation of 0.36993 between these properties and medium labour use. This would suggest that if Indian properties were separated from other small properties, the labour absorption of the other small properties would be considerably lower. It is also possible that the mechanization level is slightly higher on non-Indian small properties. Although in neither case is there a significant
<table>
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<td>Property 50 ha.</td>
<td>0.92138*</td>
<td>0.27829</td>
<td>0.19707</td>
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<td>0.41101</td>
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<td>Property &gt;500 ha.</td>
<td>-0.17155</td>
<td>-0.02251</td>
<td>0.75923*</td>
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<td>Wheat &lt;14 qls./ha.</td>
<td>0.83655*</td>
<td>0.18506</td>
<td>0.29286*</td>
<td>0.90455*</td>
<td>0.22004</td>
<td>0.18656</td>
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<td>Wheat 1½-12 qls./ha.</td>
<td>-0.01323</td>
<td>-0.06260</td>
<td>0.54070*</td>
<td>0.03328</td>
<td>0.21053</td>
<td>0.61431*</td>
<td>0.34150*</td>
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<td>Wheat &gt;72 qls./ha.</td>
<td>0.26108</td>
<td>-0.16373</td>
<td>0.31379*</td>
<td>0.23555</td>
<td>-0.0293</td>
<td>0.48514*</td>
<td>0.28085</td>
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<td>Sin Uso</td>
<td>-0.66754*</td>
<td>-0.07508</td>
<td>-0.51692*</td>
<td>-0.73386*</td>
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<td>0.17268</td>
<td>-0.13623</td>
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### TABLE 4 — Continued.

**CORRELATIONS BETWEEN MAPS 3-7**

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<tr>
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<th>Reducciones Divisiones</th>
<th>Other Property &lt;50 ha</th>
<th>Property 50.1-200 ha</th>
<th>Property 200.1-500 ha</th>
<th>Property &gt;500 ha</th>
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<td><strong>Agriculture</strong></td>
<td>0.62755*</td>
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<td><strong>Natural Pasture</strong></td>
<td>-0.29859*</td>
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<td><strong>Sin Use</strong></td>
<td>-0.33249*</td>
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<td>0.90536*</td>
<td>0.05428</td>
<td>0.13054*</td>
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<td><strong>Fertilizer 20-40</strong></td>
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<td>0.14981</td>
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<td>0.35571*</td>
<td>0.15713</td>
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<td><strong>Mechanization 0</strong></td>
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<td>0.09269*</td>
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<td>0.14309</td>
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<td><strong>Mechanization &gt;5.1</strong></td>
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<td>0.01417</td>
<td>0.33808*</td>
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<td>0.05994</td>
<td>0.00080</td>
<td>0.50739*</td>
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<td><strong>Labour 5.1-15</strong></td>
<td>0.19393</td>
<td>0.15975</td>
<td>0.42877*</td>
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<td><strong>Labour &gt;15</strong></td>
<td>0.91836*</td>
<td>0.00273</td>
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<td>0.05447</td>
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<td>Wheat</td>
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<td>Wheat 1h, 1-28</td>
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<td>Overuse</td>
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<td>Overuse</td>
<td>-0.00439</td>
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### Table 4 — Continued.

**Correlations Between Maps 3-7**

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correlation with mechanization over zero, both Indian and small properties show a positive correlation with mechanization of both levels. In the case of properties under 50 hectares, the correlation just misses being significant. If it were possible to remove the reservations from consideration, other properties under 50 hectares might well show a significant association with mechanization, although it would undoubtedly be a low one in comparison with larger properties. In the IREN study, properties from 20–50 hectares showed some mechanization, and this category would tend to exclude the Indian reserves, since they are nearly all smaller than 20 hectares per family.

Properties from 50.1–200 hectares, which would in most cases be considered family farms, show no definite pattern in any of the aspects of land use considered. This would suggest that some of these farms are farmed like unmechanized minifundia and others like small commercial farms, in a fairly random distribution.

There is an interesting contrast between the land use patterns of properties from 200.1–500 hectares and those over 500 hectares. There is not the dichotomy that was observed between Indian or small properties and larger farms, but there are important differences between the two groups. Properties from 200.1–500 hectares tend to be correlated with medium or high fertilization and mechanization, medium or low labour use, and medium or high yields. Properties over 500 hectares are correlated with medium fertilization and mechanization, low labour, and medium yields. In addition, they are the only properties to be significantly correlated with natural pasture, the only type of land use consistently classified as underused. It appears as though the largest properties are both less efficient and less labour-absorptive than the
next smaller size category. Where under-utilization of land occurs on a significant scale in Cautín, it is on these larger properties. One could probably justify labelling the farms from 200.1-500 hectares the modern commercial sector, and those over 500 hectares the remaining haciendas. These haciendas are the 452 properties which occupied 39.25% of the province's agricultural land before the land reform.

It is apparent that there is a very strong relationship between amounts of the normal capital inputs (labour, fertilizer, mechanization) and the yields obtained for wheat in Cautín Province. There is enough overlap between the categories which correlate with each other, however, to suggest that other factors are also important. One factor most likely to be important is land quality. The small properties, which correlate strongly with low mechanization and fertilization, high labour, and low yields, also tend to be on the poorest land with the most serious moisture deficit problems. The comparison of wheat yields with labour used is probably the most interesting of this group of correlations, as it is actually the medium yields which are strongly correlated with the lowest labour input. This suggests that the dichotomy between labour and mechanization is not as absolute as is often thought; the highest yields are in areas with high mechanization and medium labour. The farms with the most serious effects on rural unemployment, it appears, would be those with medium mechanization, low labour, and medium yields: the haciendas, not the modern commercial sector. (Wheat itself, of course, is not noted for its labour-absorptive characteristics. It is likely that if map data were available for other crops, the correlation between high labour and low yields would not be so strong.) In Cautín, a rational land reform program carried out without disrupting production would concentrate primarily on properties
over 500 hectares, as these are the properties which are inefficient in both labour absorption and production.

**Land Reform in Cautín Province**

Of the total 1,415,979 hectares held in private properties in Cautín, 99,255 were expropriated from 1965 through 1970. Of this amount, 50,325 hectares, or nearly 51%, were considered by CORA to be non-tillable.\(^1\) This made no substantial impact upon the structure of agriculture in the province.

In July, 1970, in Lautaro Commune, the owner of a farm called La Rinconada was having a dispute with Indians from the neighboring reservation about the ownership of 100 hectares of his farm. After the division laws of 1931 the then-owner of La Rinconada, a lawyer, had "rented" 100 hectares of land from his illiterate neighbors. The rental agreement turned out to be a bill of sale, and the Indians were unable to recover the land. One night in July, 1970, while the owner was away, 80 people from the reservation entered the property and proceeded to dig post-holes along the old boundary. They then moved the fence over to that boundary. When the owner brought out a policeman the next day, the Indians were able to show him a copy of the reservation deed showing the original boundary, and he left without taking any action. This was the first of the *corridas de cercas*, or fence-runnings, in Cautín Province.\(^2\)

In the winter and spring of 1970, there were 15 fence-runnings in


Lautaro Commune, and the practice began spreading to other parts of the province. Because of the coming elections (November), the local authorities were reluctant to take any decisive action to deal with the situation. It was known that two of the three presidential candidates, Salvador Allende and Radomiro Tomic, were both committed to expanding the expropriations, and there was a degree of uncertainty as to what the government's policy toward such events would be by the end of the year. In November, Allende was elected with the promise of a more far-reaching land reform; on November 16 in Galvarino Commune (just across the border from Lautaro), a whole farm was taken over by Indians from a nearby reserve. On November 30 the Tres Hijuelas farm in Lautaro was taken over; this time it became known that the MIR, a leftist radical group, was involved in the take-over. By the end of 1970, Lautaro Commune alone had 18 fence-runnings and 7 entire farms occupied.

These actions were soon ruled illegal by the courts, but in Chile the police are controlled by the executive branch (Ministry of the Interior) rather than the judiciary, and the Minister of the Interior refused to use force to remove the Indians and peasants from the occupied land. Instead the new Minister of Agriculture, Jacques Chonchol, moved his office from Santiago to Temuco for the months of January and February, 1971, to attempt the acceleration of the land reform process in Cautín and defuse the situation. The government drew most of its support from peasants and the urban working class, and its leaders felt that using force against peasants immediately after taking office would have been

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1Ibid., p. 87.
2Norman Gall, Chile's Mapuches, p. 1.
3Kyle Steenland, Agrarian Reform, p. 94.
seen as betrayal by these sectors.

The primary effect of the tomas (take-overs) in Cautín was probably to keep the attention of the agrarian reform agencies focussed on the area. During the first year after the elections there were 120 farms in Cautín either partly or wholly taken over, and many of these farms were eventually expropriated. Most had long-standing disputes over ownership of some or all of the land involved, and the take-overs were led primarily by Indians. The new organization of the farms, however, nearly always included the white or mestizo resident workers, and these people were often involved as allies in the toma itself. This was especially true of farms where employment conditions were notoriously bad. In Lautaro Commune, where the most activity took place, 16 of the first 35 farms expropriated by the new government had been the subjects of tomas.¹

Virtually all of the land taken over in this period was managed by cooperatives set up by the peasants involved. In addition to the many problems inherent in cooperative management among individualistic peasants, there also existed a certain amount of friction between the new cooperatives and the groups remaining on Indian reserves. This friction grew primarily out of the visible increase in material well-being of those on cooperative farms.² MTRistas working with the peasants tried to cool this friction; under their influence, people from existing cooperatives often became advisors and helpers to the reservation Indians in planning new tomas and setting up new cooperatives. After the obvious acceleration of the reform process by the government, with 239,128

¹Kyle Steenland, Agrarian Reform, p.77.
²Ibid., p.137.
hectares being expropriated in Cautín from the beginning of 1971 to mid-1973, the tomas slowed down. In 1972, 15 farms were expropriated in Lautaro Commune, only 4 of them after tomas. If the reaction from the landowners had not begun to be felt at that time, the situation would possibly have cooled by itself as the land reform program became a genuine force for change in the province.

At the beginning, reaction from landowners usually took the form of legal objections. In addition to the restrictions on expropriations provided by the 1967 land reform law itself, many of the bureaucrats in the land reform agencies were members of the opposition themselves, and sometimes engaged in such tactics as failure to fill out necessary reports, delays in sending of papers, and other such delays of individual expropriations. Eventually, many of the Cautín landowners turned to violent retaking of farms, usually organized with the help of other landowners. Sometimes these retaken farms were in turn retaken by Indians, peasants, and MIRistas, as the general level of violence in the countryside was escalated. Eventually, officials of the branch of the State Bank in Temuco decided to support the landowners by refusing to distribute peasant salaries on asentamientos. This led to the occupation of CORA offices in Temuco and Lautaro by groups of peasants and MIRistas. The government, already nervous because of an outbreak of tomas in Ñuble Province, overruled the local State Bank officials and forced them to continue the peasant salaries. Violence in the countryside continued

2 Kyle Steenland, Agrarian Reform, p.141-142.
3 Ibid., p.99.
4 Ibid., p. 143-145.
to escalate, however, up to and for some time after the military coup of September, 1973.

Due to the political situation, it is difficult to find information about the fate of the land reform program since 1973. It is known that the expropriations have stopped, but there is some disagreement as to how much expropriated land was returned to former landowners. The military government did state its intention to return all land that had been taken in the tomas, which would affect a large proportion of the land which eventually came under the reform program in Cautín. This would be particularly true of Lautaro Commune, where 66% of the properties over 20 standard irrigated hectares eventually came under the reform program.\(^1\)

Despite the chaotic situation in the countryside from late 1970 to 1973, the effect of the land reform upon production in Cautín seems to have been a positive one. The average of wheat yields in the province from 1964, 1965, 1966, 1969, and 1970 was 14.7 qts per hectare, only a very slight increase from the average of 14.5 recorded in the 1955 Agricultural Census. The average of the years 1971, 1972, and 1973 was 17.7. The average of the same groups of years for oats was 11.9 and 12.7. The same averages for barley were 18.1 and 20.1; for rape, 11.6 and 13.5; and for lentils, 6.3 and 8.6. Thus, there is a clear evolution in the efficiency of production per hectare of major crops. The total amount of production for some of these crops in Cautín actually decreased during this period, however, due to decreases in the total area planted. Some of this was due to shifts in cropping patterns. Some, however, was part of a general decrease in the harvest in 1973. According to

\(^1\)Ibid., p.207.
local CORA officials; during the 1972 planting season seeds and fertilizer arrived in Cautín up to two months later than the normal planting time. In addition, there was a good deal of wind and rain during the planting season, and this was the year that the State Bank cut off credit advances to CORA. These factors all affected the 1973 harvest. Lentils, which have a different planting and harvest schedule from the other crops described, were not affected. There was a nearly 6-fold increase in the amount of land planted to lentils in 1972, as well as an increase in production per hectare. It is likely that some farmers turned to lentils as an alternative crop when faced with the problems described above.

Although there is very little detailed information about land use in reformed areas of Cautín Province, the evidence of the provincial yield patterns, along with eye-witness reports, provides at least indirect evidence that the land reform in Cautín would have conformed to the pattern of increased efficiency in the use of agricultural resources demonstrated by Smith for other areas of the country. The next chapter will provide an actual comparison of province-wide land use and production patterns of reformed and non-reformed land, in the Mediterranean provinces of O'Higgins and Colchagua.

1 Norman Gall, Land Reform, p. 11-12.
CHAPTER VI

O'HIGGINS AND COLCHAGUA PROVINCES

Physical Geography and Land Use

The area within O'Higgins and Colchagua Provinces originally developed as part of the heart of the classic hacienda system as described in previous chapters. Both physically and culturally, it can be considered a sort of microcosm of Central Chile's hacienda system at the height of its development. Thus, it should be instructive to study present-day land-use patterns in this area and observe their relationship with the land reform of the late 1960s and early 1970s.

Physically, this area is part of the Mediterranean climate area of Chile which extends from 31 to 36 degrees south latitude. The whole area conforms closely to the standard description of a Mediterranean climate. Outside the Andes, winter temperatures commonly reach freezing only in the southern extreme of the area, near Concepción. In most of the area, the variation between winter and summer temperature averages is moderate. The primary seasonal factor here is rainfall; the entire area has rainy winters and an extended dry season in summer. Rainy, of course, is a relative term here. Annual rainfall varies from a low of about 250 mm in the north to about 1250 mm at the southern margin of the area. There is a clear gradation from low rainfall in the north to moderate rainfall in the south, additionally influenced by the physiography of the region. The entire area is divided longitudinally by the low
coastal mountains, the flat Central Valley, and the Andes, with occasional incursions of the mountain ranges onto the valley floor. Generally speaking, rainfall at a given latitude will be higher on the coast and on the western slopes of the Andes, in the middle of its range in the Central Valley, and lowest just east of the coastal mountains. All areas between 31 and 36 degrees south, however, follow the general pattern of marked seasonal variation in rainfall.

O'Higgins and Colchagua Provinces lie in the southern part of the Mediterranean climate area, between 34 and 35 degrees south. Maximum precipitation in the cultivable parts of the two provinces is about 1,000 mm annually. In the higher reaches of the Andes, precipitation reaches 2,500 mm, while the driest areas in the rain shadow of the coastal hills average less than 500 mm annually.

The terrain in this region is primarily sloping, except for the Central Valley and several broad river valleys which run from the Andes to the coast. These valleys carry the bulk of the population and intensive agricultural activity. Most of the valleys are irrigated. Forest cover is not extensive anywhere except on the more moist slopes of the Andes; most uncultivated land is prairie or meadow, of varying degrees of steepness, and in some areas with extensive rock outcroppings.

Seasonal temperature variations are very slight on the coast (9.3-11.3°C diurnal monthly averages at Sto. Domingo) and in the Andes (7.7-10.4°C averages at El Teniente), and a little more varied in the interior. Rancagua, capital of O'Higgins, has monthly diurnal averages of 11.1-17.7°C; San Fernando, capital of Colchagua, averages 7.9-15.8°C. San Fernando, to the south, is noticeably cooler than Rancagua, even though the actual distance is only about 50 km. The growing season (310 degrees C) varies from 184 days at El Teniente to 298 at Consti-
tucion, with an average 237 day season at Rancagua and 252 in San Fer-

dnando.¹

As shown on Map 8, there are four important soil management
groups in this area: irrigated soils, dry arable soils, dry non-arable
soils (defined by IREN as unsuitable for cropping), and sin uso (not
suitable for agriculture.) Of these, irrigated land covers 19.72% of
the area, dry arable 5.78%, dry non-arable 43.15%, and sin uso 31.00%.
Irrigated land is found almost exclusively in the Central Valley and
river valleys, and in fact covers most of their area. Dry arable land
is found mainly along minor stream courses in the dry western part of
Colchagua; some of this land would be suitable for irrigation if fund-
ing were made available. Dry non-arable land is found in both mountain
ranges and in the spurs which run through the valleys between the
ranges. The primary limitation of this land is the slope, although
there is an extensive area in the rain shadow of the coastal mountains
which is listed as having severe limitations of soil. Soils are thin
and rocky here. There are also a few smaller areas of this type scat-
tered throughout the study area.

The total proportion of land in the two provinces under intensive
permanent cultivation and orchards is 3.9% (Map 9). Chacra (truck
farms) and improved pasture account for 16.0%. Crops and natural pas-
ture account for 18.9%, natural pasture with no crop rotation 16.7%,
and matorral (brush) and pasture 14.6%. Only 93% of the land is list-
ed as forest, and 28.6% is listed as sin uso. The latter proportion
differs from that on Map 3 because Map 9 refers to the actual use of the

¹IREN, O'Higgin's y Colchagua, estudio integrado de los recursos
PROVINCIAS DE O'HIGGINS Y COLCHAGUA
MAP 8
1- Irrigation
2- Dry Arable
3- Dry Non-arable
4- Sin Uso

INSTITUTO DE INVESTIGACION DE RECURSOS NATURALES Y AGUA
land. Some land listed as not usable for agriculture is in fact used, usually for grazing, and this is reflected in the smaller proportion of \textit{sin uso} land on Map 9. This land use category is limited almost entirely to the Andes, except for a few rocky outcroppings in the coastal mountains and the spurs which extend into the valleys. The first two land uses are limited to the irrigated areas.

In this part of Chile, pasture is still a predominant use of land. Map 10 shows the distribution of areas with varying proportions of pasture. In the study area of the map, which excludes most of the Andes, about 1.19\% of the land is forested. Land with 75-100\% pasture comprises 62.50\% of the study area; land with 50-75\% pasture comprises 10.92\%, and land with 25-50\% pasture accounts for 15.89\%. Only 7.22\% of the land has 0-25\% pasture, and 1.38\% of the land has no pasture at all. If we compare this pattern with the four basic soil management groups, we find that in general higher proportions of pasture follow the less productive land. For example, 79.67\% of the land with 75-100\% pasture is dry non-arable land, and only 8.03\% is irrigated land. This 8.03\%, however, includes 16.91\% of the total irrigated land. While 19.35\% of the area with no pasture is on irrigated land, representing 13.6\% of the irrigated area, 1.38\% of the non-pasture land is on dry non-arable land, making up 1.59\% of this category. It may be assumed that some of this land is simply unused, but as will be shown later, a large proportion of this land is over-used as cropland. Thus, while the general pattern of pasture use follows a rational pattern of land quality, it is apparent that there are significant areas of both under-used irrigated land and overused non-arable land.

Pastures vary in their carrying capacity as well as their actual
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use. Map 11 shows the pattern of the actual use of pasture in terms of heads of animals per hectare. Of the total study area, 9.9% is unstocked, 38.1% carries fewer than .20 heads per hectare, 23.9% carries .21–.50 heads per hectare, 14.1% carries .51–1 heads per hectare, 9.6% carries 1.1–2 heads per hectare, 2.1% carries more than 2 heads per hectare, and 2.1% has no pasture. The actual stocking of pasture follows land quality fairly closely. About 3% of the irrigated land carries more than 1 head per hectare; none of the other land use types has over 1.6% of its area this heavily stocked. The vast majority of the dry non-arable land, about 90%, carries fewer than 1 head per 2 hectares. Dry arable land also carries fewer than 1 head per 2 hectares in about 90% of its area, but the average stocking is slightly higher than on dry non-arable land; 62% of the land carries from .21–.50 heads per hectare, in comparison with 25.0% of the dry non-arable land.

Underuse of irrigated land is indicated in the 22.2% of the irrigated land carrying fewer than .50 heads per hectare as well as the 8.9% unstocked. Understocking of irrigated land would appear to be a more serious problem than overstocking of dry land; at the time this map was made in 1972. Of the completely unstocked pasture, about 27% is on irrigated land; about 4% of that carrying less than .20 heads per hectare is on irrigated land.

About 55% of the land in this area is used for annual crops, either in rotation, with other crops or in rotation with pasture. On dry land, this almost invariably takes the latter form, while on irrigated land the former is more important. There is, however, a significant amount of irrigated land on which crops are rotated with pasture.

In investigating the patterns of land use—rotations, inputs, yields, etc.—it becomes obvious that irrigation of lack of it is one
of the strongest determining factors of land use in this area. When
the map of fertilizer use (Map 12), for example, is superimposed on
the map of soil management groups, the boundaries of highly fertilized
areas and irrigated areas coincide very closely. Within highly fertil-
ized areas, however, there is some variation in actual amounts used,
and this study will show that this variation is highly related to land
tenure. Of the land actually under annual crops in 1972 (about 4.5% of
the total land) 15.40% was unfertilized. About 5.91% received 1-25 kg
NPK per hectare; 11.14% received 25.1-50 kg NPK; 32.0% received 50.1-
100 kg; 32.8% received 100.1-200 kg, and 2.61% received more than 200
kg NPK per hectare. More than a quarter of the dry non-arable land
under cultivation is unfertilized, and more than half is in the lowest
three fertilization levels; none is at the highest level. More than
10% of the dry arable land is under fertilization levels from 50.1-
200 kg per ha. A further 14.1% is fertilized at 25.1-50 kg per ha, and
a smaller proportion is unfertilized or fertilized with less than 25 kg
per ha. Only an insignificant amount is fertilized at the highest level
listed, over 200 kg per ha. In contrast to the dry lands, 33.5% of the
irrigated land under annual crop cultivation is fertilized at the highest
three levels. There seems to be a clear progression from the lowest
average levels of fertilization on dry non-arable land to the highest
on irrigated land, with dry arable land in between.

Labour use in O'Higgins and Colchagua also closely follows the pat-
tern of the basic soil management groups. Map 13 shows the distribution
of labour use throughout the two provinces, with labour use measured in
units of man-days per hectare per year. The percentage distribution of
the categories of labour use shown on the map is as follows: 0 units,
23.2%; 1-4 units, 10.50%; 1-4-14 units, 6.21%; 14.1-50 units, 22.7%;
and more than 50 units, 6.90%. More than 90% of the irrigated land is farmed using more than 14 labour units per hectare; only 7.24% of dry arable and 2.8% of dry non-arable land is farmed with this much labour input. In contrast, 93.11% of the dry non-arable land and 72.45% of the dry arable land is farmed with fewer than 14 units of labour per hectare while only 2.52% of the irrigated land receives such a low input of labour. Thus, there appears to be a clear progression of labour use according to soil management category. There are differences within the soil management groups; however, which are closely related to land tenure.

One of the key aspects of any land-use system in determining its utility is the level of yields produced. In O'Higgins and Colchagua, 35.47% of the land planted to cereals yields from 0-15 quintals per hectare, low yields by any country's standards. A further 32.94% of the cereal land has yields from 15.1-25 quintals per hectare, 21.01% has yields from 25.1-35 q/ha, 12.41% has yields from 35.1-45 q/ha, and only 5.12% has yields over 45 q/ha per hectare. One of the primary determinants of yields would appear to be the basic soil management groups. More than 83% of the dry non-arable land under cereals has yields lower than 25 quintals per hectare, compared with 73% of the dry arable land and only about 29% of the irrigated land. In contrast, about 33% of the irrigated land has yields over 35 quintals per hectare, compared with 277% of the dry arable and 4.30% of the dry non-arable land. Clearly, high yields are exceptional on non-irrigated land in this region. Yields over 45 quintals per hectare are exceptional in any case. Most of the irrigated land with yields in this category lies between San Fernando and Graneros, which is an area of very rich land; not, however, the rich-
PROVINCIAS DE O'HIGGINS Y COLCHAGUA
USO ACTUAL DE LA TIERRA
MAP 12
NIVELES DE FERTILIZACIÓN EN CULTIVOS ANUALES

FERTILIZATION (KGS NPK/HA)
1- 0
2- 1-25
3- 26-50
4- 51-100
5- 100.1-200
6- Over 200
7- Not Cultivated for Annual Crops
HIGGINS Y COLCHAGUA
DE LA TIERRA
CON CULTIVOS ANUALES

FERTILIZATION (KGS NPK/HA)

1. 0
2. 01-25
3. 25.1-50
4. 50.1-100
5. 100.1-200
6. Over 200
7. Not Cultivated for Annual Crops.
est land in the two-province area. It is also an area of predominantly small and medium-sized holdings, with asentamientos covering much of the land not in small holdings.

The most remarkable performance in yields is that of the small percentage of dry non-arable land which actually produces more than 45 quintals per hectare. This land is located primarily in one contiguous area in western Colchagua, west of the village of Lolol and bounded on the east by the Nilahue estuary. Most of this area is listed as having a fertilization level of 50.1-100 kg per hectare, not a particularly high amount. Labour use is listed at the medium level, 6.1-14 units per hectare. Property sizes in the area are a mixture of small, medium, and large. The land itself is listed as having no soil limitations, but severe limitations of topography. It is also listed in the comparison between actual and potential use as being mostly in use equilibrium, with a small section classified as overused—potential forest land which is used for crops. It is difficult to find an explanation for the performance of this small area which can be verified from the data at hand. One would suspect exceptionally good land combined with some method such as contouring or terracing to deal with the problems posed by the topography. It is also likely that this area, being near an estuary, would have a relatively high water table even without irrigation. This area was entirely under private ownership in 1972.

Map 1A compares the actual use of land in these two provinces with the appropriate potential use determined by INEN. The map shows only 52.80% of the land in use equilibrium, with 12.78% underused and 34.40% overused. Of the total overused land, only 4.6% is irrigated, 1.07% is dry arable, 87.07% is dry non-arable, and 11.39% is classified as sin uso.
Of the underused land, 40.65% was irrigated, none was dry arable, and 59.35% was dry non-arable. There is a consistent difference between the subclasses of underuse appearing on irrigated and dry land. Every case of underuse on dry land was classified as used for matorral and pasture when its best potential would be for productive forest. On irrigated land, there are no examples of this type of underuse. The type of underuse appearing here consistently is use of land for rotation of annual crops and pasture when its best potential use would be for permanent crops and orchards.

Of the total irrigated land on the maps, 62% is listed as overused, 18.0% as underused, and 81.0% in use equilibrium. Dry arable land is 4.89% overused, 0.00% underused, and 95.11% in use equilibrium, by far the most efficiently used soil management type. Dry non-arable land is listed as 54.00% overused, 12.11% underused, and only 33.89% in use equilibrium. In use land is listed as 9.68% overused and the rest in equilibrium. It would appear that there are two serious and opposite problems of land use in O'Higgins and Colchagua: on the one hand, the overuse of dry non-arable land, and on the other the underuse of potentially very productive irrigated land.

Land Tenure and Land Use

Map 15 shows the distribution of various property sizes in O'Higgins and Colchagua. The study does not include most of the Andean Cordilleras, since this land is not suitable for cultivation. In the two-province area exclusive of the Andes, 66.0% of the land is held in properties over 500 hectares. Properties from 200.1-500 hectares comprise 11.25% of the land, and properties of 100.1-200 hectares include 7.92%. On the smaller end of the scale, 4.82% of the land is in parcels of
less than 10 hectares, 2.06% in parcels of 10.1-20 hectares, 3.01% in parcels of 20.1-50 hectares, and 4.32% in properties of 50.1-100 hectares. The classification of those properties between 10 and 200 has as minifundia, family-sized farms, or latifundia can be seen primarily as a function of the quality of the land included on the property.

Using the basic soil management types of Map 3, it can be seen that the majority of properties from 10-200 hectares are on irrigated land. In the case of the majority, then, we can say that the properties from 10 to 50 hectares may be considered family farms, and those above 100 hectares can be considered latifundia. The category from 50-100 hectares would probably include a substantial number of family farms if family farms are defined as those not using any permanent outside labour. The relatively less mechanized farms from 50-100 hectares would usually be operated as latifundia. In especially rich areas, where the standard irrigated hectare equals one hectare or less, even some of the farms from 20-50 hectares would be operated as latifundia.

Although only 1% of the properties over 500 hectares are on irrigated land, this represents 28.7% of the actual irrigated land. The 73.5% of properties under 10 hectares which are on irrigated land cover only 13.6% of the irrigated area. In 1972, when the map was drawn, 65.4% of the total irrigated land in the two provinces was in holdings over 100 hectares, which would normally mean over 30 standard irrigated hectares. Latifundia-sized holdings were similarly predominant in the dry areas. In 1972, of course, many of these large properties had become asentamientos or CHAs, but their predominance on the map is a good indication of the concentration of land ownership on irrigated land before the land reform. Some former latifundias had also by this time been sub-
divided in order to avoid expropriation, so it is very likely that in reality the concentration of land ownership was even more marked than the map would indicate. Only about 20\% of the land in O'Higgins and Colchagua had come under the land reform by late 1972, somewhat below the national average of about 30\%. Latifundias were still an important factor in the area, especially on irrigated land, which only made up about 1/3 of expropriations up to that point.

Table 5 shows correlation coefficients obtained for each pair of important variables on the maps of O'Higgins and Colchagua, when these variables were quantified on a grid count and computerized. It can be seen from the first section of this table that when property sizes are correlated with actual land use, the land use follows the distribution of property sizes on the basic soil management types. For example, extensive land uses such as natural pasture tend to have their strongest correlations with properties over 500 hectares, which are found predominantly on dry non-arable land. The same relationship is true of the comparison of percentages of pasture and property sizes. Large properties correlate strongly with 50.1-75.4 pasture, and even more strongly with 75.1-100\% pasture. The strongest correlation with 1-2\% pasture is that of property sizes 1-10 hectares. These properties are most often, although not always, found on irrigated land. Properties in between the extremes of size, because they are commonly found on both irrigated and dry land, correlate with a variety of land uses and percentages of pasture. The same relationship is true of stocking of pasture, where low stocking follows dry land and large properties.

The highest fertilizer uses, 100.1-200 kg per hectare and over 200 kg per hectare, have their strongest correlations with small properties—in the former case, properties from 1-10 hectares and 50.1-100 hectares,
<table>
<thead>
<tr>
<th></th>
<th>Irrigated Dry-Arabl</th>
<th>DryN-Arb1</th>
<th>Chera/Frt</th>
<th>CC/Articl</th>
<th>CC/Naturl</th>
<th>Mtrln</th>
<th>Natl1</th>
<th>Natl2</th>
<th>Bosque</th>
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<td>Chaera &amp; Fruit</td>
<td>0.86733*</td>
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<tr>
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<td>CC/Articf</td>
<td>CC/Natural</td>
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<tr>
<td>Cereals 0-15</td>
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<td>0.51659*</td>
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<td>-0.28036</td>
<td>0.88037*</td>
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<td>Cereals 15.1-25</td>
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<td>0.67293*</td>
<td>0.39114*</td>
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<td>0.69417*</td>
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<td>Cereals 25.1-35</td>
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<td>Cereals 35.1-45</td>
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<td>-0.21682</td>
<td>0.78048*</td>
<td>0.95957*</td>
<td>0.31576*</td>
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<td>CC/Art fcl</td>
<td>CC/Natural Mat</td>
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**CORRELATIONS BETWEEN MAPS 8-17**

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TABLE 5 — Continued.

CORRELATIONS BETWEEN MAP 3 8-17

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TABLE 5 — Continued.

CORRELATIONS BETWEEN MAPS 8-17.

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### Table 5 — Continued.

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**TABLE 5 — Continued.**

**CORRELATIONS BETWEEN MAPS 2-17**

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<th>Pasture 1-25</th>
<th>Pasture 25,1-50</th>
<th>Pasture 50,1-75</th>
<th>Pasture 75,1-100</th>
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## Table 5 — Continued

**Correlations Between Maps 8-17**

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and in the latter case properties 20.1-50 hectares. Lower fertilizer use levels show a more varied response, correlating strongly with several different property sizes.

There is a strong inverse relationship between property size and labour use per hectare, as shown on the following table:  

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<th>Ave. Man-Days Dry</th>
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<td>50.1-100</td>
<td>40.3</td>
<td>7.2</td>
</tr>
<tr>
<td>100.1-200</td>
<td>36.0</td>
<td>4.8</td>
</tr>
<tr>
<td>200.1-500</td>
<td>38.1</td>
<td>4.7</td>
</tr>
<tr>
<td>500+</td>
<td>16.1</td>
<td>1.4</td>
</tr>
</tbody>
</table>

Irrigated properties over 500 hectares appear to be the exception to the general downward trend of labour use with increasing property size. However, this data was collected in 1972, and large numbers of working asentamientos were over 500 hectares in size; it will be demonstrated later that there is a positive correlation between asentamientos as a form of landholding and higher labour use per hectare. The number of asentamientos over 500 hectares would have been sufficient by 1972 to change the average figures for the whole category.

There are also some important differences in types of labour employed on the various sizes of property. Irrigated farms of 20.1-50 has employ the highest percentage of seasonal labour, 21.2% of the total labour on this size farm.  

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worked by one man with the prevailing technology and too small to have resident inquilinos. Therefore, they hire outside labour at certain crucial times in the agricultural year. Properties over 500 hectares hire the smallest percentage of seasonal labour, 6.1%.1 This is partly a reflection of the predominance of asentamientos over 500 hectares in 1972 and partly due to the fact that the larger privately owned farms were still being operated as haciendas, with resident inquilinos, renters, and sharecroppers.

Mechanization is another important input, both for its impact on yields and its negative impact on employment on some properties. The degree of mechanization in these two provinces can be measured by considering tractor use:2

<table>
<thead>
<tr>
<th></th>
<th>% Irrigated Land</th>
<th>% Dry Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of Own Tractor</td>
<td>66.6</td>
<td>5.1</td>
</tr>
<tr>
<td>Rented Tractor</td>
<td>9.7</td>
<td>1.4</td>
</tr>
<tr>
<td>No Tractor</td>
<td>7.1</td>
<td>2.1</td>
</tr>
<tr>
<td>Uncultivated</td>
<td>16.6</td>
<td>91.4</td>
</tr>
</tbody>
</table>

There is a direct relationship between property size and tractor use:3

<table>
<thead>
<tr>
<th>Property Size</th>
<th>% Irr. Land Using Tractor</th>
<th>% Dry Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>.1-10 ha</td>
<td>34.1</td>
<td>3.3</td>
</tr>
<tr>
<td>10.1-20 ha</td>
<td>52.3</td>
<td>2.5</td>
</tr>
<tr>
<td>20.1-50 ha</td>
<td>64.3</td>
<td>5.0</td>
</tr>
<tr>
<td>50.1-100 ha</td>
<td>97.4</td>
<td>4.2</td>
</tr>
</tbody>
</table>

1Ibid., pp. 291-292.
2Ibid., pp. 293-294.
3Ibid., pp. 293-294.
<table>
<thead>
<tr>
<th>Property Size</th>
<th>Irr. Land Using Tractor</th>
<th>Dry Land</th>
</tr>
</thead>
<tbody>
<tr>
<td>100.1-200 ha</td>
<td>83.0</td>
<td>7.3</td>
</tr>
<tr>
<td>200.1-500 ha</td>
<td>83.9</td>
<td>5.2</td>
</tr>
<tr>
<td>500+ ha</td>
<td>78.1</td>
<td>7.2</td>
</tr>
</tbody>
</table>

On irrigated land, the greatest mechanization is on properties of 50-500 hectares, also the lowest users of labour and the second-highest users of seasonal labour. On dry land, the highest mechanization is on properties over 100 hectares, also the lowest labour users and the highest users of seasonal labour. Irrigated properties over 500 hectares show slightly higher labour use and lower seasonal labour use than other large properties, for reasons outlined above. They also show a slightly lower level of mechanization than other large properties.

Cereal yields below 25 quintals per hectare correlate with a variety of property sizes. Only the smallest properties, 1-10 hectares, and those from 200.1-500 hectares are excluded. The strongest correlations for both these size categories are with yields from 35.1-45 qls per hectare; the smallest properties have the strongest correlation with this yield category, 0.63480 as opposed to 0.47551 for properties from 200.1-500 hectares. Yields over 45 qls per hectare are correlated with only two size categories, 50.1-100 hectares (0.37129) and 100.1-200 hectares (0.32283). Properties over 500 hectares are not correlated significantly with any yield level over 25 quintals per hectare. It must be remembered, however, that these properties are more likely to be on dry land than any other size category.

In comparing Map 14 with Map 15, it can be seen that all except two property sizes have their only significant correlation with use equilibrium. Properties 20.1-50 hectares, which are more prominent on dry land than other small properties, correlate with overuse, 0.35057,
and with use equilibrium, 0.40408. Properties over 500 hectares correlate with overuse, 0.70757; underuse, 0.45636; and use equilibrium, 0.39931. Thus, properties over 500 hectares are the only size category to show a significant correlation with underuse. Although these properties are predominantly on dry land, underuse is primarily a phenomenon of irrigated areas; the 28.71% of irrigated land in properties over 500 hectares shows a high degree of underuse in a direct comparison of the two maps. However, the total pattern of overuse and underuse in relationship to property size is much more complex, as shown on the following table:

<table>
<thead>
<tr>
<th>Property Size</th>
<th>Overuse</th>
<th>Underuse</th>
<th>Equil.</th>
<th>% of Size in Tot.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10 ha</td>
<td>1.8%</td>
<td>6.1%</td>
<td>6.7%</td>
<td>4.8%</td>
</tr>
<tr>
<td>10.1-20 ha</td>
<td>2.0%</td>
<td>0.9%</td>
<td>2.3%</td>
<td>2.0%</td>
</tr>
<tr>
<td>20.1-50 ha</td>
<td>2.6%</td>
<td>1.2%</td>
<td>3.0%</td>
<td>3.0%</td>
</tr>
<tr>
<td>50.1-100 ha</td>
<td>2.5%</td>
<td>3.7%</td>
<td>6.8%</td>
<td>4.8%</td>
</tr>
<tr>
<td>100.1-200 ha</td>
<td>5.8%</td>
<td>11.2%</td>
<td>8.7%</td>
<td>7.9%</td>
</tr>
<tr>
<td>200.1-500 ha</td>
<td>9.2%</td>
<td>5.6%</td>
<td>14.2%</td>
<td>11.2%</td>
</tr>
<tr>
<td>500+ ha</td>
<td>75.7%</td>
<td>68.0%</td>
<td>58.0%</td>
<td>66.0%</td>
</tr>
<tr>
<td>Total</td>
<td>99.9%</td>
<td>99.9%</td>
<td>99.9%</td>
<td>99.9%</td>
</tr>
</tbody>
</table>

All property sizes except those over 500 hectares contribute a disproportionately small amount to the total of overused land when one considers their actual share of the total farmland, although the difference is slight in the case of properties from 10.1-50 hectares in size. The highest relative proportion of underuse, however, is on farms from 100.1-200 hectares, not on the largest farms. Many of these properties are farmed as haciendas, and are just enough below 30 standard irrigated hectares to have escaped expropriation during the period of reform be-
fore the data were gathered for these maps. The lowest relative pro-
portion of underuse is on farms 10.1-20 hectares, which may be called
small family farms, and which show a certain degree of overuse, although
not out of proportion to their share of the total land. Farms in the
size categories 50.1-100 hectares and 200.1-500 hectares also show a
very low degree of underuse in proportion to their share of the total
land. All of these property sizes are found primarily on irrigated land,
with the exception of properties 200.1-500 hectares. The latter category
is about equally distributed on irrigated and dry non-arable land, and is
found on dry arable land to a much greater degree than any other size
category.

The highest proportion of land in use equilibrium is on properties
of 50.1-100 hectares, followed closely by properties of 1.1-10 hectares
and 200.1-500 hectares. Properties over 500 hectares have the lowest
relative proportion of land in use equilibrium; this is due to the fact
that these properties show a high rate of both over and underuse.

It would appear from this comparison that the most appropriately
used properties are those from 10.1-20 hectares and those from 50.1-100
hectares, which would include most of the larger single family farms
and the smaller commercial farms. Farms from 200.1-500 hectares also
show a high degree of appropriateness of use. These farms are in many
cases operated as dry-land family farms or small commercial enterprises.
At the time of the map study, many were also operated as asentamientos.
Some of those on irrigated land were also still operated as haciendas.
Thus, there is evidence that minifundias and family farms, as well as
the smaller commercial enterprises, can be considered efficient in terms
of appropriate land use. The actual relationships between asentamientos
and land use will be discussed in the next section of this study.
Land Reform in O'Higgins and Colchagua

Although the land reform of the 1960s had concentrated on central Chile, it had fallen far short of its stated goals and the peasants' expectations. By the time of the 1970 election, the strength of the leftist parties was much greater in the countryside than during the previous election. The tomas had also spread from Cautín Province into the central part of Chile. One former CORA official states that even some re-formed asentamientos were being occupied by landless peasants.¹ For this, among other reasons, when the Unidad Popular took office expropriations and redistributions of land were accelerated. In the central provinces, this removed the immediate pressure and quickly put a stop to the tomas. Once the properties over 50 standard irrigated hectares had been expropriated, however, the UP began to look toward the properties of 40-50 standard irrigated hectares, a category which included some of the modern commercial farms as well as the more inefficient haciendas. Certain vaguenesses in the UP's approach also made for insecurity even among small and family-sized farm owners, a situation which was quickly turned to the advantage of the opposition to land reform. The National Agricultural Society, dominated by the big landowners, convinced medium and small owners that they would be expropriated and encouraged them to boycott production. Even though they were actually benefitting from increased demand for food and better credit and technical assistance, many of them joined the boycotts. (A similar situation existed in urban areas, where newly-prosperous truckers engaged in a lengthy strike funded by the opposition.) In the case of medium-sized farmers, their fears were a self-fulfilling prophecy; many agrarian advisors and officials did begin to

feel that this sector would have to be expropriated to prevent decreases in production. Thus, within about a year after the UP took office, the countryside was thoroughly polarized; the UP itself was weakened by internal disagreements about how to deal with the situation. There was also a good deal of controversy over the UP's attempt to introduce the new type of reformed landholding, the CERA, to the agrarian reform.

In the San Fernando area, O'Higgins Province, the local CORA officials made a great effort to involve campesinos in the decisions about land reform. Meetings were held at which campesinos made suggestions as to priorities for individual expropriations, and the issues were thoroughly discussed in the context of long-term strategy. Partly as a result of these discussions, CERAs became fairly common in this area compared to many provinces. (Aconcagua had a fair amount of success with CERAs too.) CERAs were more collective than the asentamiento arrangement which had previously been the rule. CERAs abolished the boundaries of former holdings, and had no employees. Land was farmed collectively and the profits shared equally. Asentamientos often employed former temporary workers on a wage basis, but CERAs included them as equal members, along with women. The primary problem of CERAs seems to have been a social/psychological one, as in the CERA described by a former CORA Official:

In the main one I dealt with, two groups developed. One was more politically aware and all for collective organization. The other was more individualistic. At first they agreed to make no distinctions with respect to rights and profits. This produced very good results. Productivity increased enormously. But soon their collective spirit weakened. One group started saying that they worked harder than the others, that they were more skilled, that it was unjust that they should own nothing privately, and so on....

Also with better wages and purchasing power in the cities, demand went up and profits too, especially as the black market developed. This made them hanker after individualistic arrangements.
This too was a product of our transitional situation—of our still having a market economy. So although both groups of this CERA remained UP supporters, the division between them grew deeper and deeper. Finally they divided the CERA. One part was still worked collectively and the other on a more private basis. To the end, these two groups remained in conflict. Similar divisions occurred elsewhere. My personal conclusion was that collectivization at this stage was utopian, in all but exceptional cases.\(^1\)

It appears, from testimonies of several former agrarian officials,\(^2\) that CERAs were most successful in areas where campesinos had the most input into decision-making from the beginning. In fact, areas where tonas were common in the early days of the reform often were successfully collectivized. A 1972 survey found that peasants on farms which came under the reform system after the 1970 election were more positive toward the idea of collectivization than those on older reform settlements.\(^3\) Observers usually claim that the collectives which were formed underwent substantial increases in production. The same CORA official previously quoted states that in the San Fernando area 1972 was a turning point in overcoming various attempts by the opposition to sabotage production: "Production schedules went up steeply in San Fernando. Take wheat, for example. By August 1973 we had already exceeded output for the whole of the previous year, and we still had a second crop to come."\(^4\)

Officially, there was a rather large decrease in wheat production in O'Higgins Province in 1973, but these figures were compiled after the military coup. The coup came at such a time as to interfere with planting of some crops as well as the harvesting of others. It is also diffi-

\(^1\) Ibid., pp. 85-86.
\(^2\) Ibid., pp. 73-124.
\(^4\) Henfrey and Sorj, Chilean Voices, p. 95.
cult to measure production after the beginning of July, due to a number of factors including a transportation strike. There were also in July and August a series of terror campaigns in San Fernando.

When the campesinos went out with their tractors, they were stoned by organized fascist bands. By now the military and police were just standing by and watching all this, and most campesinos were unarmed. They kept trying to get produce through to the towns, but soon they were having to turn back daily.

In spite of the obvious difficulty with reliability of data, especially for the year 1973, it is believed that a mathematical study of the various factors of land use and production on the reformed properties, as compared with the non-reformed properties, is possible. The data used in the rest of this chapter was taken from maps produced by the government (IREN) in 1977, and reasonable accuracy can be assumed. In most cases we are not dealing with total production figures, but with the geographical occurrence of various patterns of land use and production, a set of data much less subject to the kinds of errors and deficiencies suggested above.

Map 17 shows that of the total area of O'Higgins and Colchagua Provinces, 6.84% was in asentamientos prior to April 30, 1971, and an additional 7.54% was expropriated by September of 1971. A total of 57.34% did not come under the land reform and 28.26%, mostly in the Andes, was not studied. Of the area studied, 9.54% was in older asentamientos, 10.52% recently expropriated, and 79.93% not under the land reform. The total of about 20% of this land under reform was only 2/3 of the national average at that time. Different types of land were expropriated approximately in proportion to their share of the total. Irrigated land, about 30% of the usable land in these two provinces, made up 32.66% of the

1Hefrey and Sorj, *Chilean Voices*, pp. 96–97.
expropriations. Dry arable land, about 8% of the total, made up 7.16% of the expropriations. Dry non-arable land, about 62% of the usable land, made up only 55.87% of the expropriations; the remaining 4.29% of the expropriated land is classified as sin uso.

By September, 1971, 23.40% of the irrigated land was under the reform program, along with 17.72% of the dry arable land, 19% of the dry non-arable land, and 18.05% of the sin uso land. There were still large quantities of underused, unexpropriated land, especially in irrigated areas. This was especially true of the area surrounding Rancagua and an extensive area along the Cachapoal River. The limitations of the 1967 land reform law made it difficult to deal with some of these properties, many of which were slightly under the 80 standard irrigated hectares specified in the law, and not abandoned or grossly mismanaged. Other unexpropriated properties in these areas were latifundia which had been subdivided among family members to avoid expropriation. Theoretically, the law prevented this, but in practice many farms were subdivided just before the law took effect. In the area along the Cachapoal River, many of the unexpropriated and underused properties were over 500 hectares, which in that area would be much larger than the legal maximum; some of these were undoubtedly expropriated in the first months of 1973. However, it is clear that in O'Higgins and Colchagua, especially in O'Higgins, the land reform process moved at a much slower pace than in many other areas of the country. It is possible that the level of rural unrest in other areas such as Cautín forced a disproportionate amount of government resources to be channeled into these areas, thus taking government attention and resources away from O'Higgins and Colchagua.

Even though the land reform affected only a relatively small proportion of the land in these two provinces, there are some patterns in
land use on reformed properties which become apparent when the map of reformed areas is compared with the land use maps. Smith, in his before and after study of a sample of asentamientos and other units, did not find any statistically significant difference in the overall land use in 1972 in his sample, which included farms from a large area of central Chile; but he found very impressive changes from 1966 to 1972 on the asentamientos. These farms started with the poorest and least-capitalized land, the owner having usually kept the best land for a reserve, and made great changes in the intensity of use of the land. By 1972, there was no significant difference between the intensity of use on the asentamientos and the neighboring reserves. There is some evidence that in 1972, in O'Higgins and Colchagua Provinces, the asentamientos were actually more intensively farmed than other properties. For example, the only significant correlation on Table 5 between the different land tenure types on Map 17 and 1-25% pasture is with asentamientos, 0.54661. This apparent relationship between asentamientos and low proportions of pasture cannot be accounted for by the soil management group factor.

Irrigated land made up about 32.66% of the expropriations in this area, compared to its 30% of the usable land, not a very large proportional difference. Irrigated land by itself correlates significantly with all categories of pasture use up to 75% pasture, and the strongest correlation is with 25.1-50% pasture, 0.80363.

Fertilizer also shows a definite positive relationship with reform units. The lowest rate of fertilizer use significantly correlated with reform units is 50.1-100 kg NPK per hectare, which correlates with the more recent expropriations, 0.38970, and unreformed land, 0.51742. Fertilizer use 100.1-200 kg per hectare correlates with asentamientos, 0.73111, and recent expropriations, 0.52918. Fertilization over 200 kg
per hectare correlates only with recent expropriations, 0.41153. Irrigated land shows a similar relationship to fertilization levels in that it correlates with all fertilization levels over 100.1 kg per hectare, but in this case the correlations are not as strong. The strongest correlation between irrigation and fertilization levels is with 100.1–200 kg per hectare, 0.67716.

The lowest level of labour use which correlates significantly with asentamientos is 14.1–50 man-days per hectare per year, 0.83912. This category of labour use also correlates with recent expropriations, 0.30967. Labour use over 50 man-days per hectare correlates only with asentamientos, 0.52048.

The only significant correlation of cereal yields 6–15 quintals per hectare and land tenure type is with non-reformed land, 0.417665. Yields from 15.1–25 qls are correlated with recent expropriations, 0.411100, and unreformed land, 0.41762. Yields from 25.1–35 qls are correlated with asentamientos, 0.614100, and no others. There are no significant correlations for yields over 45 qls, although all three correlations were positive, and the highest correlation was with asentamientos. Thus, there is a progression in correlations between yields and tenure types, with non-reformed land associated with lower yields, recent expropriations associated with low and medium yields, and asentamientos associated with medium and high yields. This does not, of course, mean that high yields do not occur on non-reformed land; we have already discussed some instances where this does occur. However, the occurrence is no greater than would appear by chance.

There is also a distinct progression in over and underuse as one moves from the older asentamientos through recent expropriations to the unreformed properties. On those properties which were organised as
asentamientos prior to April 30, 1971, 28.40% of the land appears on
Map 14 as overused, 7.09% as underused, and 64.31% in use equilibrium.
Land expropriated between April 30, 1971, and September 1971 appears on
the same 1972 map as 30.97% overused, 11.40% underused, and 56.52% in
use equilibrium. Unreformed properties appear on this map as 37.95%
overused, 13.27% underused, and 46.68% in use equilibrium. Some of
these differences can be accounted for by the situation existing before
the reform, where many small properties were seriously overused and
would not have been eligible for expropriation. This would also be true
of underused small properties. However, the most intensively overused,
and the third most intensively underused properties are those over 500
hectares, nearly all of which would have been eligible for expropriation
on the basis of size alone. Minifundia and small family farms account
for such a small proportion of the total agricultural land that they
could not possibly account for the high over and underuse on the non-
reformed properties. Thus, it is reasonable to infer from this direct
map comparison that land use can be improved by expropriation and organi-
ization into asentamientos or CERAs. The same relationship is shown by
the correlation process. The only significant correlation for the older
expropriations is with use equilibrium, 0.58887. The only significant
correlation for recent expropriations is with use equilibrium, 0.43272.
Non-reformed properties are correlated with overuse, 0.75008; underuse,
0.36171; and use equilibrium, 0.60293.

There is an area of about 25 square km in O'Higgins Province, in
the Central Valley area just east of Rengo, which is entirely composed
of the best category of land listed in the province: irrigated, without
limitations of soil or drainage. This entire area is shown as having
cereal yields of 15.1–25 quintals per hectare, a very poor performance
for such land. Fertilizer use for the area is shown as 100.1-200 kg per
hectare, considerably above the average for the province. Labour use is
listed as 14.1-50 units per hectare, also higher than average. An ad-
joining area of the same size and on the same quality of land lists the
same labour use, lower fertilization levels of 50.1-100 kg per hectare,
and has yields of 35.1-45 quintals per hectare. Property size distri-
bution in these areas is approximately equal, with both areas containing
properties of all size categories except 50.1-100 hectares. Most of the
two areas in listed as underused land which should be used for permanent
crops and orchards and is used for rotation of crops and pasture. About
1/3 of the higher-yielding area is listed as in use equilibrium. About
2/3 of the higher-yielding area is under the land reform program, includ-
ing nearly all of the land in use equilibrium. None of the low-yield ar-
ea was in the land reform program at the time the yield data was compiled
in 1972. Except for the difference in yields and use equilibrium, the
only significant difference discernible from the map data between these
two areas is the presence or absence of reformed land holdings. There
is reason to believe that, at least in this area, the land reform had a
major impact upon intensity of land use and efficiency of inputs, and
perhaps ultimately upon yields.

It is apparent from the map comparisons that the most important
single factor affecting land use in O'Higgins and Colchagua Provinces is
irrigation or the lack of it. The maps consistently show more intensive
land use, more use of inputs, and better yields on land that is irrigated.
The only other factor studied here which appears to have a strong and con-
sistent impact upon land use, inputs, and yields, is the land reform pro-
gram itself. Land in reformed holdings consistently appears more inten-
sively and appropriately used, more labour-absorptive, and superior in productivity to unreformed land. It is extremely unlikely that this is an accidental performance dependent upon the particular properties expropriated; the land reform in practice affected primarily the least efficiently exploited farms, and in cases where the owner kept a reserve the reserve was generally on the best land. Most of the properties expropriated in their entirety were on relatively poor land. Thus, while it is difficult to make a precise empirical demonstration of the specific factors in the organization and functioning of reform units which would account for the difference in performance, the difference itself is very clear.
CONCLUSIONS

It has been demonstrated that in the southern agricultural provinces of Chile, where the climate tends to be consistent and crop yields stable, there was an increase in both yields and production concurrent with the agrarian reform program from 1970 to 1975. This was true even in Cautín Province, where the pre-reform agrarian structure was characterized by extremes of minifundismo and rural poverty, and where the land reform process was sometimes chaotic. Farther north, where irrigation is the most important single factor in land use and production, the case of O'Higgins and Colchagua Provinces illustrates the important differences in land use and productivity between land in reformed units and unreformed land. These differences are not accounted for by the irrigation factor, and the land reform is the only other variable studied which shows such a strong relationship to efficiency of land use and productivity. Thus, there appears to be a demonstrable relationship, in the Chilean case, between the type of agrarian reform carried out in the late 1960s and early 1970s and increases in productivity. Were the agrarian reform process to be successfully reintroduced by a new government in Chile, this would probably have a major positive impact upon Chile's capacity for meeting her own needs for food production in the near future.
GLOSSARY OF SPANISH WORDS

asentamiento: a type of reformed collective landholding, introduced in Chile in the 1960s and used into the early 1970s

asentado: a member of an asentamiento

campesino: peasant

conquistadores: Spanish conquerors of the Americas in the 1500s

corridas de cercos: fence-runnings, or partial takeovers (illegal) of large landholdings

chacra: truck farm or vegetable enterprise

ejido: commons or public land; used in Mexico to describe reformed landholdings with some degree of collective ownership

encomienda: grant from the Spanish Crown which entitled the holder to tribute and labour from a specific group of Indians

hacendado: large landowner, gentleman farmer

hacienda: large farm or landed estate, usually characterized by low technological development and use of resident labour

incuillaje: a system of farming with tenants and resident labour

incuillino: resident farm labourer

latifundio: large landholding; in Chile, over 80 standard irrigated hectares

Latifundistas: owners of latifundios

matrural: dry brushland

mercedes: grants of land by the Spanish Crown

mestizo: person of mixed European and Indian ancestry

minifundio: small, sub-family landholding

minifundista: owner of a minifundio

MIRista: member of a Chilean organization, the MIR, Movement of the Revolutionary Left
patron: landlord or boss
reduceciones: Indian reservations
sin cultivo: not cultivated
sin uso: not usable for agriculture
toma: illegal seizure of land
GLOSSARY OF ACRONYMS

CERA: Centro de Reforma Agraria: new collective-reform units introduced by the government in 1971

CIUDA: Inter-American Committee for Agricultural Development

CORA: Corporación de la Reforma Agraria: State Agrarian Reform Corporation

CORFO: Corporación de Fomento de la Producción: State Development Corporation

FRAP: Frente de Acción Popular: Popular Action Front

ICIRA: Instituto de Capacitación e Investigación en Reforma Agraria: State Agrarian Research and Planning Organization

INDAP: Instituto de Desarrollo Agropecuario: State Agricultural Development Institute

TREN: Instituto de Investigación de Recursos Naturales: Natural Resources Institute
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